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A Survey of TQM Implementation within UK Construction SME's

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Abstract
This research paper focuses on the practical issues associated with implementing TQM Systems within Small and Medium Sized Construction Related Organisations. The findings of the paper are based upon a comprehensive literature search and empirical studies conducted with 63 construction firms either adopting the TQM process or intending to.

Thirty-four different quality features are correlated with four different performance measures. The study used Canonical correlation methods to correlate simultaneously the quality features to the assessment of performance measures. In summary it can be stated that the rate of implementing quality related initiatives is high in organisations having a formal TQM system. Where as for those organisations that may not be implementing TQM, the findings suggest that these organisations do have some informal TQM in place based on the relative advancement indices.

This paper concludes by presenting a new methodology for classifying organisations based on the spiral approach. It involves nine new different classifications. It further introduces a new grouping called middle of the road organisations and splits the existing Award winners, Improvers and Drifters into six mirror images new groupings.

Keywords
Total Quality Management (TQM), SME's, Questionnaires, European Foundation For Quality Management (EFQM)

1. Introduction

This paper presents the findings of an ongoing investigation into the application of total quality management within small and medium sized construction organisations. (Chileshe and Watson, 2001) The literature review establishes that much has already been written on TQM in the health care, manufacturing and construction sectors, but the focus has been on the deployment process and the identification of the pitfalls rather than offering solutions to any problematic issues associated with the implementation process. Others studies have focussed on large organisations (Anderson & Sohal, 1999). Furthermore, only those organisations implementing TQM are usually targeted when conducting research. This omission was thought to lead to an ineffective analysis of the implementation problem. This research redresses the imbalance by including non-deploying organisations, seeking their perspectives of TQM and

identifying their critical success factors. By involving both implementing and non-implementing organisations, the survey results would serve as an indication to the non-deploying organisations by way of identifying the levels of quality initiatives in their organisations.

2. Survey Methodology & Sampling Procedure

The sample for the study consisted of 350 UK constructional related organisations randomly selected from the FAME database. A total of 82 organisations responded giving a response rate of 23%. Nineteen of the responses were unusable due to incomplete data. The analyses are based on the remaining 63 organisations. An internal consistency analysis was carried out to each of the ten constructs and the results are summarised in table 3. Apart from the "adopting the quality philosophy" construct, the remaining constructs ranged from 0.7828 to 0.9339 thus indicating a high reliability of scales as values are > 0.7. (Nunnally, 1967). Because of the small sample, a measure of the sampling adequacy using the Kaiser-Meyer-Olkin (KMO) was carried out and the results are indicated in table 1 & 3.

Table1: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.788
Barlett's Test of Sphericity	Approx. Chi-Square	2122.867
	df	561
	Sig	.000

It's recommended that the value of KMO should be greater than 0.5 if the sample is adequate. (Field 2000). The above result of 0.788 indicates that the sample was adequate for each unfactorial determination.

3. Discussion of the Results and Findings

3.1 Respondents Profile

Table 2: Sample Data

Implementing TQM	Number of Employees						Total
	Under 10	11-49	50-99	100-249	250-499	> 499	
Yes			5	7	8	0	20
No	1	6	7	14	18	1	43
Total	1	6	12	21	26	1	63

Designation of respondents in terms of frequency was as follows, Chief Executive Officer (1), Quality Director (6), Quality Co-ordinator (1), Managing Director (15), Quality Manager (30) and Others (10). Therefore this study represents top management assessment of current quality management initiatives in the UK constructional related SMEs. The range of respondents in terms of their business activities were Main Contractor (55), Management (2), Suppliers (2), Sub-Contractors (2), and Subcontractor/suppliers (2)

3.2 Data for the Investigation

The second part of the questionnaire was designed to identify the critical success factors and was based on Powell (1995). This has 34 variables based on the ten deployment constructs: executive commitment, quality philosophy, customer focus, supplier focussed, benchmarking, and training, open organisation,

employee empowerment, quality initiatives and measurement. The results of the descriptive statistics such as the mean and standard deviation are given in table 3.

3.3 Analysis

SPSS package was used for the analysis. The results of the descriptive statistics such as the mean and standard deviations are presented in table 3. The *relative advancement index* (RAI) derived to summarize the advancement of each implementation construct was computed as

$$RAI = \frac{\sum w}{AxN} \quad \text{.....Equation 1.0}$$

Adopted from Holt *et al* (1997)

Where: w = weighting as assigned by each respondent in a range 1 to 5, where 1 implies 'have not begun implementation' and 5 implies 'highly advanced in implementation'; A = the highest weight (5); N= the total number in the sample.

