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Article *in* International Journal of Operations & Production Management · June 2011

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Received 19 August 2009
Revised 9 February 2010,
23 April 2010
Accepted 26 April 2010

The relationship between multidimensional organizational culture and performance

Daniel I. Prajogo
Department of Management, Monash University, Melbourne, Australia, and
Christopher M. McDermott
Lally School of Management and Technology, Rensselaer Polytechnic Institute, Troy, New York, USA

Abstract

Purpose – This paper aims to examine the relationship between the four cultural dimensions of the competing values framework (CVF) (group, developmental, hierarchical, and rational cultures) and four types of performance: product quality, process quality, product innovation, and process innovation. Theoretically, this represents the contrasts among the four quadrants of CVF in terms of their respective outcomes, with quality and innovation reflecting the contrast between control and flexibility orientations, and product and process reflecting the contrast between external and internal orientations.

Design/methodology/approach – Data were collected from 194 middle and senior managers of Australian firms who had knowledge of past and present organizational practices relating to quality and innovation-related aspects in the organization.

Findings – Developmental culture was found to be the strongest predictor among the four cultural dimensions, as it shows relationships with three of the performance measures: product quality, product innovation, and process innovation. Rational culture shows a relationship with product quality, and along with group and hierarchical cultures, it also plays a role in predicting process quality.

Practical implications – The results provide key insights for managers to appropriately understand the fit between the culture and the strategic direction of the firm. The findings also encourage firms to appreciate the balanced view on what seems to be multiple cultural characteristics within the same organization.

Originality/value – By simultaneously examining the relationships between different cultural dimensions and different types of performance, this paper extends the previous empirical studies which linked CVF with a specific measure of performance.

Keywords Organizational culture, Competing values framework, Quality, Innovation, Australia

Paper type Research paper

1. Introduction

The relationship between organizational culture and organizational performance has been an important topic discussed in the literature. A number of studies have been devoted to examine the role of culture as organizational resource or asset which affects performance. One of the earliest studies in this area was conducted by Peters and Waterman (1982) who reported a significant link between a particular type of strong culture and superior financial performance. A later study by Kotter and Heskett (1992) echoed the importance of culture in determining superior financial performance. However, Kotter and Heskett also found that the content (type) of culture – labeled as adaptive culture – is important in affecting superior performance in addition

International Journal of Operations & Production Management
Vol. 31 No. 7, 2011
pp. 712-735

0144-3577
DOI 10.1108/01443571111144823

to thestrength of culture. A recent study was carried out by Sorensen (2002) using Kotter and Heskett's sampling framework. The findings suggested that firms with a cohesive and unified culture excel in their financial performance although this is contingent on a relatively stable environment.

The current paper examines the relationship between organizational culture and organizational performance at the operational level. Operational performance is a main antecedent of financial performance, and organizations often have more control over this than financial performance which is often affected by external factors such as macroeconomic conditions. This study focuses on the multidimensional relationships between organizational culture and operational performance. Firms are now required to achieve a high level of performance across various dimensions of competitive performance (including both quality and innovation) and, the argument is made that only those who can achieve high performance across multiple dimensions will prosper (Noble, 1995; Flynn *et al.*, 1999; Flynn and Flynn, 2004). As such, it is important for firms to know what cultural elements/characteristics are most closely associated with performance excellence in different dimensions. The performance measures selected for this study were quality and innovation, based on their recognition over the past two decades as major components of competitive performance (Forker *et al.*, 1996; Kroll *et al.*, 1999; Koufteros *et al.*, 2002; Cho and Pucik, 2005). The conceptual argument has been made that these two types of performance require different types of organizational culture (Prajogo and Sohal, 2001). However, there is increasing evidence, both empirical and anecdotal, that suggests that these two performance dimensions are not mutually exclusive but can be complimentary (Bossink, 2002; Koufteros *et al.*, 2002; Cho and Pucik, 2005), and as such might benefit from characteristics of different cultures simultaneously. None of the studies in these areas (Deshpande *et al.*, 1993; McDermott and Stock, 1999; Stock *et al.*, 2007), however, have tested the underlying cultures which support the multiple elements of quality and innovation performance simultaneously.

This paper attempts to fill the above gap by investigating the relationships between different cultural and performance dimensions. The competing values framework (CVF) is used to represent the multidimensionality of organizational culture, and its relationship with quality and innovation performance is tested. As suggested by Denison and Mishra (1995) this type of analysis is important in that it considers the specific relationships between different cultural dimensions and different types of performance. If such relationships exist, it is important for firms to understand these relationships because it might enable (or limit) their ability to achieve their strategic goals.

2. Theoretical background and hypotheses

2.1 Organizational culture and performance

The introduction of the concept of organizational culture has generally been attributed to several individuals, including Hofstede (1980) and Schein (1985). Although organizational culture has been defined in various ways, the definitions share a common view that "culture consists of some combination of artifacts (also called practices, expressive symbols, or forms), values and beliefs, and underlying assumptions that organizational members share about appropriate behavior" (Detert *et al.*, 2000, p. 851). Culture, therefore, is an explanatory variable that distinguishes one organization from another (Sathe, 1985). Literature on organizational culture commonly focuses on two major aspects of culture: content, which signifies the types of values and behaviors held by members of a firm,

and strength or the depth and breadth of those behaviors embedded among the members. As noted above, both strength and content of culture are important for achieving a high level of performance (Kotter and Heskett, 1992; Sorensen, 2002).

Organizations have different strategic directions in terms of competitive performance (Porter, 1985) and, therefore managers need to understand the fit between a specific culture (i.e. content) and certain types of performance. Whether an organization is striving to achieve leadership through innovation (product or process), quality (product or process), or perhaps both, managers stand to benefit by understanding the cultural elements that tend to be most strongly associated with high performance in their chosen area(s) of emphasis. The theoretical underpinning of the relationship between culture and quality performance and between culture and innovation performance is outlined below.

