

INFLUENCE OF ORGANISATIONAL CULTURE ON TOTAL QUALITY MANAGEMENT IMPLEMENTATION AND FIRM PERFORMANCE: EVIDENCE FROM THE VIETNAMESE CONSTRUCTION INDUSTRY

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ABSTRACT

The main purpose of this study is to examine the relationship between organisational culture (OC) and Total Quality Management (TQM), and the influence of TQM implementation on organisational performance improvement within the context of the Vietnamese construction industry. A survey was conducted with 104 respondents from Vietnamese construction firms, using validated survey instruments developed in past research. Analysis techniques include cluster analysis and Structural Equation Modelling. Findings showed that Vietnamese construction firms are dominated by clan and hierarchy cultures rather than adhocracy and market cultures according to Competing Value Framework (CVF) of OC classification. Furthermore, it was found that organisations dominated by either clan or adhocracy cultures could provide a favourable environment for successful TQM implementation, whereas this is not the case for those dominated by both market and hierarchy cultures. This study also confirmed the significant and positive relationship between TQM implementation and organisational performance improvement.

KEYWORDS

Total Quality Management, Competing Value Framework, construction, culture, Vietnam.

Introduction

Over the last few decades, the Total Quality Management (TQM) philosophy has been applied to many organisations as a tool to improve quality and corporate performance [1]. However, the benefit of TQM to organisational performance improvement is mixed. While many studies indicate that TQM could benefit organisational performance, it has been reported that not all cases of TQM application have given satisfactory results to the organisations that implemented it [1, 2]. Generally, TQM has been recognised as a successful management philosophy in manufacturing and service industries [3]. However, its benefits to the construction industry are still unclear [4].

Similar to many other developing countries, infrastructure development in Vietnam has been considered as one of the key facilitators for regional and national economic growth [5]. The World Bank revealed that Vietnam reached an annual average rate of economic growth at 7.3 per cent during the period from 1990 to 2010, and one of the key sectors that contributed to the success was the construction industry [6]. Every year, approximately 10% of GDP was invested in infrastructure development in Vietnam during the period between 2005 and 2010, which is the highest investment rate if compared with the surrounding countries such as China, Indonesia, Thailand or the Philippines [7].

The Vietnamese construction industry has been recognised as one of the key sectors that contri-

buted to the economic growth [6, 8]. However, the Vietnamese construction industry has been facing many constraints that negatively affect construction projects as well as construction firms [6]. One of the main reasons for those problems as advocated by many researchers is poor management practices [6, 9]. Aiming to seek a direction for Vietnamese construction firms to improve their performance, this study examined the applicability and efficacy of TQM, and how this is impacted by an organisational culture, within the context of Vietnamese construction organisations. The primary aims of this study are (1) to identify organisational culture (OC) profiles of Vietnamese construction organisations; (2) to empirically examine the relationship between OC and TQM implementation; and (3) to empirically examine the influence TQM implementation on organisational performance improvement.

Theoretical background and hypothesis development

Organisational culture and TQM

Over the last few decades, the topic of organisational culture (OC) has attracted much attention from many scholars. Deal and Kennedy [10] defined OC as the business environment, values, heroes, rites and rituals, and communication networks, known as a cultural network. Prajogo and McDermott [11] defined OC as the general pattern of mindsets, beliefs and values that members of the organisation share in common, and which shape the behaviours, practices and other artefacts of the organisation which are easily observable. Similarly, Deshpande and Webster [12] considered OC as the pattern of shared values and beliefs that help individuals understand the organisational functioning and thus provide them norms for behaviour in the organisation.

By convention, Total Quality Management (TQM) could be defined as a management tool, philosophy, and a set of principles which can be applied to all functions and processes of an organisation to continuously improve the quality of products and services, to exceed customer satisfaction at any time, and continuously reduce the production cost [11, 13]. According to Evans [14], the philosophy of TQM involves six basic management concepts: customer focus, process orientation, continuous improvement, empowerment and teamwork, management by fact, and visionary leadership. Firstly, customer focus means that TQM philosophy considers a customer as the one who judges and drives quality. This makes a significant change in the organisational business strategy from the focus on product-orientation par-

ticular to traditional approaches [13]. The core objective of TQM is to meet and exceed customer expectation by “do it right the first time and every time, for customer satisfaction” [13, p. 2]. Hence, understanding and translating customer needs and expectations into organisational action plans is a key point of TQM implementation.

Prajogo and McDermott [11] state that OC is one of the key determinants for the successful TQM implementation. This has also been advocated by many other scholars [15–17]. It was also found that the failure of the TQM implementation primary derives from the lack of integration of TQM and culture change [18]. To nurture TQM implementation success, a number of researchers recommended the need of organisations for changing OC [15, 19]. In doing so, organisations need to be able to systematically define and assess their OC based on a well-developed framework or model.

The Competing Values Model (CVM) remained one of the most adopted approaches for OC assessment over the last few decades [20]. Many studies in the concept of OC have adopted this model to classify and assess OC. In addition, this model has also been validated by Howard [21] and Lamond [22] as a representation of OC. The CVM was first introduced by Quinn and Rohrbaugh [23] and then developed by Quinn [24]. As noted by Quinn [24, p. 47], the variables that characterised an effective organisation “differed from one study to another” and “the more we learned, the less we knew”. Because of this, Quinn and Rohrbaugh [23] changed the approach to discover OC. Instead of seeking for the characteristics of effective organisations, they asked experts to give opinions about effective organisations. This study came up with a consensus that experts share the same implicit theoretical framework [24]. Based on the findings they created the competing values framework (CVF).