Table 3: Descriptive Statistics & Results of Internal Consistency Analysis

Implementation Construct	Number of items	TQM Organisations (N =20)			Non-TQM (N = 43)		KMO[c]	Coefficient Cronbach (a) alpha[d] -
		Mean	Rank[b]	SD	Mean	Rank[b]		
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
1. Executive Commitment	3	4.10	1	0.940	2.92	3	0.689	0.9339
2. Adopting the philosophy	3	3.27	4	1.083	2.50	6	0.478	0.5700
3. Customer Focussed	4	3.80	2	1.150	3.06	1	0.801	0.8949
4. Supplier Focussed	3	3.07	6	1.130	2.50	7	0.645	0.7828
5. Benchmarking	3	2.60	10	1.386	2.12	9	0.709	0.8883
6. Training	4	2.65	9	1.257	2.55	5	0.673	0.8779
7. Open Organisation	3	3.17	5	1.356	2.93	2	0.767	0.9314
8. Employee Empowerment	4	3.05	8	1.310	2.23	8	0.845	0.9187
9. Zero Defects	3	3.43	3	1.489	2.92	4	0.665	0.8434
10. Measurement	4	3.05	7	1.134	2.11	10	0.776	0.8986

a - The mean scores for each construct are on a scale of 1-5. The value is used as a measure of central tendency.
b- Ranking based on the mean values, 1 as most important factor/construct and 10 as the least
c -The Kaiser-Meyer-Olkin Measure of Sampling Adequacy
a[d] - value of 0.6 or above indicates strong scale reliability

3.4 Summary of The Findings

The means and standard deviations for the ten deployment constructs for the SME's constructional related organisations are shown in table 3. For TQM deploying organisations, the means ranged between 2.65 and 4.10 while for Non-TQM between 2.11 and 3.06. A score of 4 or more indicates highly advanced in the deployment of the TQM initiative or practice. A score of less than 2.0 indicates that the organisations have not begun the deployment of the TQM practice. For ease of discussion, the ten deployment constructs are further grouped into the following five categories namely; Vision Leadership, Customer Orientation, Supplier Orientation, Workforce and Process Management. The findings are presented in the following sections

4. Impact of the Union on TQM Implementation

The Implementation of TQM can equally be affected by employee relations. Literature review showed that organisations with trade unions had a major impact on the internal culture of a firm. For example, a unionised work force can limit the effectiveness of such TQM elements as flexible work assignment; merit based promotion rules, and formal performance appraisals. (Kochan *et al*, 1986). In order to address this aspect the following question was posed: "Is your organisation unionised?" The findings from this survey indicated that the absence of the union had no impact on whether an organisation implemented TQM.

4.1 Visionary Leadership: Executive Commitment & Quality Philosophy

Executive Commitment had the highest mean rating for TQM deploying organisations indicating that Executive commitment is possibly the most important element in TQM. This can be equated to leadership as used in other studies. The small standard deviation for the executive commitment indicates that there is a high rate of advancement for this construct among the TQM deploying organisations. For Non-TQM deploying organisations, this construct was ranked third. Typical responses from these organisations ranged from having difficulties with the word "program"; instead organisations were committed to providing quality. Leadership in TQM requires the manager to provide an inspiring vision, make strategic directions that are understood by all and to instil values that guide subordinates.

4.2 Customer Orientation: Customer Focus

Customer focus had the second highest overall mean for TQM deploying organisations followed by a culture of zero defects, adopting the quality philosophy (4), open organisation, supplier focus, measurement, employee empowerment, training and lastly benchmarking. Customer had the highest mean rating and the least was measurement for Non-TQM deploying organisations.

4.3 Supplier Orientation: Supplier Focus

One respondent stated that "we demand quality- how it is achieved is up to the supplier-if they don't want to lose our business. The Literature review suggests that TQM can only be successful if others contributed towards the effort. This calls for supplier chain partnership as advocated by Egan (1998; 2002). This is evident in both types of organisations.

4.4 Workforce: Training, Open Organisation and Employee Empowerment

Training was one of the two constructs that scored a mean of less than 3 for TQM deploying organisations. This indicates that the level of advancement in these essential TQM principles is low. This finding is contrast with the study by Tan (1997) who states that for TQM to work; the workforce must not only be trained, but must be "trusted" to make informed decisions on how to improve the work process continuously. It's suggested that less bureaucracy often conflicts with program. TQM is built on a foundation of ethics, integrity and trust. Both types of organisations acknowledge this fact as evident from the mean values the open organisation variables. According to management theory and existing dichotomous as proposed by various researchers (Ahmad & Sein, 1997; Watson & Chileshe, 1998, and Watson & Korukonda, 1999), SME's need to adopt the mechanistic structure as opposed to organistic if implementation of any nature is to succeed.

