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Organisational culture and quality management system implementation in Indonesian construction companies

1. Introduction

The study of the organisational culture in the construction industry is still in the stage of debate (Oney-Yazıcı *et al.*, 2007). Despite the complexities involved in measuring the culture of the construction industry (Tijhuis and Fellows, 2012), this culture is regarded as being worthy of research, especially in relation to the organisational culture needed to support quality management systems (Koh and Low, 2008; Watson and Howarth, 2011) and to improve organisational effectiveness, and therefore, organisational performance (Coffey, 2010; Cheung *et al.*, 2011).

A number of recent studies have examined the construction companies' organisational culture within the context of the use of Cameron and Quinn's Competing Value Framework (CVF), as well as the use of their Organizational Culture Assessment Instrument (OCAI) as the conceptual paradigm for the analyses (Thomas *et al.*, 2002; Nummelin, 2006; Oney-Yazıcı *et al.*, 2007; Koh and Low, 2008). However, there has been little research based on the use of Cameron and Quinn's CVF-OCAI tool for identifying types of construction companies' organisational culture and their influences on the implementation of QMS-ISO 9001. Research output and information is also very limited relating to the strength of the companies' organisational culture driving an effective QMS-ISO 9001 implementation, affecting the companies' effectiveness. To rectify these research gaps, the research has been aimed to study organisational culture types (based on CVF) and their influences on the implementation of QMS-ISO 9001:2008 principles and elements, which eventually lead to improved companies' quality performance. In order to fully examine the status of the QMS being implemented, the research has studied the relationships of the barriers of QMS implementation with the implementation of QMS-ISO 9001:2008 principles and elements and with the business performance of the companies, as well as the examination of the relationships of the implementation of QMS-ISO 9001:2008 principles and elements with the companies' business performance. The research output has been the development of fundamental and original studies on the study topics, to provide the knowledge for improvements in Indonesian construction companies' quality performance and quality outcomes.

2. Relationship between organisational culture and quality management system implementation in construction companies

Culture addresses people matters, and thus becomes the crucial factor in effective QMS implementation (Corbett and Rastrick, 2000; Irani *et al.*, 2004; Koh and Low, 2008). This means that, with recognizable adaptable strong organisational culture profiles, a construction company's QMS can be efficiently and effectively implemented and continually improved, to provide a strategic management system that improves a company's performance (Coffey, 2010; Cameron and Quinn, 2011). A number of studies have been undertaken in analysing how a QMS can be successfully implemented and identifying the potential benefits to be gained by a construction company that achieves effective implementation of such a system. Corbet and Rastrick (2000), Irani *et al.* (2004), Coffey (2005), Coffey (2010) agree that there is a definite relationship between organisational culture and quality in construction projects. It has also been noted that the nature of the culture is a major determinant factor for such success, and that this, in turn, is related to the successful implementation of a QMS. Koh and Low (2008) have referred to this relationship as "mutually reinforcing", and by this they mean that if the organisational culture is good, the QMS will be applied appropriately, which leads to good products and services.

Building up the concept of organisational culture within an organisation influences quality management practices and vice versa (Noronha, 2002), it requires that all the organisational practices be in a state of congruence for good quality practices to operate (Koh and Low, 2008). This implies, for example, that if the management applies a new approach that focuses on internalizing quality values (Bright and Cooper, 1993), then the organisational culture creates an organisational climate, which supports quality improvement and/or also grows the quality climate. This, in turn, directs the quality management processes [and implementation] that achieve quality results (Noronha, 2002).

According to Maull *et al.* (2001) construction companies should undertake a preliminary review of their internal culture before attempting to introduce Total Quality Management (TQM). Although it is recognised that cultural profiles differ among organisations, the basic beliefs in business competition and the desire to have an efficient operational budget, should be common to all companies (Irani *et al.*, 2004). These points are useful when considering of appropriate culture profile, dimensions and strength that a construction company needs to possess or develop, in order to have a chance in gaining customers' satisfaction, engage in effective management functions, and therefore achieve business excellence.

Earlier research findings have revealed that the link between organisational culture and effective QMS or TQM implementation in construction companies is related to several common but important management traits, which include (1) process management, (2) leadership and management commitment, and (3) staff empowerment and effective communication. Process management is the key element in guaranteeing project results that conform to specified requirements (Zhang *et al.*, 2000), and all organisations' activities need to be directed to TQM initiatives in order to achieve overall quality performance (Mahmood *et al.*, 2006). Then naturally, the organisational culture needs to be embedded in a project's process management through the establishment of top-driven and high-quality project objectives, combined with a desire to satisfy customers by meeting and even exceeding their requirements. Leadership and management commitment is the most important value in QMS implementation. The success of any QMS can be achieved even if there is nothing but a strong commitment to improving quality, and guidance from management on their expectations and requirements for quality in order to value customers (Everett, 2002; Ahmed *et al.*, 2005; Mahmood *et al.*, 2006). Hence, the essence of a company's organisational culture reveals the quality management styles of a company from top to middle management levels, with top management's motivation within a company playing a key role in improving quality (Lo, 2002). An appropriate organisational culture also enhances a harmonic internal relationship among management and staff, so that communication between them runs smoothly (Karathanos, 1998), and this will motivate staff to produce valuable outcomes, as they know exactly what they must do (Irani *et al.*, 2004). Cheung *et al.* (2011) also note that goal settings and accomplishment, team orientation, coordination and integration, performance emphasis, innovation orientation, member participation and reward orientation are significant organisational culture factors in the construction companies that help provide a company with an identity. From these perspectives, it can be stated that the cultural factors of a company are inspired in the minds and attitudes of company players, who actualize them in a quality manner with a full understanding of their responsibilities.

Culture in construction organisations is a major determinant factor for the successful implementation of a QMS. This is the answer of a series of studies (Landin, 2000; Quazi *et al.*, 2002; Haupt and Whiteman, 2004; Low and Hong, 2005; Turk, 2006; Leonard, 2010; Shibani *et al.*, 2010; Watson and Howarth, 2011) regarding a doubt cast on the whole concept of QMS implementation due to the barriers in implementing it. The unsolved barriers may lead to failure in executing proper QMS-ISO 9001 interpretation and an ineffective and inefficient implementation stage. Thus, the expected benefits of QMS implementation will be

difficult to achieve by the ISO 9001 certified construction companies. This research forms a much-needed and comprehensive study on how well QMS-ISO 9001:2008 is being used by construction companies in Indonesia, together with how their QMS implementation might be better implemented and better business outcomes achieved through the investigation of the dominant and directions of organisational culture.