The role of organizational culture in determining quality performance has been emphasized in the literature (Dale and Cooper, 1992; Oakland, 1995; Thomas, 1995; Wilkinson *et al.*, 1998; Stock *et al.*, 2007). Quality performance has been defined in a variety of ways, often resulting in inconsistencies (Reeves and Bednar, 1994). As such, it is important to clarify how quality is conceptualized in this study. Drawing from the key quality management literature (Crosby, 1979; Deming, 1982; Feigenbaum, 1991), quality performance, here, is defined as "conformance to the specified characteristics of products which meet the needs and expectations of customers". As time passed, culture began to receive more attention in quality management (Adebanjo and Kehoe, 1999; Maull *et al.*, 2001). This shift of emphasis was driven by the fact that many TQM implementations have produced mixed results (Samson and Terziovski, 1999). In this regard, scholars have attributed the failures of TQM to ignorance of the "soft" (i.e. cultural) factors (Kekale and Kekale, 1995; Crofton and Dale, 1996).

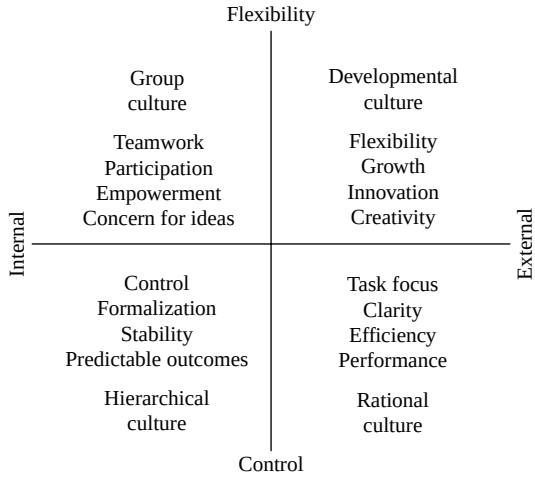
Similarly, the link between culture and innovation has also been well documented in the literature (Kanter, 1983; Brannen, 1991; Ahmed, 1998; Conceição *et al.*, 2002; McLean, 2005). In this study, innovation has been defined as "something that is new or improved and done by the enterprise to create significantly added value either directly for the company or indirectly for its customers" (Carnegie *et al.*, 1993, p. 3). This definition is conceptually similar to other definitions of innovation in the literature (Rogers, 1983; Damanpour, 1991). At the firm level, organizational (corporate) culture has been shown to be a key determinant of innovation success (van der Panne *et al.*, 2003; Khazanchi *et al.*, 2006; Laforet, 2008; Tellis *et al.*, 2009). While clearly a wide variety of other variables (e.g. size and structure Damanpour (1991)) are also determinants of innovation success, the literature on organizational culture shows convergence in defining types of culture that support innovation. The present study expands upon this general understanding of innovative cultures by specifically exploring different types of innovation (product and process) within an established framework of culture types.

2.2 CVF and its relationship with quality and innovation

This paper uses the CVF, which was developed by Quinn and Spreitzer (1991). The CVF captures four contrasting cultural dimensions. These dimensions are represented by two axes with each representing a superordinate continuum. The first dimension is the flexibility – control axis that describes two contrasting orientations, between that which reflects flexibility (i.e. spontaneity and development) and that which reflects control (i.e. stability and continuity). The second dimension is the internal – external axis that also describes two orientations with one being oriented towards maintenance and

improvement of the existing organization and the other being focused on adaptation and interaction with the external environment. The combination of the two dimensions results in an archetype of cultural characteristics in each of the four quadrants, namely group, developmental, hierarchical, and rational, as shown in Figure 1. Quinn and Spreitzer (1991) affirmed that while these archetypes represent stylized or ideal states, in reality it is common for individual organizations to exhibit characteristics of each of the dimensions independently, allowing, for example, an organization to have both high internal and external orientations simultaneously.

The juxtaposition of the different cultural dimensions based on control versus flexibility and external versus internal orientation has been considered in the organizational research literature, particularly their role as a driver of organizational performance (Detert *et al.*, 2000). The contrasting values captured under CVF provide a strong reason for choosing this model of organizational culture over the others, such as Hofstede's (1980) model or organizational culture profile developed by O'Reilly (1991). In this study, the dimensions of flexibility and control are important for testing whether underlying cultures are required for the pursuit of different strategic goals in terms of quality or innovation. This issue has raised a theoretical debate whereby the management of quality and innovation were considered as antithetical to each other, as summarized by Prajogo and Sohal (2001). For example, the contrasting management values between control and learning – suggested by Sitkin *et al.* (1994) – provide theoretical support for the antithetical nature of quality and innovation. TQC which promotes stability, regulatory standards, and routine processes is suitable for achieving quality by conformance. On the other hand, learning, which is associated with openness, novelty, and risk taking is effective for pursuing innovation. Much of the focus of quality management is associated with conformity and standardization while innovation requires freedom and flexibility to release creativity and ideas. Quality is also associated with exploiting the known or prescribed needs of customers, thus, it requires firms to precisely follow the specifications set by customers. Innovation, on the other hand, is concerned with exploring the unserved needs of customers, therefore, encouraging



Source: Adapted from Quinn and Spreitzer (1991)

Figure 1.
The CVF of organizational culture

firms to be flexible in probing the unknown aspects of customer needs and expectations (Benner and Tushman, 2003).