By using two key dimensions comprising of the degree of flexibility or control, and a degree of internal or external focus of organisations, Quinn [24] classified OC into four models including Human Relations Model or “The Team”, Open Systems Model or “The Adhocracy”, Internal Process Model or “The Hierarchy” and Rational Goal Model or “The Firm”. Based on the “Jungian Framework” developed by Jung [25], the competing values model of organisational effectiveness developed by Quinn and Rohrbaugh [23], and Quinn [24], and the notion that “cultures are defined by the values, assumptions, and interpretations of organisational members” and “a common set of dimensions organises these factors on both psychological and organisational levels”,

Cameron and Freeman [26] adjusted Quinn's CVM to a new model consisting of four OC types labelled by Clan, Adhocracy, Hierarchy, and Market Culture.

In more detail, clan culture tends to emphasise human factors. These types of organisations focus on sharing values among people, emphasising teamwork and empowerment, and developing an environment that stresses human relationships. It is for a prime aim of long-term individual development with high morale and cohesion [16]. Contrasting to clan culture, market culture is characterised by result-oriented emphasise driving towards profitability and productivity in order to achieve competitive advantages [16, 26]. The long-term purpose of this type of culture is to achieve established organisational goals and targets through competitive actions.

Adhocracy culture emphasises the adaptive, flexible, and innovative characteristics of the organisations. Such organisations readily take risks to employ new resources and inventions in order to gain further profits [16]. In addition, the organisational effectiveness is measured by new market or new development directions [26]. Adhocracy culture is in direct contrast to hierarchy culture where the organisations stress orders, rules, and regulations to govern employee's work [16, 26]. The organisational effectiveness is measured by the stability, predictability, and smooth operations [12].

Based on the Competing Value Framework (CVF) developed by Quinn [24], researchers have attempted to identify the types of OC that are most suitable for TQM implementation. Gimenez-Espin et al. [17] found that clan culture, adhocracy culture, and the "culture for quality", which is the integration of clan and adhocracy cultures, positively impact on quality management, while hierarchy and market cultures give adverse results. Conversely, in the study by Zu et al. [27], clan and market cultures were found to have a significant effect on TQM practices, while adhocracy and hierarchy were found to have no links to TQM practices. Despite these mixed findings, clan and adhocracy cultures have been widely advocated to be favourable to the successful TQM implementation [11, 28], whereas hierarchy and market cultures were often found to have none or negative effects on the TQM implementation [17]. In addition, it was suggested that no organisation is likely to be reflected by a single value system. They instead would be expected to appear in combinations of values, in which some are more dominant than others [28]. Based on these findings, the following hypotheses were developed to address the influence of OC on TQM implementation within the context of Vietnamese construction firms:

H1: Vietnamese construction organisations dominated by either clan or adhocracy cultures are favourable for the success of TQM implementation.

H2: Vietnamese construction organisations dominated by both hierarchy and market cultures are unfavourable for the success of TQM implementation.

TQM application and performance of construction organisations

The Vietnamese construction industry has considerably developed and significantly contributed to the economic growth since 1986 as a result of renewal policies [29]. However, despite its fundamental contribution, Vietnamese construction industry has been facing many difficulties and constraints that negatively affect construction projects as well as the construction firms [6]. In the study by Nguyen and Chileshe [29], the authors revealed ten most fundamental critical factors causing poor performance of the construction industry, including: (1) disregard of the significance of project planning process and project planning; (2) lack of experience in executing complicated project; (3) poor design capacity and frequent design changes; (4) lack of knowledge and ability in managing construction projects; (5) lack of financial capacity of owner; (6) poor performance of contractors; (7) lack of a systematic approach to managing the project and entire organisation; (8) corruption and bribery; (9) the delays in payment; and (10) economic volatility and high inflation. It can be seen that most of these factors are closely related to management work. This implication was also concluded by many other researchers and practitioners as poor management is the main reason for construction project failure as well as poor performance of construction firms in Vietnam (e.g. Luu et al. [30]; Nguyen et al. [6]). To clarify the fact of poor management in the Vietnamese construction industry, Nguyen et al. [6] cited that an estimated 30% of the total construction capital was lost due to poor management. Other difficulties faced by the Vietnamese construction industry were identified by Long et al. [31], namely, the complexity of legal and institutional framework, and the lack of capable domestic consultants and contractors for handling large projects. This was concreted by the study of Nguyen and Chileshe [29] as the authors claimed that Vietnamese construction firms are working in an environment where laws and regulations are inconsistent, and policies change rather frequently.

In addition, it has been argued that the construction market in developing countries becomes riskier for organisations where this has been experienced by the failure of many construction firms over the last

decade [30]. The ineffective operation of construction firms resulted in higher market demands as well as a more intense competition in the marketplace due to the presence of a large number of foreign construction firms that attempt finding and adopting new and more effective methods and practices in order to improve their performance [30]. Some methods, such as the integration of Balance Scorecard and SWOT analysis, have been suggested for Vietnamese construction firms to evaluate organisational strengths and weaknesses and to measure their performance as suggested by Luu et al. [30]. However, it does not seem to be enough to deal with the existing problems.