2.1 Competing Values Framework

There are a number of well-recognised organisational culture models which are used for identifying and measuring organisational culture. One of these models is the Competing Values Framework (CVF), which was developed in 1999 by American researchers Kim S. Cameron and Robert E. Quinn, derived from research undertaken by Campbell *et al*. (1974) and Quinn and Rohrbaugh (1983). The CVF is useful as a guide for enhancing organisational effectiveness and for facilitating culture change within an organization. It aims on helping organisations to understand themselves and develop an effective organisational environment (Cameron and Quinn, 2006).

The CVF consists of four major culture types (Clan, Adhocracy, Market, Hierarchy) that are theorized to compose cultural profiles within various kinds of organisational contexts (Choi *et al*., 2010). These authors further explain that an organisation can possess either a predominant internal or external focus, and may either be wishing to achieve flexibility and discretion, or stability and control. This combination of factors creates the four potential cultural categories, each representing a distinct set of cultural values. The four major cultures are briefly described by Cameron and Quinn (2006) as follows (Figure I):

[INSERT FIGURE I HERE]

The CVF has been selected as being the most suitable organisational culture model for this study due to its suitability for identifying the profiles of organisational culture of Indonesian construction companies. The CVF helps provide an understanding of how a complex phenomenon operates in these companies. In addition, output based on the CVF model is regarded as being compatible with studies pertaining to culture in the construction industry, such as research undertaken by Thomas *et al*. (2002), Numellin (2006), Liu *et al*. (2006), Oney-Yazıcı *et al*. (2007) and Koh and Low (2008).

From the CVF model, the Organizational Culture Assessment Instrument (OCAI) was developed as a tool in providing a comprehensive picture of a company's organisational

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culture and the values that characterize each culture. The OCAI was used to identify the current culture profiles of Indonesian construction companies. It is constructed in the form of a questionnaire that requires individuals to rate a set of statements that relate to six cultural dimensions, i.e. dominant characteristics, organisational leadership, management of employees, organisational 'glue', strategic emphasis, and criteria of success. The six cultural dimensions of OCAI represent the culture in an organisation which forms a cumulative representation of an organisational culture (Rameezdeen and Gunarathna, 2003). The cultural dimensions with associated cultural types of the OCAI are presented in Table I.

[INSERT TABLE I HERE]

3. Research methods

This research employed a questionnaire survey of construction industry practitioners, to collect empirical data regarding the assessment of the Indonesian construction companies' organisational culture profiles and the examination of the QMS-ISO 9001:2008 implemented by the contractors. It was followed by an analysis of the influence of different organisational culture profiles on the companies' QMS implementation. For questions pertaining to organisational culture assessment, the Organizational Culture Assessment Instrument (OCAI) developed by Cameron and Quinn (2006) was utilised. Questions regarding the examination of the QMS implementation were based on studies in the literature, which consist of current problems within the quality system, the implementation of QMS-ISO 9001:2008 principles and elements, and the companies' business performance while implementing their QMS. This paper focuses on the organisational culture aspects and their influence on the QMS implementation. The assessment on the implementation of QMS was discussed in Willar *et al.* (2015).

3.1 Selection of respondents

The target population of the study was the grade 7 (G-7) construction companies holding ISO 9001:2008 certification, the highest grade of Indonesian contractor qualification. This study adopted complex probability sampling designs, in particular, stratified random sampling and cluster sampling in order to secure a sufficient number to represent the population, while governing estimated non-response rate, cost, time, and operational constraints, with the results being able to be generalized to the population as a whole.

The stratified random sampling was used to select respondents representing a typical construction practitioner, i.e. Quality Management Representatives (QMRs), Managers (MRs) and Project/Site Engineers (SEs). These groups of respondents also represented the high level (QMRs), middle level (MRs), and low level (SEs), in the organisational structure. Cluster sampling is used primarily to choose the location of designated construction companies; these were in the capital city of Jakarta, and the two capital cities of Makassar and Manado for South Sulawesi Province and North Sulawesi Province, respectively. The main reason for drawing respondents from these ISO 9001:2008 certified contractors in the three cities, was that they represented the environment of the construction industry of typical large, medium, and small cities in Indonesia. In the case of the Indonesian construction companies organisational culture, the differences among cities of the operations of the sampled construction companies with respect to market demand, business environment, and social culture, may require the companies to have a different emphasis of cultural values.

Based on data provided by the National Construction Services Development Board [1], out of 913 (total of G-6 and G-7) construction companies, only 305 have ISO 9001 certification and all these are in the G-7 qualification category. Of these 305 contractors, about 150 have dominant business lines covering building and civil engineering works, of which, 126 (84%) are located in the three cities (Indonesian Contractors Association, 2009; 2010). However, due to some operational constraints, only 118 civil engineering contractors were able to be targeted and be sent the questionnaire booklets.

Seventy-seven companies returned the questionnaires, giving a company response rate of 65.25%, with a minimum of three responses and a maximum nine responses, in each company grouping. This response rate was considered satisfactory for the required purposes, since the sample represented approximately 51.3% of the total number of building and civil engineering certified companies in Indonesia. A total of 403 useable questionnaires were completed, equivalent to an individual response rate of 44.8%; these response rates met the required sample sizes for the purposes of the survey, with a response rate between 25-35% being regarded as adequate for postal questionnaires in construction industry related studies (Fellows and Liu, 2008).

3.2 Results of the organisational culture assessment

Using the Organizational Culture Assessment Instrument (OCAI) questionnaire, each respondent was asked to rate (from $0 - 100$) a set of statements related to the six cultural dimensions. They are dominant characteristics (DC), organisational leadership (OL),

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management of employees (ME), organisation glue (OG), strategic emphasis (SE), and criteria of success (CS). The rating level was based on whether the dimensions were similar (or not) to the current situation in the company of the respondent. This instrument was used to identify the most closely fitting category of culture for the company, i.e., whether it is predominantly a Clan, Adhocracy, Market, or Hierarchy culture.