While control and flexibility may reflect the contrast between quality and innovation, the internal and external orientations of the CVF may reflect the distinction between product and process focus. Product here is defined as a physical good to customers (who are external), while process is defined as production operations which produce the products and which typically occur in the absence of the customer in a manufacturing environment. An external customer is typically interested in the product offering itself, not the internal processes the organization uses to make the product available. As such, since the product is designed and produced to serve customer needs, it has to carry an external orientation, commonly termed as market orientation or customer focus (Kohli and Jaworski, 1990; Lengnick-Hall, 1996). Processes, on the other hand, occur inside the organization, often without contact with the customer and hence, more internally oriented (Abernathy and Utterback, 1988). The distinction between product and process has been a particularly important issue in the literature on innovation (Tushman and Nadler, 1986; Cooper, 1998). The importance of distinguishing product innovation from process innovation is mainly because each requires different organizational skills (Damanpour and Gopalakrishnan, 2001). These different skills can be rooted from the contrasting underlying cultural orientations, namely external and internal. In other words, one might expect a product focus to be associated with an externally oriented culture, while a process focus would align with the elements of an internal orientation.

2.3 Research hypotheses

In summary, the above discussion highlights the contrasting types of organizational culture based on two dimensions: between control and flexibility orientations which reflect the contrast between quality and innovation, and between external and internal orientations which reflect the distinction between product and process. Based on these arguments, the following hypotheses were posed with regard to the relationships between four different types of culture under CVF and four different types of performance, product quality, quality processes, product innovation, and process innovation. While potentially there could be 16 (4×4) relationships, we only hypothesized those which had theoretical underpinning to serve confirmatory purpose of this study.

The literature affirms that such values as change, creativity, and growth are the typical characteristics of innovative firms (Amabile *et al.*, 1996). Because of the nature of innovation, flexibility is the key ingredient of innovation where formal rules or procedures must be kept at a minimum level in order to allow creativity to flourish. In addition, an external orientation is central to excelling at developing products the customer wants (Goffin and New, 2001). The whole notion of traditional new product development based on market orientation explicitly hinges on a solid understanding of the customer's unmet needs (Zhou *et al.*, 2005; Laforet, 2008). Taken together, firms aiming to excel at product innovation would then want a culture that is characterized by both flexibility and an external orientation and product innovation fits best with the characteristics of developmental culture under the CVF:

H1. Developmental culture which is oriented towards flexibility and external customers is positively related to product innovation.

Process innovation is focused on adopting innovation to improve internal processes in terms of efficiency and productivity. One form of process innovation is continuous improvement, which promotes such behavior as employee empowerment, participative management, teamwork, and employee involvement in providing suggestions and ideas on improvement (Imai, 1986; Lawler, 1994; Spreitzer *et al.*, 1997). These typical values fit closely to the characteristics of group culture under CVF. Studies on advanced manufacturing technology adoption have also shown the importance of similar cultural dimensions (including empowerment, trust, and commitment) and in determining the implementation process and the outcomes of the new technology (Zammuto and O'Connor, 1992; Cleland *et al.*, 1995; Lewis and Boyer, 2002). Because processes innovation appears to require both flexibility (for innovation) and an internal focus (to target internal processes), it best fits with the characteristics of group culture under the CVF. As such:

H2. Group culture which is oriented towards flexibility and internal activities is positively related to process innovation.

The third quadrant in the CVF is the hierarchical culture, which is defined by an internal focus and a control orientation. Similar to the above arguments, a focus on process quality would mean attention to internal activities (for the processes) and a control-oriented culture (where emphasis could be placed on TQM and the like) would seem more closely aligned with this goal. This study by Germain and Spears (1999) showed that such quality management processes and tools as statistical process control (SPC) and process documentation were significantly associated by control approaches which are reflected in mechanistic and formal systems. As such:

H3. Hierarchical culture which is oriented towards control and internal activities is positively related to process quality.

As mentioned above, product quality has been defined as "conformance to the specified characteristics of products which meet the needs and expectations of customers." This definition captures two major aspects of quality which have been defined in various ways in the literature: quality as conformance and quality as customer orientation (Reeves and Bednar, 1994). These two elements of product quality have strong implications in the context of our study. The clear focus and direction on product quality characteristics derived from customer needs and expectations requires external orientation by keeping contact with customers. In addition, the use such of mechanistic tools as quality function deployment to build the link between customer voice and product characteristics (in terms of specifications) is an example of how control is exercised in developing product quality. Such control and external (i.e. customer focused) orientations suggest that product quality fits with the characteristics of rational culture under CVF. As such:

H4. Rational culture which is oriented towards control and external activities is positively related to product quality.

Utilizing the CVF allows for the analysis of other linkages that one might expect to stem from the more "direct" associations outlined in the first four hypotheses (above). The first of these linkages we explore has to do with the development of quality processes. While *H2* explores the extent to which process innovation is associated with group culture, these same characteristics of the group culture are also linked

conceptually with the ideas surrounding quality processes. Many of the key tenets of a process approach to quality would be aided by the teamwork, participation and empowerment focus of this internally oriented, flexible culture. As such:

H5. Group culture which is oriented towards flexibility and internal activities is positively related to process quality.

Similarly, while *H1* suggests that the externally oriented, flexible nature of the developmental culture would be associated with product innovation, the same factors that drive product innovation (external focus and flexibility) might also encourage a focus on the importance of product quality for the customer. As suggested by Naveh and Erez (2004), product quality will be enhanced by the combination of two organizational values: attention to detail (precision and accuracy) and innovation. In this study, attention to detail – which is similar to quality by conformance in our study – is reflected in rational culture (*H4*), and innovation is reflected in developmental culture. Moreover, the external focus of these firms could be seen to encourage customer-driven improvements to product quality. As such:

H6. Developmental culture which is oriented towards flexibility and external activities is positively related to product quality.

The next linkage we explore again stems from the characteristics of one of the culture types within the CVF. *H4* suggests that the external and control orientation of the rational culture will lead to linkages for product quality. As a corollary to this suggestion, one might expect that the elements that define this rational culture (task focus, clarity, efficiency, and outcome excellence) would naturally create logical links between a focus on product quality and those quality process activities that one would rationally see as means to the stated goal. The task-focused nature of rational culture would necessarily create linkages between quality products (an externally oriented goal) and quality processes (an internally focused means toward that goal). As such:

H7. Rational culture which is oriented towards control and external activities is positively related to process quality.