Many studies have been conducted to examine the impact of TQM on organisational performance such as the study of Elghamrawy and Shibayama [4], Kaynak [2], Prajogo and McDermott [11]. These studies typically showed that TQM is positively and significantly related to organisational performance. Although TQM has been recognised as a successful philosophy in manufacturing and service industries [3], its benefits in the construction industry are mixed [4, 32]. Arditi and Gunaydin [32] identified the distinguishing characteristics of the construction industry that could be seen as barriers to the successful TQM implementation in construction firms, including uniqueness, single-order, single-production products, mobility site, long duration, lack of clear, and the uniform standard for the overall quality evaluation, direct influence of the project owner on the production, one-time collaboration between participated individuals and parties. However, a score of literature showing some practical evidence of successful TQM implementation in Japanese and American construction firms by Arditi and Gunaydin [32] and Elghamrawy and Shibayama [4] may lead to an assumption of the wider applicability of TQM in construction industries of other countries. For this reason, it is suggested that TQM can be successfully applied to Vietnamese construction firms. Thus, the following hypothesis can be proposed:

H3: TQM implementation positively and significantly correlates with the organisational performance of Vietnamese construction firms.

Method

Approach and analysis

A quantitative research employing a survey method was selected for this study. To test the first two hypotheses (H1 and H2), a two-staged cluster analysis employed in a similar study by Panuwatwanich et al. [33] was used to uncover the profiles of the respondent's organisational culture and to ex-

amine the relationships between these profiles and the TQM implementation. Following this, Structural Equation Modelling was undertaken to analyse the relationship between the TQM implementation and organisation performance, in order to test the third hypothesis (H3).

The questionnaire was initially designed in English and was subsequently translated into Vietnamese before sending to respondents. To ensure the accuracy of the translation, the questionnaire was first translated from English to Vietnamese. The Vietnamese version was then translated back to English by a different translator. Subsequently, the result was compared to the original version by the authors to test the accuracy of the translation.

The online survey using the Survey Monkey tool was selected to administer the survey due to several advantages. First, it can offer flexible functions to manipulate all types of questions designed in the questionnaire. It also has an attractive interface and is economical. In addition, this method is especially convenient and useful for a researcher who is not personally present at the investigated locations. Furthermore, with this method, the researcher can monitor the progress of obtaining responses, and therefore he can take actions whenever needed. Another advantage is that the achieved responses from the Survey Monkey tool can be summarised automatically, stored online, and extracted in a suitable format for operating analysis programs such as SPSS.

When all questions in the questionnaire were included on the website, the authors sent the link to several people within the sample and asked them to answer the questionnaire as well as to give feedback. This could be considered as a pilot stage to identify and eliminate any mistakes existing in the online questionnaire.

Sample

Judgemental sampling was used for this study to determine the type of targeted samples. Several construction project management units and construction contractors were selected to be included in the designed sample. Using this method, a researcher can ensure the suitability for the target population and the possibility of getting responses. The sampling frame was drawn using a combination of the convenient sampling and snowball technique, totalling 60 organisations. The questionnaire was then provided to qualified members within each of the identified organisations. The designed sample for this study were the qualified members consisting of organisational leaders, department heads, managers at all levels of

management, experienced staff members working in the selected project management units, and contractors are. To avoid bias, no more than ten valid responses were chosen randomly from each organisation to comprise the final data set.

The target population and sample of this study included leaders, department heads, managers, and experienced staff members working at construction Project Management Units or construction contractors in Vietnam. An online questionnaire survey was conducted, and 134 individuals responded to the questionnaire, representing 44 organisations. Of these, 30 individual responses were excluded from the data set due to significant incompleteness and invalid responses. Thus, 104 valid responses remained, being equivalent to an effective response rate of 77.6%. The majority (80.8%) of respondents were male. Approximately 77% of the respondents were employed in construction contractor companies, while the remaining were engaged in project management. Most of the respondents (67%) were at the position of a department head while about 20% were top executives. Regarding firm size, 38.5% respondents were from small firms (<50 staff members), 25% came from medium firms (50–99 staff members), and 36.5% represented large firms (>100 staff members).

Measures

To measure OC, this study employed four main cultural dimensions previously used in the study by Cameron and Freeman [26]. They are: dominant characteristics, leadership style, institutional bonding and strategic emphases, measured by four survey questions corresponding to the four dimensions. Each question is described by four statements presenting four types of OC according to CVF (Clan, Adhocracy, Hierarchy and Market). The respondents were asked to attribute 100 points across the four questions in such a way that best captures the characteristic of their organisations. It is worth noting that the findings relating to OC types based on the CVF are presented in this paper.