Of the 77 company responses, only 74 responses were included in the analysis, as the responses for three company respondents were incomplete. A minimum of three sets and the maximum of nine sets of questionnaires obtained from each company were used in the OCAI analysis. Table II summarises the dominant culture types of the six cultural dimensions possessed by most of the 74 construction companies.

[INSERT TABLE II HERE]

Overall, respondents perceived that the dominant characteristics (DC) or the core values of the construction companies are most represented by the 'Clan culture' (41.9%). The core values of Clan type' in this first dimension is the sense of 'family' and the importance of 'sharing'. In reference to the style of the organisation leader (OL), most of the construction companies are Hierarchy oriented (29.7%), with the leaders being hard drivers, producers, and competitors. The management style used to manage employees (ME) is Clan oriented (56.8%), which is characterized by the value of team work, consensus, and participation. The organisation glue (OG) that holds companies together is also the Clan culture (66.2%); loyalty and mutual trust are key norms of this Clan type in this fourth cultural dimension. The companies' strategic emphasis (SE) is Market oriented (35.1%), the Market culture having a competitive and achievement focus. Success criteria (CS) of companies as perceived by employees as the Clan culture (45.9%), they believe that their success lies on the development of human resources, commitment, and concern for people. In summary, the six cultural dimensions do not have a single dominant culture type, however Clan type is more emphasized in the four cultural dimensions than the other three culture types.

3.3 Results of the examinations of the relationships among QMS variables
Prior to conducting correlation analysis, principal component analysis (PCA) was carried out to obtain a more meaningful structure of the QMS variables by combining them into smaller sets of QMS factors or groups. The PCA was conducted on the 50 quality management system (QMS) variables, which consisted of eight QMS-ISO 9001:2008 principles, 20 QMS-

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ISO 9001:2008 elements, 14 QMS barriers, and eight QMS key performance indicators. These sets of variables were analysed to see which variables formed coherent subsets of variables (variables that were correlated with one another) but largely independent of other subsets of variables, were combined into factors (i.e. groups of variables) (Tabachnick and Fidell, 2007). When the PCA was performed on the 50 QMS variables, a reduced set of factors which form the underlying structure of the QMS variables was obtained, consisted of six variables loaded onto factor 1, eight variables loaded onto factor 2, three variables loaded onto factor 3, three variables loaded onto factor 4, and three variables loaded onto factor 5. These factors, when combined, accounted for 43.11% of the total variance. The 50 QMS variables and the results of the PCA for all the QMS variables are presented in Table III and Table IV respectively.

[INSERT TABLE III HERE]

[INSERT TABLE IV HERE]

Subsequently, Cronbach's alpha was used to evaluate the internal consistency of the construction of the factors, the results of which are shown in Table V. The closer Cronbach's alpha is to 1, the higher the internal consistency. An alpha over .80 is considered to be good, between .70 and .80 is acceptable, while below .70 is poor (Sekaran and Bougie, 2009). The Cronbach's alpha for factor 1 was .85, factor 2 was .88, factor 3 was .68, and factor 4 was .83, all were greater than .60. The internal consistency of the measures used in this study can therefore be considered to be acceptable for the measurement of QMS variables. However, since the Cronbach's alpha coefficient for factor 5 was lower than .6, this factor was not considered for inclusion in the correlation analysis.

[INSERT TABLE V HERE]

In summary, the four factors which accounted for 38.95% of the total variance are considered to be the four important factors in the factor model (Table IV). These factors shaped the patterns of response of current QMS implementation within Indonesian construction companies. The variables grouped on the same factors suggest that factor 1 QMS-ISO 9001:2008 elements and factor 3 QMS-ISO 9001:2008 principles represent the implementation on QMS-ISO 9001:2008 (named as QMS principles-elements), factor 2 represents a barrier to QMS implementation (QMS barriers), and factor 4 represents a key

performance indicator on business performance (QMS business performance). These factors and the associated variables in each factor in the correlation analysis were identified as QMS variables.

Pearson's correlation (or Pearson's r) was used in the study of the relationships among QMS variables. Only for these QMS variables analyses, all the 77 respondents were included. The Pearson correlation analysis was conducted in SPSS 19. The results of the Pearson correlation analysis are summarised in Table VI.

[INSERT TABLE VI HERE]

There are significant negative relationships between the QMS barriers and the QMS principles-elements ($r = -.43$, $p < .01$), and between the QMS barriers and the QMS business performance ($r = -.34$, $p < .01$). However, the QMS principles-elements was not significantly related to the QMS business performance ($r = .13$). These results suggest that higher levels of the QMS barriers will have a negative impact on the QMS principles-elements and the QMS business performance, resulting in lower performance. However, the QMS principles-elements did not affect the QMS business performance.

3.4 Results of the examinations of the relationships between organisational culture profiles and QMS variable

A One-Way Analysis of Variance (ANOVA) test is used to test for statistically significant differences among three or more independent sample means (Allen and Bennett, 2010). The independent variable in this research is the four distinct culture types in each cultural dimension, while the dependent variable is the total score of the QMS principles-elements. From the 77 surveyed companies, only 74 companies' organisational culture profiles were identified to have complete data, and were therefore included in ANOVA test. The ANOVA test was conducted to examine whether there are significant differences in the mean scores on the QMS principles-elements across the four different culture types (Clan, Adhocracy, Market, and Hierarchy). Six analyses were conducted with the QMS principles-elements scores under the six cultural dimensions (e.g., (1st) Dominant characteristics-DC, (2nd) Organisational leadership-OL, (3rd) Management of employees-ME, (4th) Organisation glue-OG, (5th) Strategic emphasis-SE, and (6th) Criteria of success-CS). For example, the first analysis tested whether QMS principles-elements scores in the DC dimension, differ across the four culture types. In this analysis, the independent variables are the culture types in the DC dimension, while the dependent variable is the total QMS principles-elements. Pairwise comparisons (e.g., Contrast test) were then used as follow-up tests to find out where the differences lie. The ANOVA analysis was conducted in SPSS 19.