A similar logic underpinning *H7* is also applied for the case of innovation. *H1* suggests that the developmental culture will relate to product innovation. First, the development of new products may in turn require changes in the process, and therefore, developmental culture which drives product innovation will play a similar role in process innovation. Second, adoption of new technologies as process innovation normally occurs in organizations which keep abreast with the emerging issues in the industry and market, again meaning that they are characterized by developmental culture. As such:

H8. Developmental culture which is oriented toward flexibility and external activities is positively related to process innovation.

3. Research method

3.1 Research framework and design

The CVF model has been applied in previous studies examining both quality and innovation. Deshpande *et al.* (1993), McDermott and Stock (1999) and Škerlavaj *et al.* (2007) used the CVF scales for their studies related to innovation, while Al-Khalifa

and Aspinwall (2001), Chang and Wiebe (1996), Dellana and Hauser (1999), and Stock *et al.* (2007) used this framework in their studies in the quality management area. This present application of the framework therefore aims to advance these works by linking the two areas – quality and innovation – into one research framework using a common antecedent: the four CVF cultural dimensions. This study used structural equation modeling (SEM) to examine the relationships between the four CVF's cultural characteristics and two different types of performance in terms of quality and innovation. The use of SEM allows us to test the relationships between the four types of culture (group, developmental, hierarchical, and rational) and their respective dimensions of competitive performance (quality and innovation) simultaneously.

3.2 Sample and procedures

Data were obtained through a mail survey of 1,000 managers of Australian firms in late 2001. Most of these managers held middle to senior positions and had knowledge of past and present organizational practices relating to quality and innovation-related aspects in the organization. The sample encompassed various industry sectors, including manufacturing and non-manufacturing. The focus of this study was limited to one site per organization. After removing 150 questionnaires that were returned to sender, a total of 194 managers responded, accounting for 22 percent response rate. Since this study used in total 30 items, the ratio between the number of items and the number of participants is above the minimum 1:5 ratio.

To test for non-response bias, we compared the responses of early and late waves of returned surveys based on the assumption that the opinions of late respondents are representative of the opinions of non-respondents (Armstrong and Overton, 1977). Student's *t*-tests yielded no statistically significant differences between early-wave and late-wave groups, suggesting that non-response bias was not a problem. In addition, through follow-up e-mails and follow-up phone calls, it was identified that 30 firms that declined to participate in the survey commonly stated their reasons as lack of time, lack of resources, and not interested. None of these reasons alluded to the possibility that there were systematic reasons for not participating in the study.

The proportion of the respondents was nearly equal between manufacturing and non-manufacturing sectors (52 and 48 percent, respectively). The manufacturing sectors included metal, steel, electrical, machinery, textile, plastic, chemical, and food manufacturing, and the non-manufacturing sectors included construction, consulting, health care, information technology, and retail/distribution. In terms of organizational size (based on the number of employees), 90 percent of the respondents represent firms with 500 employees or less, with around 60 percent of them representing small-to-medium-sized firms with less than 100 employees. More than half of the respondents (58 percent) were either quality managers or production/operations managers, followed by senior managers (general manager or managing director), which accounted for 35 percent. The remainder held various managerial positions in finance, marketing, human resources, and administration.

3.3 Measures

This section describes the measures used in this study, and the complete information on the survey items are provided in the Appendix.

3.3.1 Competing values framework. The instrument designed by Quinn and Spreitzer (1991) measures each of the four quadrants in the CVF model, as discussed above. Each of these ideal types is measured by four items shown in Figure 1. The authors used a five-point Likert scale for the 16 items which indicate the extent to which the attribute characterizes the respondent's organization instead of adopting an ipsative method, as used by Deshpande *et al.* (1993) or Dellana and Hauser (1999). From a methodological point of view, Quinn and Spreitzer (1991) suggest that the ipsative method is not suitable for correlation-based statistical analyses, such as factor analysis and regression, which were used for the purpose of this study. Moreover, the Likert-scale instrument which they developed for assessing organizational culture met the criteria of validity and reliability (Quinn and Spreitzer, 1991; McDermott and Stock, 1999; Gregory *et al.*, 2009). From a conceptual point of view, this approach suggests that the combination of these four types of culture would be expected to be found in an organization – although some types may be more dominant than the others – rather than an organization reflecting only one culture. More specifically, Quinn (1988) strongly argued that the term "competing values" reflects the reality of the paradoxes that organizations want to achieve, that is to be adaptable and flexible, but also stable and controlled. Therefore, the CVF model does not suggest that the seemingly opposite cultural dimensions cannot mutually exist in an organization.

3.3.2 Product and process quality. In operationalizing the measure of product and process quality performance, we sought one that has been used in past studies on quality management rather than "re-inventing the wheel". Furthermore, because this study maintains that quality performance contains multifaceted aspects, we only focused on the studies that employed multi-faceted constructs in defining quality performance, most notably those by Ahire *et al.* (1996), Grandzol and Gershon (1998), and Samson and Terziovski (1999). For product quality, the three-item scale used by Ahire *et al.* (1996) was selected for several reasons. First, its content is a subset of the items in Garvin's (1984) dimensions of quality, namely: reliability, performance, and conformance to specification. The Garvin's dimension would establish content validity of the scale. Second, the scale by Ahire *et al.* shows strong validity and reliability, much superior to those used by Samson and Terziovski (1999) or Grandzol and Gershon (1998). Third, whilst the scale was originally developed in the manufacturing context, we can see its relevance to the service context as well. For example, the measure of product performance can be applied for both physical goods and services. Similarly, reliability has been well understood as part of one of the key dimensions of service quality (Zeithaml *et al.*, 1990). Conformance to specification is also widely used as a measure in service context (Collier, 1994; Harvey, 1998; Brah and Chong, 2004).