The study adopted seven TQM practices used by Kaynak [2] as indicators of the TQM implementation (referred to simply as a latent variable “TQM” in the analysis). However, only items that have significant factor loadings were included. Thus, a total of 31 items were used to measure seven TQM practices:

- management leadership (e.g. major department heads actively participate in the quality improvement process);
 - training (e.g. employees throughout your organisation are provided with specific work-skills training);
 - employee relations (e.g. employees are given regular and timely feedback on their quality performance);
 - quality data and reporting (e.g. quality data such as defects, defect rates, rework, scrap, etc. are fully available in your organisation);
 - supplier quality management (e.g. suppliers are selected based on quality rather than price or delivery schedules);
 - project design (e.g. project designs are reviewed and inspected carefully before using them for the construction process);
 - process management (e.g. inspection, review, or checking is emphasised during the implementation process rather than final outputs).
- These items were converted into five-point Likert-type questions with some adjustments to the wording to make them suitable for the construction industry and the target samples.
- Regarding the organisational performance variables, this study adopted the ten most important non-financial Key Performance Indicators (KPIs) from the study by Ali et al. [34]. They are:
- quality of work (e.g. quality of work done by your organisation is accepted by the client at the first time);
 - external customer satisfaction (e.g. clients are generally satisfied with your organisation’s performance);
 - safety (e.g. in your organisation, the number of accidents at work has reduced over the last five years);
 - market share (e.g. the number of projects managed or constructed by your organisation is increasing);
 - effectiveness of planning (e.g. the estimated cost and time to complete the project work is not significantly different from the actual values);
 - labour efficiency (e.g. in your organisation, labour is used efficiently);
 - rate of successful tenders or quality contractor selected (e.g. the rate of successful tenders or quality contractors selected of your organisation is increasing);
 - competency in human resource management (e.g. in your organisation, human resources are managed effectively);
 - risk control (e.g. risk management is applied effectively to projects); and
 - manager’s competency (e.g. in your organisation, managers have enough ability to actively deal with issues related to their responsibility).
- These ten KPIs were then converted into survey questions, using the five-point Likert scale.

Analysis and results

Data treatment

The data obtained from the survey was primarily analysed, using SPSS version 22, to assess its normality and to determine whether it can be treated as a single dataset. To assess the normality, this study assessed the normality based on “skewness” and “kurtosis” indices. Skewness refers to the symmetry, whereas kurtosis refers to the pointiness of the distribution [35]. According to Panuwatwanich [36], skewness and kurtosis indices that fall within the range of -2 to +2 indicate a normal distribution. The Analysis of Variance (ANOVA) is performed to compare different respondent groups to determine whether or not the data are homogeneous across all groups. Based on the result, the researcher can decide to retain the data as a single data set or separate them into different sets of data for further analyses. The results indicate that of the 46 initial variables, the values of skewness ranged from -1.117 to 0.892 and the values of kurtosis ranged from -0.612 to +1.974. This result suggests that the distribution of the data used in this study can be considered normal.

As mentioned previously, respondents were classified into different groups based on categories such as gender, the age of a respondent, size and type of the employing company, years of experience, or position being held by respondents in their organisations. For this study, it was determined that the size of the company and types of companies might have more effects on respondents’ perceptions than other factors. One-way ANOVA test was therefore performed on these factors. The values of F-statistics, mean differences and effect size indicated that there were no significant differences among all the variables based on the size and types of companies.

Measurement scale analysis

Measurement scale analysis was performed to assess the reliability and validity of each model construct. Two assessments were included in this analysis, i.e. internal consistency and item-total correlation. Internal consistency aimed to assess the degree

to which the items measuring a concept hang together as a set, while item-total correlation was used to assess how well an item belonged to its scale by inspecting the correlation between each item or variable and the total score of the construct.

To measure internal consistency, Cronbach’s alpha was used. The analysis results indicated that Cronbach’s alpha values of all constructs range, within the acceptable limit (0.7), from 0.721 to 0.894, except for the supplier quality management construct ($\alpha = 0.529$). Item-total correlation analysis was then performed to identify the items that do not correlate with the supplier quality management scale, using the cut-off of 0.3 for the corrected item-total correlation coefficients as recommended by Field [35]. The result led to the exclusion of one item from the “supplier quality management” scale, which eventually improved its Cronbach’s alpha to 0.728.

Cluster analysis

The hierarchical cluster analysis was first performed with Ward’s method using all 104 cases based on four variables of OC. Based on the examination of a Dendrogram, a four-cluster solution was recommended. Subsequently, non-hierarchical cluster analysis was performed using the four-cluster solution as input. The results showed that the final centroids of the four clusters (Fig. 1) were significantly different (sig. values of F-statistic test less than 0.001) across all four variables of OC as shown in Table 1. This verified the validity of the cluster analysis results.

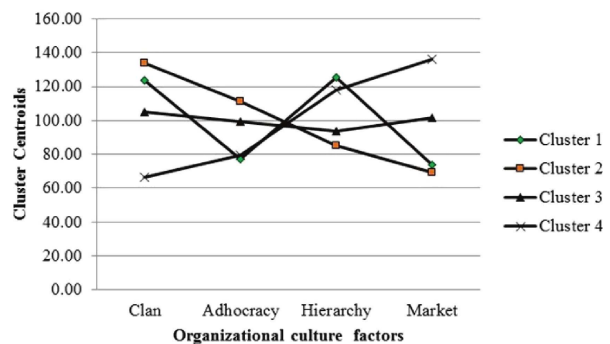


Fig. 1. Centroid plots of the four clusters.

Table 1
ANOVA test result for the validity of cluster analysis.

OC Factors	Centroids				ANOVA test statistics	
	Cluster 1 (n = 22)	Cluster 2 (n = 17)	Cluster 3 (n = 49)	Cluster 4 (n = 16)	F	Sig.
Clan	123.68	134.18	105.20	66.56	45.712	.000
Adhocracy	77.45	111.24	99.59	79.69	19.150	.000
Hierarchy	125.27	85.12	93.88	117.81	23.191	.000
Market	73.59	69.47	101.33	135.94	40.226	.000

Table 2
ANOVA test results of comparing TQM practices between clusters.