The results of the ANOVA test (Table VII) show that there is a significant difference in the total QMS principles-elements across the different types of organisational culture in the first dimension (Dominant characteristics-DC) (F = 3.06, p = .034). The Contrast test results (Table VIII) show that in the first dimension, the QMS principles-elements was significantly higher in the Hierarchy type than Clan type (Difference (D) = -.62, p = .007). In addition, the QMS principles-elements was significantly higher in the Hierarchy type than Adhocracy type (D = -.53, p = .036).

The results also show that there is a significant difference in total QMS principles-elements across different types of organisational culture in the third dimension (Management of employees-ME) (F = 3.78, p = .015) (Table VII). The Contrast test results (Table VIII) show that in the third dimension, the QMS principles-elements was significantly higher in the Market type than Clan type (D = -.41, p = .01). In addition, the QMS principles-elements was significantly higher in the Market type than Adhocracy type (D = -.81, p = .003).

[INSERT TABLE VII HERE]

[INSERT TABLE VIII HERE]

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The results of the ANOVA (Table VII), however, should be interpreted with caution due to the small sample sizes of some comparison groups (see Table II). For example, in the first dimension (Dominant characteristics), Hierarchy type was excluded from the analysis since it only had a sample size of 5, Adhocracy type was excluded from the analyses of the second, third, fourth, fifth, and sixth dimensions, on account of the sample sizes being less than 10. Therefore, the ANOVA analysis was run a second time, based on the inclusion of only on the groups with a sufficient number of observations (Table IX). The non-significant results are likely to have been due to insufficient power. Finally, the results from the first run of ANOVA (Table VII) were used as a basis for interpretation and discussion. In summary, the ANOVA results show that different profiles of organisational culture can have different influences on the implementation of QMS principles-elements.

[INSERT TABLE IX HERE]

A Structural Equation Modelling (SEM) analysis (Figure II) was conducted in order to test the model of the relationships among the QMS variables (R1, R2, R3), and the relationship between the QMS principles-elements and the organisational culture variables (R4). A Bayesian model was selected using Marcov Chain Monte Carlo estimations to fit the SEM. This approach allows for categorical variables in SEM (Lee, 2007). This method provides an alternative to the maximum likelihood estimation, which is based on strict assumption and can only be fitted to normally distributed data. Using the Bayesian approach for SEM, posterior distributions for the parameter estimates were formed. In the current SEM, missing data were excluded. The six culture profiles were included with paths to QMS principles-elements (R4). For QMS barriers, the paths were entered to QMS principles-elements (R1) and QMS business performance (R2). Finally, a path was entered from QMS principles-elements to QMS business performance (R3). QMS barriers, QMS principles-elements and QMS business performance were entered as continuous variables, while the culture profiles were entered as categorical variables. The SEM was conducted in Amos 19.

The results of the SEM analysis are presented in Table X and Figure II. As shown in Table X, the model fitted well (convergence statistics < 1.01). Significant paths from organisational culture profiles to QMS principles-elements were observed for Dominant characteristics (DC), Management of employees (ME) and Strategic emphasis (SE). This suggests that DC, ME and SE dimensions have an influence on QMS principles-elements. As expected, a significant link was found between QMS barriers and QMS principles-elements.

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Corresponding to the above correlation analysis (see Table VI), more QMS barriers will result in lower levels of QMS principles-elements. In addition, the link between QMS barriers and QMS business performance was significant, indicating that more QMS barriers will result in lower QMS business performance. As well as corresponding to the correlation analysis, QMS principles-elements showed no significant relationship with QMS business performance. In summary, observations from the SEM were consistent with the above bi-variate correlations.

[INSERT TABLE X HERE]

[INSERT FIGURE II HERE]

4. Discussion

4.1 Assessment of Indonesian contractors' culture profiles

The findings from the study of the identification of dominant culture types within Indonesian construction companies indicate that the organisational culture within most Indonesian construction companies is predominantly of the Clan type. This type is characterized by: a focus on internal maintenance with flexibility, family-like relationships having a concern for people, and sensitivity towards its customers. This predominant culture type is also emphasized most in the cultural dimension related to how employees are managed, how the organisation is held together, and how the organisation's success in its achievements is defined. This finding is fundamental to the perspective of organisational culture within Indonesian construction companies. With the rapid and remarkable growth rate in the construction industry, it is important for this sector to recognise its individual and collective cultural patterns, in order to evaluate companies' current operational activities, achievements, and future successes. In addition, adoption of the predominant company cultural profile allows companies to adapt and respond to challenges, and hence later set up appropriate cultural changes or maintain and strengthen the existing fundamental culture profile.

The dimension labelled 'organisational leaderships' is related to the dominant leadership style and approach used by leaders and managers in those companies, which are more Hierarchy-focused than the other three culture types. This indicates that the leaders and managers are generally considered to exemplify coordinating, organising, and smooth-running efficiency. For an ISO 9001:2008 certified company, this finding confirms that the role of leaders and managers is to set an example in the day-to-day operational activities of

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the companies (Ahmed *et al.*, 2005; Mahmood *et al.*, 2006; Müller and Turner, 2007; Müller and Turner, 2010), to become the focal points within the organisation in which the operational activities are largely governed by standardized procedures. In the Indonesian cultural profile of leadership, the leader has a function to directly control with authority (Rini, 2002), and this indicates that hierarchical control is the most effective way in managing an organisation. Another profile of Indonesian leaders, is based on the vertical synchronization used by the leaders to pattern duties and moral responsibilities, in order to maintain staff and assure success; bad patterns of duties and responsibilities may lead to staff frustration and demotivation (Danandjaja, 1985). This coincides with the profile of hierarchical-leadership that tends to be expected by the ISO 9001:2008 certified construction companies, rather than the leader being a mentor or parental figure (more typical of Clan leaders).