Our items for process quality focus on the tools organizations use in pursuit of a high level of quality in terms of degree of conformance to specification. Underlying process quality is the cybernetic approach which promotes conformance and minimizes variation using a feedback loop (Sitkin *et al.*, 1994). We drew upon several studies (Flynn *et al.*, 1994; Anderson *et al.*, 1995; Ahire and Dreyfus, 2000; Cua *et al.*, 2001) in selecting the items for this scale. The three items measuring process quality are standardised working procedures, the use of SPC, and review of performance as feedback control.

3.3.3 Product and process innovation. Innovation performance in organizations has been measured in various ways. For the purpose of comprehensively capturing the aspects of innovation performance, this study developed a scale for measuring

innovation on the basis of several criteria that have been conceptualized and used in the previous empirical studies of innovation. These include Cohn (1980), Miller and Friesen (1982), Deshpande *et al.* (1993), Avlonitis *et al.* (1994), Subramanian and Nilakanta (1996), and Hollenstein (1996). For product innovation, these criteria include the level of newness (or novelty), the use of latest technologies, the number of early market entrants and the number of new products introduced. For process innovation, the items include the speed of new technology adoption, technological competitiveness of the firm, the novelty of process technology, and the rate of technological change in the firm.

With regard to the measurement approach, perceptual data were used in which respondents evaluated the company's innovation performance against their major competitor in the industry. This approach is important in minimizing industry effects as suggested by Kraft (1990).

4. Results

4.1 Scale validity and reliability

We used two steps of analysis suggested by Anderson and Gerbing (1988): measurement test and structural relationships test. Confirmatory factor analysis (CFA) was employed to test the constructs validity. A total of two CFAs were run separately for the four cultural dimensions of CVF as the independent variables and the four performance measures as the dependent variables. The results presented in Tables I and II show that the items loaded significantly on their respective constructs. The item loadings and the overall model fit (indicated by RMSEA, NFI, NNFI, and CFI) strongly demonstrate acceptable unidimensionality and convergent validity for the measures (Bollen, 1989; Bagozzi *et al.*, 1991; Hoskisson *et al.*, 1993). Cronbach's α suggest satisfactory reliability of the ten constructs (Nunnally, 1978). One item was deleted from the hierarchical scale (i.e. control and centralization) due to a very poor loading path and reliability score; a similar case that was also found in the study by McDermott and Stock (1999). The final 29 items used in this study are presented in Tables I and II.

Scales	Items	Loading paths	Cronbach's α
Group	Participation, open discussion	0.83	0.91
	Empowerment of employees to act	0.81	
	Assessing employee concerns and ideas	0.85	
	Human relations, teamwork, cohesion	0.87	
Developmental	Flexibility, decentralization	0.68	0.79
	Expansion, growth, and development	0.56	
	Innovation and change	0.72	
	Creative problem solving processes	0.76	
Hierarchical	Routinisation, formalisation and structure	0.67	0.82
	Stability, continuity, order	0.87	
	Predictable performance outcomes	0.75	
Rational	Task focus	0.82	0.87
	Direction	0.84	
	Efficiency	0.73	
	Outcome excellence	0.71	

Notes: $\chi^2 = 130.11$; df = 82; RMSEA = 0.05; NFI = 0.97; NNFI = 0.98; CFI = 0.98

Table I.
Scale validity and reliability for CVF culture

Scales	Items	Loading paths	Cronbach's α
Product quality	The performance of our products	0.80	0.88
	Conformance to specifications of our products	0.84	
	Reliability of our products	0.79	
Process quality	"Fool-proof" (preventive-oriented) processes	0.67	0.75
	Standardized and documented instructions	0.73	
	Use of statistical techniques (e.g. SPC)	0.69	
Product innovation	The level of newness (novelty)	0.81	0.87
	The speed of our new product development	0.75	
	The number of new products introduced	0.73	
	The number of "early market entrants"	0.73	
Process innovation	The technological competitiveness	0.81	0.89
	The speed of the new technological adoption	0.83	
	The updatedness or novelty of the technology	0.82	
	The rate of technological change	0.83	

Notes: $\chi^2 = 126.99$; df = 71; RMSEA = 0.06; NFI = 0.95; NNFI = 0.97; CFI = 0.98

Table II.
Scale validity and reliability for performance

A test of discriminant validity was performed to examine if each measure only represents one construct; in other words, every construct should be distinct from each other. The method used by Ahire *et al.* (1996) was followed by pairing each of the constructs and subjecting them to CFA. The first model allowed the correlation between the two constructs to be estimated (unconstrained), while in the second model the correlation between the two constructs was set to one (constrained). Each model resulted in its χ^2 value, and between the two models there is a difference of degree of freedom of 1. The statistical significance of this χ^2 difference was then tested at $p < 0.01$. From the statistics table, we found that the χ^2 difference surpassed 6.64 to be verified as significant at $p < 0.01$. With eight scales (four cultural dimensions and four performance measures) included in this study, 28 discriminant tests were run, and all tests passed the criterion for discriminant validity.

4.2 Common method variance

Since the data set was drawn from a single respondent in the organization, common method variance needs to be checked to ensure that the data had no major problem with response bias. The test for checking common method variance used in this study was Harmann's single-factor test suggested by Podsakoff and Organ (1986). This test was run by loading all 29 remaining items into a principal component analysis and forced the 29 items into one factor. This method produced poor result as indicated by only 26 percent variance extracted and many items suffered from poor factor loadings which fell below 0.5.

4.3 Composite scores

Once the scale validity and reliability was completed, factor scores were calculated from the remaining items to generate the composite scores for the eight constructs (Hair *et al.*, 1998). These composite scores were then used in the next stage of the analysis. Prior to this analysis, the normality of the eight factor scores was checked and the result indicated no violation, with skewness and kurtosis values well within the accepted range (± 1 and < 7, respectively) recommended by Curran *et al.* (1996).