TQM practices	Clusters' mean values				ANOVA test statistics	
	Internal focus	Flexibility focus	Balance focus	Control focus	F	Sig.
Leadership management	4.18	4.07	4.18	3.51	5.821	.001
Training	3.77	3.76	3.84	3.02	4.207	.008
Employee Relation	3.98	3.85	4.01	3.23	9.695	.000
Quality data and reporting	3.74	3.94	3.82	3.17	7.016	.000
Supplier quality management	3.69	3.65	3.63	3.09	4.538	.005
Project design	4.00	4.00	3.95	3.47	3.809	.012
Process management	3.81	3.88	3.81	3.34	4.366	.006

According to Table 1, the four formulated clusters present four distinctive combinations of the OC variables. In cluster 1 ($n = 22$) is dominated by clan (123.68) and hierarchy (125.27). Similarly, cluster 2 ($n = 17$) is dominated by clan (134.18) and adhocracy (111.24) cultures. Conversely, cluster 4 is dominated by hierarchy and market cultures with their scores of 117.81 and 135.44, respectively. Finally, cluster 3 presented a good mix between the four cultures. Based on the two key dimensions of CVF, which are the degree of control or flexibility, and the degree of internal or external focus, the four clusters can be named as internal focus, flexibility focus, balance focus, and control focus culture for clusters 1, 2, 3 and 4, respectively.

One-way ANOVA was then performed to evaluate the differences in terms of TQM practices between the four clusters (Table 2). The results showed that the significant values of all seven TQM practices, ranging from 0.000 to 0.012 are smaller than 0.05. This implies that there is a significant difference between the mean scores on each dependent variable across the four clusters [37]. The comparison can be further illustrated in Fig. 2.



Fig. 2. TQM practice comparison between the four clusters.

Results of the cluster analysis suggest that internal focus, flexibility focus, and balance focus clusters have similar and reasonably high mean values, rang-

ing from 3.74 to 4.18, to each of the seven TQM practices. These values are significantly higher than those of the control focus cluster, ranging from 3.02 to 3.51. This shows that internal focus, flexibility focus or balance focus clusters are more favourable for the TQM implementation than the control focus cluster.

Structural Equation Modelling

The primary purpose of SEM is to test the validity of the hypothesised theoretical model by specifying, estimating and evaluating the linear relationships between a set of observed and unobserved variables [36]. The strength of SEM is that it can offer a straightforward procedure to test the relationships among latent or unobserved variables that are measured by multiple indicators while other general leaner modellings (GLM) such as ANOVA or multiple regressions cannot perform in unobserved variables [38]. SEM analysis normally goes through five steps including, model specification, data collection, model estimation, model evaluation, and model modification if necessary [38]. In this study, the “item parcelling” technique was employed to develop a “partial disaggregation” model, following Bagozzi and Edwards [39]. This means that, for each of the TQM variables, a mean score was calculated by averaging all of its questionnaire items included in the analysis. Figure 3 presents the partial disaggregation model used in this study along with its associated estimated parameters calculated using AMOS version 20.

To ascertain the validity of the SEM model, Koufteros [40] suggested that the convergent validity can be established if absolute t-values are greater than 2. The estimated results of the t-values ranging from 7.44 to 9.06, significant at $p < 0.001$, satisfy $|t\text{-value}| > 2$. Thus, it can be concluded that all seven measured variables are significantly related to the TQM construct, verifying the postulated relationships among indicators and the latent con-

struct. In addition, the reliability can be established if the proportion of variance R^2 values of observed variables are greater than 0.5 [40]. The examination of R^2 value for each indicator showed that they all exceed the critical value of 0.5. From this, it can be concluded that the item reliability of hypothesised model is established.

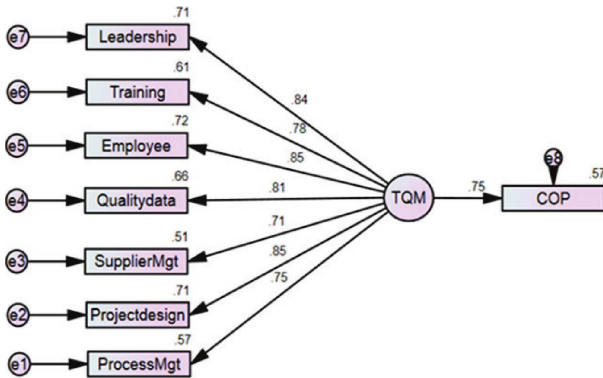


Fig. 3. Partial disaggregation model and SEM analysis results.

Model fit assessment refers to the extent to which hypothesised model fits the data, whereas unidimensionality refers to how well a set of measured variables can exist in a single underlying construct. The unidimensionality can be established when the fit indices satisfy their respective criteria [36].