The dimension labelled as 'strategic emphasis' the area of emphasis that drives the organisation's strategy, in this study is 'Market type dominant', wherein the company emphasizes permanence and stability; efficiency, control and smooth operations, as the important company strategies. This finding suggests that current form of Indonesian construction strategy is focused more on profit and goal accomplishment, due to high competitiveness in both domestic and international markets. Contractors' focus on profit and market-orientation, in fact, is in line with of The Ministry of Public Work's policy to enforce Indonesian construction to take a role in global markets, as the industry can no longer just depend on the domestic market (Surtiningsih and Abidin, 2009).

4.2 Examination of Indonesian contractors' QMS implementation

Earlier study by Willar *et al.* (2015) discussed the barriers to effective QMS implementation, the implementation levels of QMS ISO 9001 and the performance of Indonesian contractors implementing such QMS. In this current study, it is found that higher levels of experiencing the eight variables of QMS barriers significantly contributed to the rolling out lower levels of implementation of the nine variables of QMS principles-elements (R1). Consistent with the arguments of Haupt and Whiteman (2004) and Shibani *et al.* (2010), problematic issues associated with the implementation of QMS-ISO 9001 and TQM inhibit the eventual successful implementation of the quality system. An ISO 9001 certified contractor must overcome or reduce the frequency of problems experienced by the company, and this requires a total commitment of all units within the company, and most importantly, a strong commitment from the top management. Watson and Howarth (2011) also strongly state that in order to effectively implement QMS-ISO 9001, a quality manager must have the full

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support from the top management to have authority and power, as well as to have access to relevant resources needed for the success of the QMS-ISO 9001 implementation.

In reference to the relationship between the QMS barriers and QMS business performance (R2), this study found that a higher level of experience of the eight variables of QMS barriers significantly contributed to the lower level of performance of the three QMS business performance variables. This finding is consistent with that of other earlier studies undertaken by Asa *et al*. (2009), which stated that Indonesian ISO 9001 construction companies that intend to raise the company's profitability should consistently implement their QMS and overcome their difficulties when following their QMS. The typical QMS barriers investigated in this study are representative of those commonly experienced by ISO 9001:2008 certified contractors. Those barriers can hinder the companies in achieving a high level of business performance in the company, due to low levels of sales growth, low profitability and poor market shares, or in general, due to a declining capacity to be able to compete in a free-trading industrial construction market.

In contrast to the above examination of R1 and R2, the examination of the relationships between the QMS principles-elements variables and QMS business performance variables (R3) shows that there is no significant relationship between them. This means that, in this study, the higher level of implementation of the nine QMS principles-elements variables was not associated with the higher level of performance of the three QMS business performance variables. Previous studies on the relationship between the two variables, such as undertaken by Naveh and Marcus (2005), Morris (2006), and Benner and Veloso (2008), found that companies that become ISO 9001 certified failed to have financial benefits. However, there are other similar studies of this relationship which have argued that ISO 9001 construction companies do have benefits. Those benefits include being chosen to bid in both local and global market contracts, achieving quality performance at organisation and project levels, as well as improving corporate profitability (Ofori *et al*., 2002; Turk, 2006; Farooqui and Ahmed, 2009; Watson and Howarth, 2011). The results of this study cannot be clearly related to the results of earlier studies.

4.3 Examination of the influence of the contractors' culture profiles on the QMS implementation

In this examination, the different profiles of construction companies' organisational culture is analysed in reference to the different influences on QMS principles-elements implementation (R4). There is evidence to suggest that QMS principles-elements differ across the four culture

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types, particularly in the cultural dimensions of dominant characteristics of the organisation (DC), and the style of how employees are treated and the working environment is like (ME). In the analysis results of dominant types of the six cultural dimensions of the surveyed contractors, Clan type was more emphasized in the two dimensions, DC and ME. However, in the analysis of the relationships between organisational culture profiles and the QMS principles-elements' variables, in the DC dimension, the implementation of QMS principles-elements was significantly higher in the Hierarchy type than Clan type, while, in the ME dimension, the implementation of QMS principles-elements was significantly higher in the Market type than Clan type culture.

A Hierarchy oriented culture is expected to drive companies in building and sharing values of standardisation, control, a well-defined structure for authority and decision-making, and to support the successful implementation of QMS. In addition, a global Market orientation is an important culture strategy to drive companies in building successful external relationships with customers and achieve success with proven quality product results. These insights are strategic, as Koh and Low (2008) found that modification of organisational culture and fortification of customer and process management are clear strategies for successful of TQM implementation. It, therefore, appears plausible that once the traits and typologies of Hierarchy-Market shared values and underlying assumptions within the construction organisation, that allow the organisation to operate effectively, are bound into strong organisational cultures and that are understood by all internal stakeholders and are in existence and integrated, there will be a positive impact on the QMS implementation. This will lead to improvements of organisational effectiveness.

From the above findings, it is concluded that ISO 9001:2008 certified Indonesian construction companies should make the cultural change from a 'now' Clan culture to 'future' hybrid Hierarchy-Market culture. As a pragmatic approach, this would be the best-fit cultural profile for Indonesian construction companies to effectively implement their QMS and achieve optimal business performance. Moreover, in order to bring about changes to the effectiveness and operational efficiency of QMSs across all qualification categories of Indonesian contractors, there is a clear need for a cultural shift within the small and medium-scale companies if they are to become competitive and serious in the future national market, and for supporting their parent companies in global markets.

5. Conclusion

Based on the analysis of the results and the discussion aforementioned, the following conclusions can be made:

- The identified organisational culture profiles that is more emphasized within Indonesian construction companies contributes to the recognition of the current contractor's cultural pattern, and this can be a basis for a company to strengthen or develop their desired organisational culture in order to possess the most adaptable organisational culture. Current identified culture profiles suggest that a Clan typical of a family-type organisation is the dominant cultural character within the construction companies.

- This study provides empirical evidence in support of the notion that problematic issues associated with the implementation of QMS-ISO 9001:2008 within Indonesian construction companies can have an impact on the implementation of the QMS, and contribute to the lower level of the companies' business performance. However, the higher level of the implementation of QMS principles-elements was not related to higher level of the companies' business performance. A strong commitment from the top management is required for an ISO 9001:2008 certified contractor to overcome the problems of implementing the QMS, in order to be able to compete in a free-trading industrial construction market. Finally, it is found that organisational culture influences successful QMS implementation.