4.5 Process Management: Zero defects, Measurement and Benchmarking

Application of zero-defects was considered to be very important by both types of organisations as indicated by the mean scores of 3.43 & 2.92 for TQM and Non-TQM Organisations respectively. On the

other hand, this is not complemented by employee training in statistical methods for measuring and improving quality. Benchmarking was identified as the weakest area for Non-TQM deploying organizations. This is not surprising as they have no desire in fully implementing TQM; therefore researching best practice of other organisations is out of question. However Zairi (1992) states that benchmarking is necessary for TQM Implementation.

Table 4: Classification of Organisations based on the Advancement/Commitment Matrix

Current Groupings	Proposed Groupings	Classification	Rank	Weightings[a] (x,y)
(1)	**(2)**	**(3)**	**(4)**	**(5)**
1. World Class	World Class Organisations (WCO)	HH	1	(0.8, 0.8)
2. Award Winners	Award Winners-1	HM	2	(0.8, 0.5)
	Award Winners-2	MH	3	(0.5, 0.8)
3. Improvers	Improvers-1	HL	4	(0.8, 0.2)
	Middle of The Road	**MM**	5	(0.5, 0.5)
	Improvers-2	LH	6	(0.2, 0.8)
4. Drifters	Drifters-1	ML	7	(0.5, 0.2)
	Drifters-2	LM	8	(0.2, 0.5)
5. Uncommitted	Uncommitted	LL	9	(0.2, 0.2)

a – weightings derived from Chileshe *et al* (2003)

5. Classification of Organisations based on the Spiral Approach

This section attempted to explain the rationale behind and meaning of the spiral approach. Only organisations having the same level of commitment & advancement will lie on the diagonal route that ranges from three levels, Low (L), Medium (M) & High (H). This three-dimensional classification of organisations led to nine possible types of organisations (Fig 1): Whereas in the current classification, all the five categories lie on the diagonal, this proposed method takes into account loss of focus in either advancement or commitment of the ten deployment constructs. Hence the new group of Improvers namely Improver-A and B, (denoted as HL & LH on fig 1 respectively), Awarder winner 1 & 2 would be expected to lie on either side of the neutral axis (see Fig 1).

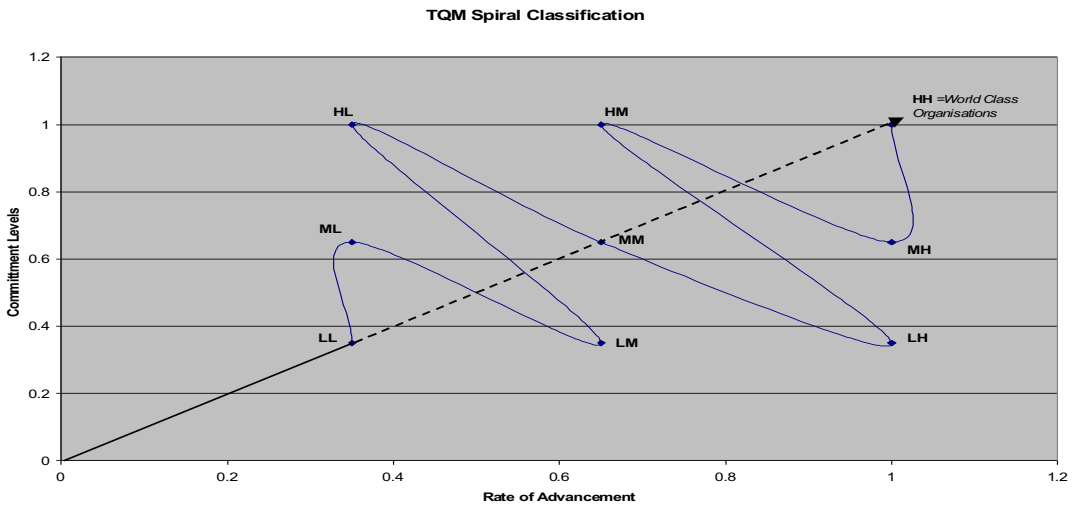

Fig 1: TQM Spiral Classification

The other new grouping of "Middle of the Road" (MM) allows time for reflection of what lies ahead in order to achieve the desired goal.

6. Conclusions

This study has established that TQM-deploying organizations display a number of common features, such as top management commitment, adopting a quality philosophy and closer to customers focus. There is a need for developing a comprehensive training programme (both internal and external where needed) for all employees and management as the survey identified that both TQM and Non-TQM deploying organisations placed less emphasis on training, benchmarking and on entering an EFQM award competition. Furthermore, training employees in problem solving skills and teamwork were not regarded as priorities**.** Non-TQM organisations where more customer oriented and exhibited an open organisation culture. Scheuermann *et al* (1997) identified two major TQM components as being the use of statistical tools to help abolish non-value-added activities, and a change in manager's behaviour. Based on the findings of this study**,** its proposed that contrary to the current grouping of TQM adoption into five groups as advocated by Dale (1997), nine different types are suggested using the advancement/commitment matrix, which are obtained from the analysis of the second part of the questionnaire.

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