Six fit indices were used for model fit assessment, adapted from the study of Koufteros [40] and Panuwatwanich et al. [36], including four incremental indices of Tucker-Lewis index (TLI), comparative-fit index (CFI), normed-fit index (NFI), and incremental-fit index (IFI); and two absolute indices of relative Chi-square (χ^2/df), and root mean square error of approximation (RMSEA). The Confirmatory Factor Analysis (CFA) was performed using the AMOS Graphics. The CFA results summarised in Table 3 give strong evidence of model fit and unidimensionality. As shown in Fig. 2, SEM analysis results indicated that TQM had a significant and positive relationship with construction organisational performance (standardised path coefficient of 0.75 at $p < 0.001$).

Table 3
Model fit indices against criteria.

Indices	Criteria	Estimated results
χ^2/df	< 3	1.395
RMSEA	< 0.08	0.015
NFI	> 0.9	0.953
TLI	> 0.9	0.974
CFI	> 0.9	0.986
IFI	> 0.9	0.986

Discussion of the results

Organisational culture and the use of TQM

Results of the cluster analysis identified three clusters including internal focus, flexibility focus, and balance focus that demonstrate similar and reasonably high mean values scores to each of the seven TQM practices. These values were significantly higher than those of control focus cluster as presented in Table 2. This finding suggests that the organisations characterised by internal focus, flexibility focus or balance focus had better performance of TQM practices than control-oriented organisations. In other words, the findings indicate that internal focus, flexibility focus or balance focus cultures are more favourable for TQM implementation than control focus culture.

As presented in the cluster analysis results, internal focus culture is dominated by both clan and hierarchy cultures. This type of culture emphasises both the human relations and internal process of the firms in order to maintain the socio-technical system, and gain the organisational objectives of human resources development, consolidation and equilibrium [24]. Similarly, flexibility focus culture is dominated by both clan and adhocracy cultures. It emphasises the human relations and open systems towards the development of human resources as well as expansion and transformation of the organisations [24]. This type of OC has also been known as “culture for TQM” according to Gimenez-Espin et al. [17]. While internal focus culture was dominated by clan culture, flexibility focus culture was dominated by both clan and adhocracy culture. For these reasons, the first proposed hypothesis (H1) “Vietnamese construction organisations dominated by either clan or adhocracy cultures are favourable for the success of TQM implementation” can be supported.

These findings once again reinforce the important role of clan and adhocracy cultures for successful TQM implementation as identified by many previous studies [11, 17, 28, 41]. It has been suggested that once TQM has been introduced into an organisation, it often meets some forms of resistance deriving from individual compliance with the organisational mandate flows from factors such as trust, long term commitment, participation in decision making, and incentives [28]. For the organisations that are dominated by clan and adhocracy culture, a positive correlation with a climate of trust, positive attitude toward the organisation, and equity of rewards could be found as a result of that OC values [28]. The resistance to the TQM implementation, therefore, becomes less for these organisations. In addition, due

to its own nature, clan and adhocracy cultures imply most of TQM dimensions such as commitment, customer orientation, continuous improvement, motivation and training of workers, innovation, and availability of quality information [17]. This, therefore, could explain why these types of OC are more favourable for the TQM implementation.

Previous studies indicated that hierarchy culture itself does not have any links to the TQM implementation [27], or have negative relationships with TQM [17]. However, the finding of the present study indicates that when the hierarchy is integrated with the clan to be the dominant OC, it could foster the successful implementation of TQM. This can lead to two suggestions: either the hierarchical value has no effects on the TQM implementation, and the effects are solely caused by clan values, or hierarchical values become supportive of the TQM implementation when they are combined with the values of clan culture. This unclear conclusion may require further studies to estimate exactly the role of hierarchy model in internal focus culture.

The results also indicated that the control focus cluster had significantly lower scores on the seven constructs of TQM than the other three clusters. This suggested that control focus culture did not favour TQM implementation in Vietnamese construction organisations. Thus, the second proposed hypothesis (H2) “Vietnamese construction organisations dominated by both hierarchy and market cultures are unfavourable for the success of TQM implementation” can be accepted. This finding is consistent with the findings of Gimenez-Espin et al. [17] as control-oriented had a negative effect on the quality management system. The finding implies that excessive focus on control could lead to the reduction of freedom and responsibility of employees to get involved and contribute to continuous improvement and error reduction [17]. In addition, orientation towards fixed objectives, goals, and the lowest transaction costs with suppliers, customers and workers, might lead to adverse effects on the successful implementation of TQM [42, 43].

An additional finding of this study was the supportive effects of balance focus culture on the successful implementation of TQM. This implies that when a balance of the four types of OC (clan, adhocracy, hierarchy, and market culture) is maintained by the organisations, it could also create a supportive environment for nurturing TQM success. This finding was supported by the underlying assumption of the CVM regarding the importance of balance as noted by Denison and Spreitzer [44] that when one type of culture is overemphasised or ignored, the organi-

sation may become dysfunctional. At that time, the strengths of specific types of OC may even become weaknesses. This finding made the hypothesised cases become more comprehensive and provided another approach for the firms to successful TQM implementation.