4.4 Preliminary correlation analysis

As a preliminary step in the analysis, bivariate (Pearson-*r*) correlations were calculated among the eight composite variables (factor scores). The results of this analysis are presented in Table III. As shown, the correlation coefficients among the four cultural variables were at medium level (between 0.3 and 0.6).

These findings support the coexistence of different types of cultures within an organisation, even among those located in orthogonal positions (i.e. between developmental and hierarchical and between group and rational). These correlations, however, did not reach a magnitude which would create a problem of multicollinearity among the independent variables that may confound the results of path analysis (Tabachnick and Fidell, 2007).

4.5 Structural equation modeling

The eight hypotheses posed in this study were tested simultaneously using SEM. The four CVF dimensions (group, developmental, hierarchical, and rational) were considered as the independent variables and the four performance measures (product quality, process quality, product innovation, and process innovation) were considered as dependent variables. A total of two control variables were included in the equation, namely industry sector (manufacturing versus non-manufacturing) and organization size (in terms of number of employees). Although it is not part of the core of this study, we estimated the correlations among the four performance measures since they could be correlated with each other over and above the variance explained by the hypothesized cultural dimensions. The full result of SEM is presented in Table IV and the path diagram is shown in Figure 2.

Overall, the model shows a good fit. The RMSEA is well below 0.08, and the other fitness indices (NFI, NNFI, and CFI) are well above 0.90. The path coefficients (γ) are presented in the table along with their statistical significance level. The eight hypothesized paths are significant at $p < 0.05$ or better, thus supporting the posited hypotheses. For a confirmatory purpose, we also ran a competing model which tested all 16 paths between the four independent variables and the four dependent variables. The results (based on the χ^2 – degree of freedom ratio, and the fit indices) indicated that the competing model was inferior to the tested model; thus, establishing the validity of the tested model.

As mentioned above, we also estimated the error correlations among the dependent variables, and three of them (i.e. product quality – process quality, product innovation – process innovation, and product quality – process innovation) were found

	Mean	SD	1	2	3	4	5	6	7
1. Group	3.67	0.82	1.00						
2. Developmental	3.63	0.69	0.69**	1.00					
3. Hierarchical	3.45	0.78	0.40**	0.37**	1.00				
4. Rational	3.79	0.71	0.64**	0.64**	0.52**	1.00			
5. Product quality	4.19	0.55	0.39**	0.49**	0.26**	0.43**	1.00		
6. Process quality	3.24	0.86	0.60**	0.50**	0.45**	0.58**	0.42**	1.00	
7. Product innovation	3.41	0.72	0.29**	0.41**	0.09	0.29**	0.33**	0.31**	1.00
8. Process innovation	3.53	0.67	0.42**	0.43**	0.12	0.35**	0.56**	0.32**	0.56**

Note: Significance at: $^{*}p < 0.05$, $^{**}p < 0.01$

Table III.
Pearson correlations among the variables

Table IV.
Results of structural equation modelling

	Dependent variables			
	Product quality	Process quality	Product innovation	Process innovation
Control variables				
Industry sector	0.24	0.27**	−0.05	0.09
Organisational size	−0.01	0.19	0.27	0.07
Independent variables				
Group	–	0.42**	–	0.20**
Developmental	0.36**	–	0.44**	0.31**
Hierarchical	–	0.17*	–	–
Rational	0.19**	0.25**	–	–

Note: Significance at: $^{*}p < 0.05$, $^{**}p < 0.01$

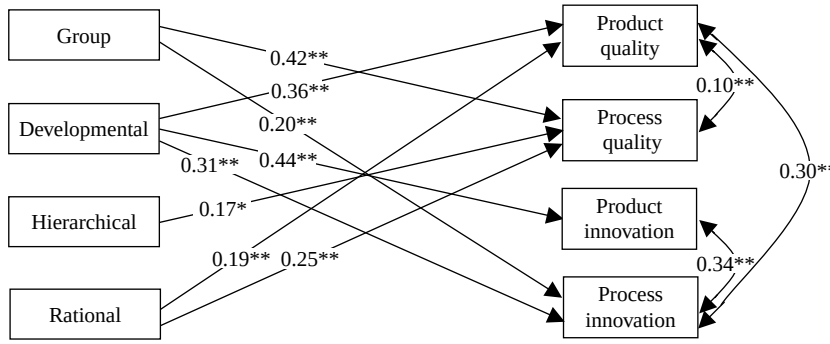


Figure 2.
Path diagram

Notes: Paths are significance at: $^{*}p < 0.05$, $^{**}p < 0.01$; $\chi^2 = 17.57$, df = 11, RMSEA = 0.08, NFI = 0.98, NNFI = 0.97, CFI = 0.99

to be statistically significant (Figure 2). These indicated an exclusive relationship between the two correlated variables over and above what is contributed by the independent variables (Bagozzi, 1980). Although they are not the core of this study (thus not hypothesized), these three error correlations support the theoretical arguments invoked in this study. The correlations between product and process in both quality and innovation areas suggest that decision on products will impact on processes (Kraft, 1990; Reed *et al.*, 1996). The correlation between product quality and process innovation reinforces the importance of continuous improvement (as one form of innovation) of processes in enhancing quality of products (Imai, 1986).

5. Discussion, conclusion, and limitations

The findings demonstrate the distinction among product quality, process quality, product innovation, and process innovation with respect to the contrasting underlying cultures associated with them. Taken as a whole, the findings underscore the importance of understanding the role organizational culture plays as a resource in pursuing different competitive performance priorities (Detert *et al.*, 2000). From a managerial perspective, these findings help firms identify the specific cultural dimensions they need to develop to support their competitive goals, or alternatively, how they might choose to position their organization to compete given their particular cultural characteristics.