- Two different culture profiles, Hierarchy and Market types, have a significant influence on the implementation of QMS-ISO 9001:2008, with the implementation of the QMS being significantly higher in the Hierarchy culture, while in the culture climate relating to the management of employees, the implementation of the QMS was significantly higher in the Market culture. This will then advantage the company in setting up appropriate culture changes from a 'now' Clan culture to 'future' hybrid Hierarchy-Market culture. As a pragmatic approach, this would be the best-fit cultural profile for Indonesian construction companies to effectively implement their QMS and achieve optimal business performance.

6. Research implications

This research study has implications that can be viewed from three different perspectives: a contribution to the body of knowledge, a contribution to the construction industry; and a

contribution for policy. For the body of knowledge, the results reported contribute to and enrich the literature on organisational culture assessment and QMS implementation in construction organisations, as well as contribute to the knowledge in the area of Indonesian construction's organisational culture and QMS development. This study has also demonstrated the methods for analysis of the relationships between the organisational culture profiles (independent variable) and QMS principles-elements (dependent variable), for which the original Cameron and Quinn's analysis model was used. By framing the culture profiles as a categorical variable (with QMS principles-elements being a continuous variable), the study shows additional ways for analysing the relationships between the two variables.

The research findings will help improve the understanding among the construction organisations and project practitioners to enable them to identify, strengthen or develop strong organisational culture that is adaptable to the most-recent business environment in order to successfully achieve quality deliverables in infrastructure project delivery. In the context of the contribution to policy, the research findings will provide a future reference for facilitating consultation and communication among the construction services providers, construction companies associations, the Construction Services Development Board (CSDB) and the Government, in defining and determining policy for more widespread promotion and implementation of organisational culture and QMS, in the Indonesian construction industry.

7. Research recommendations

Several recommendations have been provided for future research. First, it is recommended that future research be undertaken to confirm the dominance of the mixed culture profile found in this study. Second, in this study, there have been examinations of the relationships between the organisational culture and QMS principles-elements variables, and of the relationships among the QMS variables. However, a further analysis should be considered to simultaneously examine the relationships among all variables. A Structural Equation Modelling (SEM) analysis could be used to undertake such data analysis. Third, factors such as corruption-collusion-nepotism and unhealthy competition practices among contractors, might be considered potentially influencing the effective implementation of construction companies' QMS. The influence of these factors would, therefore, be an appropriate topic for future research. Finally, different countries have different and specific national cultures, different legal guidelines, and different political and business environments, which might influence an organisations' culture. This study might have potential value for the examination

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of culture-based QMS implementation in construction organisations in other emerging and developing countries and on a wider global basis.

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Table I. The nature and typology of OCAI

Cultural Dimensions	Culture Types			
	Clan Culture	Adhocracy Culture	Market Culture	Hierarchy Culture
Dominant Characteristics	A very personal place like a family	Entrepreneurial and risk taking	Competitive and achievement oriented	Controlled and structured
Organizational Leadership	Mentoring, facilitating, or nurturing	Entrepreneurial, innovative, or risk taking	No-nonsense, aggressive, results oriented	Coordinating, organizing, efficiency oriented
Management of Employees	Teamwork, consensus, and participation	Individual risk taking, innovation, freedom, and uniqueness	Competitiveness and achievement	Security, conformity, predictability
Organization Glue	Loyalty and mutual trust	Commitment to innovation and development	Emphasis on achievement and goal accomplishment	Formal rules and policies
Strategic Emphases	Human development, high trust, openness	Acquisition of resources and creating new challenges	Competitive actions and winning	Permanence and stability
Criteria of Success	Development of human resources, teamwork, and concern for people	Having the most unique and newest products and services	Winning in the marketplace and outpacing the competition	Dependable, efficient, and low cost

Source: Cameron and Quinn (2011).

Table II. Dominant culture types of six cultural dimensions (N=74)

	Cultural profiles	Clan type		Adhocracy type		Market type		Hierarchy type		No dominant type	
		n	%	n	%	n	%	n	%	n	%
1st	Dominant characteristics (DC)	31	41.9	11	14.9	22	29.7	5	6.8	5	6.8
2nd	Organisational leadership (OL)	18	24.3	8	10.8	21	28.4	22	29.7	5	6.8
3rd	Management of employees (ME)	42	56.8	4	5.4	11	14.9	13	17.6	4	5.4
4th	Organisation glue (OG)	49	66.2	3	4.1	7	9.5	5	6.8	10	13.5
5th	Strategic emphasis (SE)	13	17.6	6	8.1	26	35.1	15	20.3	14	18.9
6th	Criteria of success (CS)	34	45.9	-	-	11	14.9	23	31.1	6	8.1

Table III. Fifty Quality Management System variables

Name of variables	Questionnaire items	Name of variables	Questionnaire items
(1stP)	Customer focus	(18thE)	Training
(2ndP)	Leadership	(19thE)	Servicing
(3rdP)	People involvement	(20thE)	Statistical techniques
(4thP)	Process approach	(B1)	Misleading QMS purposes
(5thP)	Systems approach	(B2)	ISO 9001 is a documentation matter instead of opportunity to make a change
(6thP)	Continual improvement	(B3)	Lack of corporate commitment
(7thP)	Factual approach to decision making	(B4)	Lack of strong motivation
(8thP)	Mutually beneficial supplier relationships	(B5)	Lack of effective management response
(1thE)	Management responsibility	(B6)	Difficulty in understanding ISO 9001 terminology
(2ndE)	Quality system	(B7)	ISO 9001is a matter of fulfilling audit requirements
(3rdE)	Contract review	(B8)	Failure in disseminating ISO 9001-QMS
(4thE)	Design control	(B9)	Lack of a well-design reward system
(5thE)	Document and data control	(B10)	Lack of effective internal communication
(6thE)	Purchasing	(B11)	Poor external communication
(7thE)	Control of customer-supplied product	(B12)	Uncertainty with sub-contractors and supplier quality systems
(8thE)	Product identification and traceability	(B13)	Resistance to QMS implementation
(9thE)	Process control	(B14)	Lack of funding for QMS implementation
(10thE)	Inspection and testing	(KPI1)	Profitability for the preceding two years
(11thE)	Inspection, measuring and test equipment	(KPI2)	Sales growth for the preceding two years
(12thE)	Inspection and test status	(KPI3)	Market shares for the most recent year
(13thE)	Control of a nonconforming product	(KPI4)	Global market contracts acquired
(14thE)	Corrective and preventive action	(KPI5)	Quality of services and products
(15thE)	Handling, storage, packaging, preservation, and delivery	(KPI6)	Sustainable construction products
(16thE)	Control of quality records	(KPI7)	New product innovation and development
(17thE)	Internal quality audits	(KPI8)	Generating employee satisfaction

Notes: There are 8 QMS principles variables, 20 QMS elements variables, 14 QMS barriers variables, and 8 QMS key performance indicators variables.