TQM and organisational performance of construction firms

SEM analysis results indicated that TQM had a significant and positive correlation with construction organisational performance. This finding provides support to the third proposed hypothesis (H3) “TQM positively and significantly correlates with the organisational performance of Vietnamese construction firms”. The finding of the present study was also consistent with those of Elghamrawy and Shibayama [4], and Pheng and Teo [3] which also suggested the positive influence of TQM on construction organisational performance. The finding is also supported by many other studies that investigated other industries, employed different measurement constructs and different research methodologies (e.g. Kaynak [2] from manufacturing and service industries). Similarly, the studies by Fotopoulos and Psomas [45], and Douglas and Judge [46], focusing on manufacturing and service industries, and medical industry, all found the same positive effects of TQM on organisational performance as the present study. It is stated that if the results of the multiple studies employing different approaches are consistent, then the strong conclusion can be made about the strength and generality of the findings [47]. Overall, this finding indicates that although construction industry has distinctive attributes in comparison to the others, construction firms, particularly in Vietnam can still benefit from proper TQM implementation.

Conclusion

This study proffered the application of TQM as one means by which Vietnamese construction firms can improve their performance. In doing so, the study sought to understand what types of organisational culture are favourable for the successful TQM implementation in Vietnamese construction firms and whether the TQM implementation can lead to improved performance. OC profile of Vietnamese construction firms appears to present the dominant features of clan and hierarchy cultures according to the classification of CVF. This type of culture was also found to be characterised by an internal focus culture as classified according to the cluster analysis results. In addition, cluster analysis results in-

dedicated that in parallel with flexibility and balance focus cultures, internal focus culture was found to be favourable for the use of TQM. In light of these findings, it can be concluded that the overall OC of Vietnamese construction firms could provide a supportive environment for the TQM application and implementation. In addition to the established relationship between the TQM implementation and organisational performance improvement, it can be concluded that Vietnamese construction firms can achieve better performance when the TQM philosophy is in place. Such improved performance can be seen as aggregated improvement in the quality of work, external customer satisfaction, safety, market share, the effectiveness of planning, labour efficiency, the rate of successful tenders or quality contractor selected, competency in management human resources, risk control, and manager's competency.

On a final note, the findings from this study should be interpreted in light of two main limitations. Firstly, the limited sample size included in this study might not represent the full range of cultural profiles of the construction organisations across the industry. A larger sample would be required in the future research to address this shortcoming. Secondly, the TQM variable was operationalised as a latent construct. Therefore, it was not possible to understand the role of each TQM practice on the firm performance, and how it could be impacted by organisational culture. The future research would benefit from disaggregating these TQM practices to understand their relationships with other constructs.



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References

- [1] Terziovski M., Samson D., *The link between total quality management practice and organisational performance*, International Journal of Quality Reliability Management, 16, 3, 226–237, 1999.
- [2] Kaynak H., *The relationship between total quality management practices and their effects on firm performance*, Journal of Operations Management, 21, 4, 405–435, 2003.
- [3] Pheng L.S., Teo J.A., *Implementing Total Quality Management in Construction Firms*, Journal of Management in Engineering, 20, 1, 8–15, 2004.
- [4] Elghamrawy T., Shibayama T., *Total Quality Management Implementation in the Egyptian construction industry*, Journal of Management in Engineering, 24, 3, 156–161, 2008.
- [5] Pradhan R.P., Bagchi T.P., *Effect of transportation infrastructure on economic growth in India: the VECM approach*, Research in Transportation Economics, 38, 1, 139–148, 2013.
- [6] Nguyen L.D., Lan D.T.X., Ogunlana S.O., *A study on project success factors in large construction projects in Vietnam*, Engineering Construction and Architectural Management, 11, 6, 404–413, 2004.
- [7] Moore C., Nguyen T.T.H., Saladini M., *Vietnam Infrastructure*, Italian Trade Commission and Mekong Research, 2010.
- [8] Pham T.K., Panuwatwanich K., *Management styles and employee satisfaction: the role of cultural diversities*, Proceedings of the 14th East Asia-Pacific Conference on Structural Engineering and Construction (EASEC14), Ho Chi Minh City, Vietnam, 1425–1432, 2016.
- [9] Ling F.Y.Y., Hien M.B.T., *Boosting project outcomes through alignment: a case study of Vietnam*, Australasian Journal of Construction Economics and Building, 14, 2, 73–86, 2014.
- [10] Deal T.E., Kennedy A.A., *Corporate cultures: the rites and rituals of organizational life*, Addison-Wesley, Mass, 2, 98–103, 1982.
- [11] Prajogo D.I., McDermott C.M., *The relationship between total quality management practices and organizational culture*, International Journal of Operations & Production Management, 25, 11, 1101–1122, 2005.
- [12] Deshpande R., Farley J.U., Webster Jr F.E., *Corporate culture, customer orientation, and innovativeness in Japanese firms: a quadrad analysis*, The Journal of Marketing, 23–37, 1993.
- [13] Besterfield D.H., Besterfield-Michna C., Besterfield G.H., Besterfield-Sacre M., *Total Quality Management*, Prentice Hall, Upper Saddle River, 1999.
- [14] Evans J.R., *Total Quality Management, Organization, and Strategy*, Rob Dewey, Canada, 2005.
- [15] Baird K., Hu K.J., Reeve R., *The relationships between organizational culture, total quality management practices and operational performance*, International Journal of Operations Production & Management, 31, 7, 789–814, 2011.
- [16] Cheng C.W., Liu A.M., *The relationship of organizational culture and the implementation of total quality management in construction firms*, Surveying & Built Environment, 18, 1, 2007.
- [17] Gimenez-Espin J.A., Jiménez-Jiménez D., Martínez-Costa M., *Organizational culture for total quality management*, Total Quality Management & Business Excellence, 24, 5–6, 678–692, 2013.
- [18] Cameron K.S., Quinn R.E., *Diagnosing and Changing Organizational Culture: Based on the Compet-*