The supported hypotheses relating to developmental culture provide insight into the value of the powerful combination of a flexible and externally oriented culture. Because customer needs and expectations keep changing, creating evolving criteria relating to their needs and wants, flexibility is required when dealing with these changes. Because a developmental culture provides not only the external awareness to recognize customer needs, but also the ability to be flexible in their organizational response, it is consistently positively associated with our performance metrics. The positive relationship between developmental culture and both product quality and product innovation (*H1* and *H6*) are consistent with the above view. The results also lend support to the synergistic or cumulative view between quality and innovation rather than the antithetic position between the two, in that a developmental culture is associated with higher performance across both dimensions simultaneously. An external orientation provides market focus, while flexibility enables the organization to change to work toward those goals. The path between developmental culture and process innovation (*H8*) can be understood in the light of the product-process interaction in innovation. As Tornatzky and Fleisher (1990) suggested, it may be that the external orientation drives innovation throughout the organization, including the adoption of new equipment/processes that are brought to light through external scanning and awareness.

The positive effect of both developmental culture and rational culture on product quality (*H4* and *H6*) further reinforces the combination of flexibility and control suggested by Sitkin *et al.* (1994). From a conceptual point of view, this combination reflects the importance of a balanced understanding of quality as performance and quality as conformance (Flynn *et al.*, 1997; Meirovich, 2006). Quality as performance is determined by the way the product is designed according to customers' needs and expectations. Given that customers' expectations will keep changing, it is important to have flexibility and open ideas on the characteristics of the product. Quality as conformance is determined by the degree a product conforms to its designed specification which requires a high degree of control. While the achievement of high conformance to specification is always important (as strongly emphasized during the TQM era), high performance in quality is primarily determined by how well the products' characteristics (i.e. design) meet customer expectations which will keep changing over time. This notion is consistent with Kano (1984) and other literature that has discussed the dangers of confining quality as conformance rather than dynamic (Wind and Mahajan, 1997; Slater and Narver, 1998).

Look closely to the control-oriented quadrants, rational culture also shows a positive relationship with process quality (*H7*). This is because quality is often defined in terms of conformance, and such conformance requires a standardized and stable process to ensure consistency of its outputs. Our result concurs with the study by Naveh and Erez (2004) which showed that quality improvement programs were associated with cultures oriented toward "attention to details" attitudes. In our study, this attitude would be best represented by the rational culture. The findings concerning rational culture also relate to the pattern found in the innovation quadrants (discussed above), in that developmental culture shows a positive relationship with both product and process innovation, suggesting that culture which supports products will also affects the associated processes. This result is reinforced by the error correlations between product quality and process quality and between product innovation and process innovation as discussed in the previous section (i.e. Results).

Back to the innovation quadrants, group culture found support for the two posited hypotheses. It was found to be associated with both process quality and process innovation (*H2* and *H5*). This finding suggests that having flexible-oriented culture is important in improving the internal aspect of quality and innovation. Such attitudes as teamwork and empowerment have been recognized as playing important role in ensuring the success of process improvement as well as implementation of new process technologies.

Hierarchical culture has a positive association with process quality (*H3*). While the result concurs with the study by Germain and Spears (1999), coupled with the other findings relating to group culture and rational culture, we suggest that process quality should also be directed for improvement which requires flexibility orientation as well as being focused on meeting customer needs which requires external orientation. The SPC tool, for example, while aims to reduce variation in processes, is primarily meant for improving the process performance instead of maintaining its "status quo". Again, this is consistent with our discussion above regarding external orientation as a driver for process improvement.

Overall, three major findings are highlighted from this study. First, this study has demonstrated the uniqueness of each cultural dimension captured in the CVF in terms of its relationship with specific types of performance associated with its specific characteristics. The findings showed the unique fit between cultural dimensions and performance measures. Understanding this fit is important in ensuring that the resource (i.e. organizational culture) we build is congruent with the competitive performance goals we pursue. Our study highlights the importance of acknowledging the link between an organization's goals and its internal cultural orientation. The findings show that some benefits are not associated with certain cultural characteristics.

Second, in conjunction with the first point, the findings in this study have also demonstrated the need for accommodating diverse cultural orientations (external versus internal and flexible versus control) to pursue multidimensional competitive bases. This concurs with the findings in the previous studies (Buenger *et al.*, 1996; Lewis, 1998; Kalliath *et al.*, 1999; McDermott and Stock, 1999; Gregory *et al.*, 2009) which showed that organizations emphasizing the balance between different cultural variables might more effectively obtain competitive benefits. Beyond these observations, however, the findings of our study lend support to the idea of managing paradoxes in organizations (Handy, 1995; Thompson, 1998) and theoretical views on the need for developing contrasting cultures and capabilities, such as control and flexibility (Sitkin *et al.*, 1994), mechanistic and organic (Spencer, 1994), and exploitation and exploration (Benner and Tushman, 2003).

Third, the results have led us to reconsider our view on the demarcations between quality and innovation as a reflection of the contrast between control and flexibility orientations, and the demarcations between product and process as a reflection of the contrast between external and internal orientations. In particular, our findings show that the cultural dimensions which are primarily related to product (i.e. external) orientation also have significant effect on process (internal) orientation. External input should drive internal efforts, or the design of processes is perhaps best derived from the kind of products the external market tells the firm to produce. Similarly, the cultural dimensions which are primarily related to innovation (i.e. flexibility) also show a significant effect on quality (i.e. control). Tight, controlled processes should be put in place on those activities

that a firm's flexible, open orientation has first identified. As such, our findings suggest that quality needs to be defined in a dynamic instead of static way.

The implication of this notion is that while the findings have shown the uniqueness of each cultural dimension in their association with different types of performance (as noted in the first point), the inclination is more towards flexible and external orientations. Specifically, developmental culture is shown to be the strongest predictor of performance. As well as being the only culture significantly related to the three performance measures, developmental culture also shows the strongest effects on these relationships. These results are consistent with and extend the work of Dellana and Hauser (1999) who show that developmental culture is the best predictor for the six Malcolm Baldrige National Quality Award criteria which are considered as the framework for best practice among US high-performing firms. This finding calls for attention for firms on the importance of developmental culture in enhancing organizational performance, without underestimating the other cultural dimensions. This is particularly true when firms set their strategic direction towards differentiation (Porter, 1985) and exploration (Benner and Tushman, 2003) as reflected in quality and innovation performance measures captured in this study. Such strategic directions would require firms to keep themselves vigilant (i.e. flexible) against the changes occurring in the business (i.e. external) environment which fits the characteristics of developmental culture.