Table IV. Principal Component Analysis results for the QMS variables (N=403)

Name of group variables		Questionnaire items	Factors				
			1	2	3	4	5
QMS-ISO 9001 elements	17[th]E	Internal quality audits	.77				
	19[th]E	Servicing	.73				
	16[th]E	Control of quality records	.73				
	18[th]E	Training	.70				
	10[th]E	Inspection and Testing	.67				
	2[nd]E	Quality System	.66				
QMS-barriers	B3	Lack of corporate commitment		.80			
	B4	Lack of strong motivation		.78			
	B5	Lack of effective management response		.72			
	B10	Lack of effective internal communication		.70			
	B2	ISO 9001 is a documentation matter instead of opportunity to make a change		.65			
	B6	Difficulty in understanding ISO 9001		.63			
	B9	Lack of a well-design reward system		.62			
	B11	Poor external communication		.60			
QMS-ISO 9001 principles	4[th]P	Process approach			.64		
	6[th]P	Continual improvement			.64		
	7[th]P	Factual approach to decision making			.61		
QMS-KPI	KPI2	Sales growth				.88	
	KPI1	Profitability				.81	
	KPI3	Market shares				.78	
	KPI6	Sustainable construction products					.68
	KPI5	Quality of services and products					.63
	KPI7	New product innovation and development					.61
		% Variance	15.11	11.39	7.15	5.30	4.16
		Cumulative %	15.11	26.50	33.65	38.95	43.11
	Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy		.89				
	Bartlett's Test of Sphericity	Chi-Square	9747.19				
		df	1225				
		p	< .001				

Table V. Reliability of internal consistency (N=403)

QMS variables	Number of questions	Cronbach's alpha
Factor 1: QMS elements	6	.85
Factor 2: QMS barriers	8	.88
Factor 3: QMS principles	3	.68
Factor 4: QMS-business performance	3	.83
Factor 5: QMS-values	3	.59

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Table VI. Pearson's rho correlation matrix (N=77)

QMS variables	Number of associated variables	Total QMS barriers	Total QMS principles-elements	Total QMS business performance
Total QMS barriers	8	-	-.43**	-.34**
Total QMS principles-elements	9		-	.13
Total QMS business performance	3			-

Note: ** Correlation is significant at the .01 level.

Table VII. ANOVA results: QMS principles-elements on the six cultural dimensions

Culture Profiles	Clan type		Adhocracy type		Market type		Hierarchy type		ANOVA	
	M	SD	M	SD	M	SD	M	SD	F	Sig
1st (DC)	3.05	.50	3.14	.55	3.28	.39	3.67	.14	3.06	.034*
2nd (OL)	3.16	.39	3.18	.38	3.25	.48	3.02	.59	.80	.497
3rd (ME)	3.09	.49	2.69	.44	3.49	.30	3.14	.43	3.78	.015*
4th (OG)	3.21	.41	2.85	.18	2.98	.68	2.98	.55	1.29	.287
5th (SE)	3.27	.37	3.23	.46	3.21	.38	2.96	.63	1.37	.262
6th (CS)	3.15	.48	-	-	3.31	.34	3.10	.49	.77	.466

Notes: DC = Dominant characteristics, OL = Organisational leadership, ME = Management of employees, OG = Organisation glue, SE = Strategic emphasis, CS = Criteria of success.
* $p < .05$

Table VIII. Pairwise comparisons in the six cultural dimensions of QMS principles-elements between the four culture types

Comparisons between each pair of culture types	Differences in the comparisons					
	1st (DC)	2nd (OL)	3rd (ME)	4th (OG)	5th (SE)	6th (CS)
Clan - Adhocracy	-.09	-.01	.40	.36	.04	-
Clan - Market	-.23	-.08	-.41*	.23	.05	-.16
Clan - Hierarchy	-.62*	.14	-.06	.23	.31	.05
Adhocracy - Market	-.14	-.07	-.81*	-.13	.02	-
Adhocracy - Hierarchy	-.53*	.16	-.46	-.13	.27	-
Market - Hierarchy	-.39	.23	.35	-.00	.26	.21

Notes: DC = Dominant characteristics, OL = Organisational leadership, ME = Management of employees, OG = Organisation glue, SE = Strategic emphasis, CS = Criteria of success.
* $p < .05$

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Table IX. ANOVA results (second run)

Culture	Clan type		Adhocracy type		Market type		Hierarchy type		ANOVA	
	M	SD	M	SD	M	SD	M	SD	F	*p*
1st (DC)	3.05	.50	3.14	.55	3.28	.39	e	e	1.47	.239
2nd (OL)	3.16	.39	e	e	3.25	.48	3.02	.59	1.13	.33
3rd (ME)	3.09	.49	e	e	3.49	.30	3.14	.43	3.53	.035**
4th (OG)			e	e	e	e	e	e		
5th (SE)	3.27	.37	e	e	3.21	.38	2.96	.63	1.98	.148
6th (CS)	3.15	.48	e	e	3.31	.34	3.10	.49	.77	.466

Notes: DC = Dominant Characteristics, OL = Organizational Leadership, ME = Management of Employee, OG = Organizational Glue, SE = Strategic Emphasis, CS = Criteria of Success.
** *p* < 0.05
e = excluded from ANOVA test.