- ing Values Framework, Jossey-Bass, San Francisco, 2006.
- [19] Irani Z., Beskese A., Love P.E., *Total quality management and corporate culture: constructs of organisational excellence*, Technovation, 24, 8, 643–650, 2004.
- [20] Ferreira A.I., Hill M.M., *Organisational cultures in public and private Portuguese Universities: a case study*, Higher Education, 55, 6, 637–650, 2008.
- [21] Howard L.W., *Validating the competing values model as a representation of organizational cultures*, The International Journal of Organizational Analysis, 6, 3, 231–250, 1998.
- [22] Lamond D., *The value of Quinn's competing values model in an Australian context*, Journal of Managerial Psychology, 18, 1, 46–59, 2003.
- [23] Quinn R.E., Rohrbaugh J., *A spatial model of effectiveness criteria: Towards a competing values approach to organizational analysis*, Management Science, 29, 3, 363–377, 1983.
- [24] Quinn R.E., *Beyond rational management: Mastering the paradoxes and competing demands of high performance*, Jossey-Bass, 1988.
- [25] Jung C.G., *Psychological types: The collected works*, Routledge and Kegan Paul, London, 1971.
- [26] Cameron K.S., Freeman S.J., *Cultural congruence, strength, and type: relationships to effectiveness*, Research in Organizational Change and Development, 5, 23–58, 1991.
- [27] Zu X., Robbins T.L., Fredendall L.D., *Mapping the critical links between organizational culture and TQM/Six Sigma practices*, International Journal of Production Economics, 123, 1, 86–106, 2009.
- [28] Dellana S.A., Hauser R.D., *Toward defining the quality culture*, Engineering Management Journal, 11, 2, 11–15, 1991.
- [29] Nguyen T.P., Chileshe N., *Revisiting the critical factors causing failure of construction projects in Vietnam*, Proceedings of the 29th Annual ARCOM Conference, Association of Researchers in Construction Management, 929–938, 2013.
- [30] Luu T.V., Kim S.Y., Cao H.L., Park Y.M., *Performance measurement of construction firms in developing countries*, Construction Management and Economics, 26, 4, 373–386, 2008.
- [31] Long N.D., Ogunlana S., Quang T., Lam K.C., *Large construction projects in developing countries: a case study from Vietnam*, International Journal of Project Management, 22, 7, 553–561, 2004.
- [32] Arditi D., Gunaydin H.M., *Total quality management in the construction process*, International Journal of Project Management, 15, 4, 235–243, 1997.
- [33] Panuwatwanich K., Stewart R.A., *Evaluating innovation diffusion readiness among architectural and engineering design firms: Empirical evidence from Australia*, Automation in Construction, 27, 50–59, 2012.
- [34] Ali H.A.E., Al-Sulaihi I., Al-Gahtani K.S., *Indicators for measuring performance of building construction companies in Kingdom of Saudi Arabia*, Journal of King Saud University Engineering Sciences, 25, 2, 125–134, 1997.
- [35] Field A., *Discovering statistics using IBM SPSS statistics*, Sage, 2013.
- [36] Panuwatwanich K., Stewart R.A., Mohamed S., *The role of climate for innovation in enhancing business performance: the case of design firms*, Engineering, Construction and Architectural Management, 15, 5, 407–422, 2008.
- [37] Pallant J., *SPSS survival manual*, McGraw-Hill Education, Berkshire, 2013.
- [38] Lei P.W., Wu Q., *Introduction to structural equation modeling: Issues and practical considerations*, Educational Measurement: Issues and Practice, 26, 3, 33–43, 2007.
- [39] Bagozzi R.P., Edwards J.R., *A general approach for representing constructs in organizational research*, Organizational Research Methods, 1, 1, 45–87, 1998.
- [40] Koufteros X.A., *Testing a model of pull production: a paradigm for manufacturing research using structural equation modeling*, Journal of Operations Management, 17, 4, 467–488, 1999.
- [41] Jabnoun N., Sedrani K., *TQM, culture, and performance in UAE manufacturing firms*, The Quality Management Journal, 12, 4, 8, 2005.
- [42] Deming W.E., *Improvement of quality and productivity through action by management*, National Productivity Review, 1, 1, 12–22, 1981.
- [43] Flynn, B.B., Schroeder R.G., Sakakibara S., *A framework for quality management research and an associated measurement instrument*, Journal of Operations Management, 11, 4, 339–366, 1994.
- [44] Denison D.R., Spreitzer G.M., *Organizational culture and organizational development: a competing values approach*, Research in Organizational Change and Development, 5, 1, 1–21, 1991.
- [45] Fotopoulos C., Psomas E.L., *The structural relationships between TQM factors and organizational performance*, The TQM Journal, 22, 5, 539–552, 2010.
- [46] Douglas T.J., Judge W.Q., *Total quality management implementation and competitive advantage: the role of and competitive structural control and exploration*, Academy of Management Journal, 44, 1, 158–169, 2001.
- [47] Palich L.E., Cardinal L.B., Miller C.C., *Curvilinearity in the diversification-performance linkage: An examination of over three decades of research*, Strategic Management Journal, 21, 2, 155–174, 2000.