From a theoretical point of view, this study shows the use of CVF model to explain the multidimensionality of cultural characteristics which underlie different dimensions of performance in organizations. Therefore, it extends the previous empirical studies which examined the relationship between CVF and a specific dimension of performance (either quality or innovation). For example, Stock *et al.* (2007) related CVF to quality performance in terms of error reduction, while Deshpande *et al.* (1993) and McDermott and Stock (1999) examined the relationship between CVF and product and process innovation. The present study extends these findings by examining the associations of the four CVF cultural dimensions with four types of performance. Theoretically, this represent the contrasts between the four quadrants of CVF, with quality and innovation reflecting the contrast between control and flexibility orientations, and product and process reflecting the contrast between external and internal orientations.

On the practical front, the findings once again highlight the importance of culture as part of organizational resources in their association with performance. In particular, the specific relationships studied provide directions for managers to appropriately understand the fit between the culture and the strategic direction of the firm. As argued earlier, only after understanding the cultural dimensions, can managers tackle the issues of cultural strength (Sorensen, 2002). Furthermore, the findings also encourage firms to appreciate the balanced view on what seems to be multiple cultural characteristics within the same organization. As such, managers must overcome paradoxes existing in their organization (including cultural dimensions) by tailoring their organization's balance to match the situational complexity they face as emphasized by Quinn (1988). While developmental culture appears to be more dominant in affecting performance compared to the other cultural dimensions, it is important not to assume that the findings suggest "one size fits all". The other cultural dimensions also show a significant role in predicting certain aspects of performance; hence, firms need to value them as part of the organizational assets. The practical implications of this issue affect a range of aspects in organizations, including managerial skills and styles as well as organization's design (Shelton *et al.*, 2002).

We acknowledge several limitations on this study. First, the research framework of this study only tested a baseline and linear model of the direct relationship between various dimensions of organizational culture and different aspects of organizational performance. While this framework is sufficient for serving the purpose of this study; that is to demonstrate the unique relationships between different dimensions of culture and performance, we believe that the true relationships are more complex than what have been captured in this study. As such, we propose that future studies can expand our findings by involving two further analyses involving moderation and mediation. For example, research exploring moderation effects could explore the extent to which different cultural dimensions operate in a synergistic way with respect to performance. Further, one might also explore if the link between culture and performance is mediated by other factors, such as organizational practices (Naor *et al.*, 2008) or employee attitude (Gregory *et al.*, 2009).

Second, we suggest that future study can be done with a larger sample size to re-test the results of this study, enhancing the statistical power to generalize the findings. It is also acknowledged here that because the observations made in this study were limited to the organizational level using the perceptions of a single respondent, it could not identify the existence of sub-cultures in different departments, divisions, or functions within organizations, especially large ones. For example, developmental culture is usually positively valued in marketing and R&D functions but negatively regarded by traditional production or manufacturing department looking to improve efficiency through large production volume. This difference, if any, would lead to an argument for identifying homogeneous culture at the functional level and heterogeneous cultures at the organizational level. The use of a single respondent is also sometimes associated with bias. As such, future studies can address this issue using multiple respondents representing different functions of the organization.

Finally, despite the significant effect of culture on performance, organizational culture in its own right is not sufficient to explain the variance of firms' performance comprehensively. There is myriad of other organizational factors which are not captured in this study which have significant effect on performance, including firm' size, technological status, financial leverage (i.e. debt-to-equity), operating leverage (i.e. slack), diversification, and environmental dynamism.

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Appendix

Organizational culture

Please assess the extent to which the following statements characterize the behavior and attitude of people in your organization (1 – strongly disagree, 3 – neutral, 5 – strongly agree):

- Participation, open discussion.
- Empowerment of employees to act.
- Assessing employee concerns and ideas.
- Human relations, teamwork, cohesion.
- Flexibility, decentralization.
- Expansion, growth, and development.
- Innovation and change.
- Creative problem-solving processes.
- Control and centralization * (deleted after confirmatory factor analysis).
- Routinization, formalization and structure.
- Stability, continuity, order.
- Predictable performance outcomes.
- Task focus, accomplishment, goal achievement.
- Direction, objective setting, goal clarity.
- Efficiency, productivity, profitability.
- Outcome excellence, quality.

Organizational performance

Process quality. Please assess to what extent to following statements reflects what your organization has been practicing so far (1 – strongly disagree, 3 – neutral, 5 – strongly agree):

- We design processes in our firm to be "fool-proof" (preventive oriented).
- We have clear, standardized and documented process instructions which are well understood by our employees.
- We make an extensive use of statistical techniques (e.g. SPC) to improve the processes and to reduce variation.

Please assess the relative performance of your organization against the major competitors in your industry with regards to the following: (1 – behind, 3 – comparable, 5 – leader).

Product quality

- The performance of our products is [. . .].
- Reliability of our products is [. . .].
- Durability of our products is [. . .].
- Conformance to specifications of our products is [. . .].

Product innovation

- The level of newness (novelty) of our firm's new products is [. . .].
- The speed of new product development process is [. . .].
- The number of new products our firm has introduced to the market is [. . .].
- The number of our new products that is first to market (early market entrants) is [. . .].

Process innovation

- The technological competitiveness of our company is [. . .].
- The speed with which we adopt the latest technological innovations in our processes is [. . .].
- The updated-ness or novelty of the technology used in our processes is [. . .].
- The rate of change in our processes, techniques and technology is [. . .].

Corresponding author
Daniel I. Prajogo can be contacted at: daniel.prajogo@buseco.monash.edu.au