**Table X**. SEM results: regression weights from a Structural Equation Model

	1	2	3	4	5	6	7	8	9	10	11
DC to Practice*	.15	.05	.25	<.01	.05	1.00002	.15	.14	.23	-.12	.42
Practice<--OL	-.09	-.20	.02	<.01	.06	1.00001	-.09	-.09	.25	-.33	.21
Practice<--ME*	.12	.02	.25	<.01	.06	1.00003	.12	.40	.50	-.12	.45
Practice<--OG	-.05	-.17	.06	<.01	.06	1.00002	-.05	-.28	.83	-.35	.29
Practice<--SE*	-.20	-.32	-.07	<.01	.06	1.00002	-.20	-.01	.18	-.50	.09
Practice<--CS	.01	-.03	.06	<.01	.02	1.00001	.01	.24	.91	-.10	.14
Practice<--Problems*	-.37	-.53	-.21	<.01	.08	1.00001	-.37	-.01	.12	-.75	.00
KPI<--Practice	.01	-.23	.25	<.01	.12	1.00001	.01	.00	.10	-.59	.62
KPI<--Problems*	-.25	-.45	-.05	<.01	.10	1.00001	-.25	.00	.09	-.72	.23

Notes: 1 = Mean, 2 = 95% Lower bound, 3 = 95% Upper bound, 4 = Standard error, 5 = Standard deviation, 6 = Convergence statistics, 7 = Median, 8 = Skewness, 9 = Kurtois, 10 = Minimum, 11= Maximum.

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Figure I. The Competing Values Framework (adapted from Cameron and Quinn, 2011)
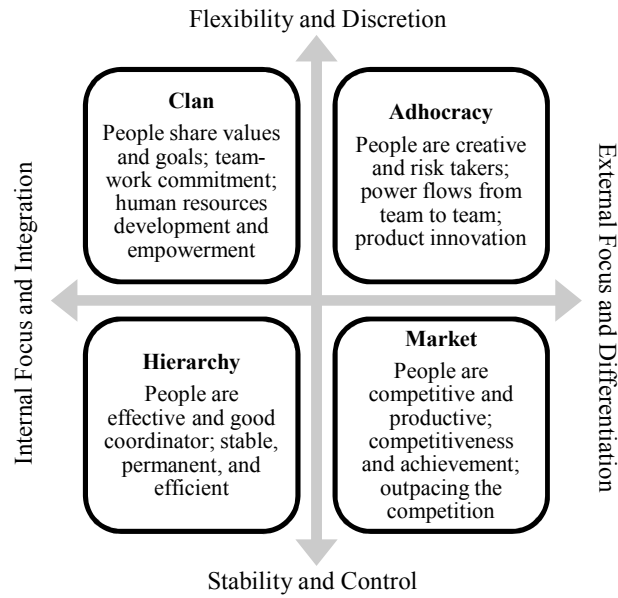
Figure II. Regression weights from a Structural Equation Model of the organisational culture and QMS implementation relationships
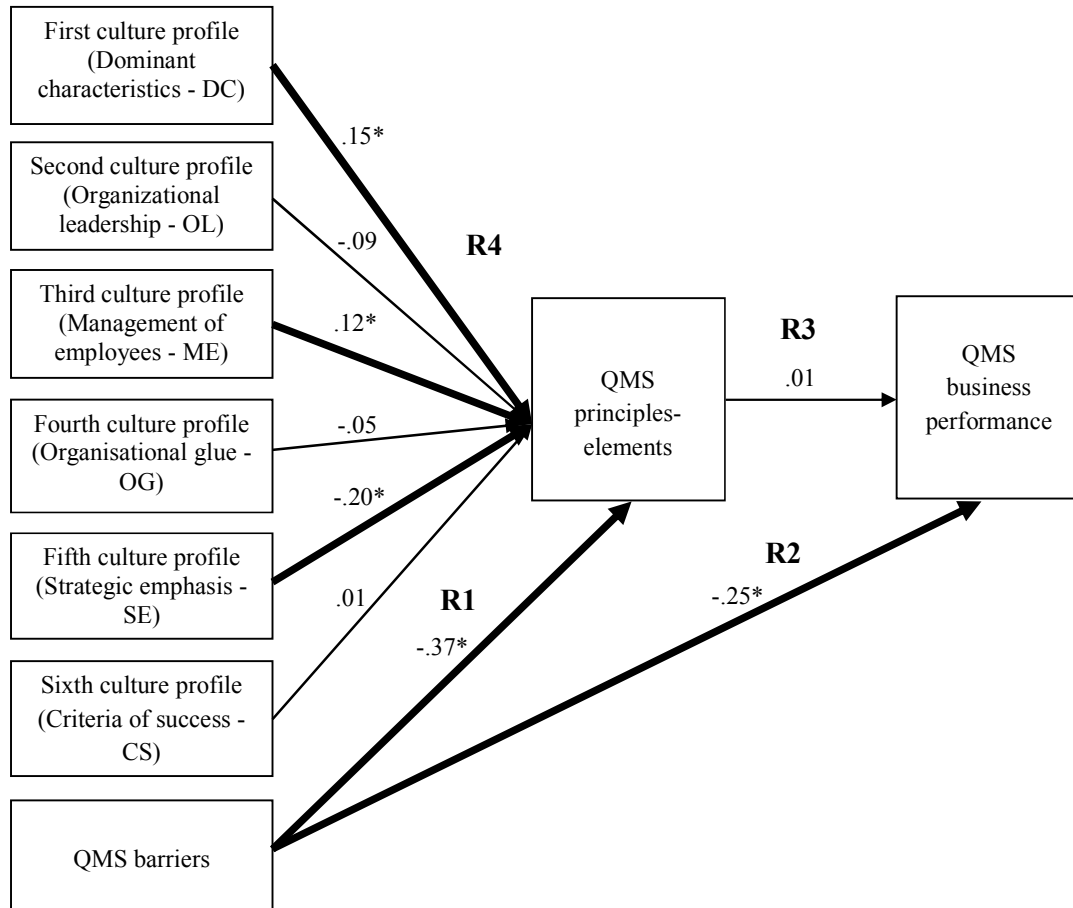
Note: *p* < .05 for significance

= paths that were statistically significant