

Impact of Organisation Size and TQM Maturity on Implementation of TQM: Empirical Findings From The UK Construction Related SMEs.

Dr Nicholas Chileshe

Senior Lecturer, School of Environment and Development
Sheffield Hallam University, Sheffield, UK

Professor Paul Watson

Head of Quality of the Built Environment Division, Faculty of Development and Society
Sheffield Hallam University, Sheffield, UK

Abstract

Studies on impact of organisational size and TQM maturity present mixed findings, with the main two schools of thought being the fact that there would be a difference between early adopters and late adopters (i.e. Powell 1995; Taylor and Wright 2003; and Reed et al 1996). The other school claiming that there is no difference between early adopters and late adopters, According to Taylor (1997). While some studies find support for a correlation between organisation size and TQM implementation, in contrast several studies have failed to find support for a direct relationship between organisation size and implementation of TQM. In addition, most of the studies conducted are in large organisations and the impact of time-lag on benefits of TQM implementation remains unexplored. Thus the motivation for this paper is to address the identified omissions.

The main aims of this paper are twofold; first to ascertain whether the perceived TQM success was associated with the length of time since adoption of TQM and organisation size, and secondly to determine whether the strengths of model relationships are affected by TQM duration and organisation size. Time-lag analysis is then addressed through contingency analysis, which involves an examination of the invariance of levels of the TQM deployment constructs across sub groups based on TQM maturity. The classification of organisations based on Ahire and Dreyfus (2000) is as follows; Recent TQM implementers (3 or few years of TQM) and Experienced TQM implementers (more than 3 years of TQM)

The findings indicate that there is little difference in the deployment of TQM based on the organisational size and duration of the program. Secondly the time between inception of the quality initiative and accruing of benefits, and the variation in a casual and the consequent variation of the caused construct is not great. Time lag is considered in this TQ-SMART model as evidenced by the inclusion of an indirect path, which emanates from the executive commitment and reaches the organisation performance variables through various intermediate variables

Keywords: Time-Lag Analysis, Organisational Size, TQM, Structural Equation Modelling, SMEs

INTRODUCTION

Despite various studies on the impact of organisation size and TQM maturity on implementation of TQM, these studies have produced mixed findings. Furthermore the issue of time lag has received little attention in contingency studies. Although Powell (1995) acknowledged the existence of time-lag between implementation and consistent performance advantages; his data however did not permit such analysis. According to Taylor and Wright (2003), time-lag analysis is best served by longitudinal studies. In their

study they asked specific questions as to whether higher levels of perceived TQM success were associated with size of organisations and the length of time since adoption of TQM.

On the other hand, Reed et al (1996) argued that time-delay between TQM Implementation and performance will be longer for firms with an operations orientation, than those with a customer orientation. Studies on time-lag analysis present mixed findings, the main two schools of thought are those for the fact there would be a difference between early adopters and late adopters (i.e. Powell 1995; Taylor and Wright 2003; and Reed et al 1996). On the other side of the coin are those claiming that there is no difference between early adopters and late adopters. Jones et al (1997) in their study of impact of time on benefits received for those seeking ISO 9000 certification could not find any differences between the longer-certified companies and recently certified. Lai and Cheng (2001) in exploring the quality initiatives within the Hong Kong setting acknowledged the importance of time-lag i.e. delayed effects of quality management implementation on quality outcomes. Sousa (2003) argues that with sufficient time elapsed since the adoption of a practice; plants or organisations are better able to make a sound cost-benefit assessment of the practice's use, however Williams et al (2003) recommends exercising caution as a series of question need clarification. Would the actual change in the financial performance indicator or independent variable is associated with the known outcome of that variable?

Time Limit: Hendricks and Singhal (2001) observes that TQM literature does not provide much theoretical or empirical guidance on what should be the appropriate length of time in examining performance. On the other hand Reed et al (1996) note that where empirical work such as this, considers firm performance and time in a manner that is similar with publication of financial data (information) i.e. annual reports and accounts for publicly quoted companies, then the time lag can be taken as the year after commencement of TQM strategy and publication of annual data. The **Effects of Time Lag** were also considered in order to isolate the effects of the time lag between inception and improvement on the degree of use of quality management practice, a cut off point between experienced and inexperienced organisations was introduced. For the purpose of this study, a three period was taken to be the demarcation between the less experienced and experienced, or early adopters and later adopters.

RESEARCH METHODOLOGY

Two levels of data analysis are conducted: a macro-level analysis of aggregate, surface characteristics of the respondents and a micro-level level analysis of deeper, fined data methods. The macro-level is concerned with the aggregate measures of the descriptive statistics, where as the micro-level, there is the evaluation of the measurement and structural model of the TQ-SMART using fine grained methods such as structural equation modelling (SEM)

Qualitative data was collected based on the following ten implementation constructs, namely, Training (TR), Employee Empowerment (EE), Executive Commitment (EC), Quality Philosophy (QP), Customer Focus (CF), Supplier Focus (SF), Measurement (ME), Benchmarking (BM), Open Organisation (OO) and Zero Defects (ZD). A survey methodology was employed of 350 questionnaires with a response rate of 22.22%. The analyses are based on the remaining 63 organisations of which 20 were TQM deploying and 43 Non-TQM deploying organisations. Respondents assigned values in a range of [1 ... 5], where 1 implies 'have not begun implementation' and 5 imply 'highly advanced in implementation'.

DEFINITION OF TERMINOLOGY

From the theoretical development viewpoint, the constructs or concepts can be defined as abstractions in the theoretical domain that express similar characteristics (e.g. construction effectiveness, executive

commitment and organisation culture). For clarity purposes and to avoid the generally accepted confusion throughout this paper, the terminology used will be that of constructs. Generally, there is confusion as to what constitutes TQM, though it can be regarded as a set of concepts and tools for getting all employees focussed on continuous improvement. A concept may be defined essentially as a business philosophy, a company ideal or a policy statement (Nilsson et al 2001). The confusion in the terminology can lead to uncertainty, as noted by Hellsten and Klefsjo (2000).

RESULTS

One of the objectives of the study was to investigate the impact of organisation size on TQM implementation, accordingly the sample was classified into small and medium sized where small was organisations having less than 100 employees and medium was more than 100 but less than 500, hence the purpose was to test the hypotheses about the differences between the two groups of organisations. Following similar studies, the hypotheses were tested using one-tailed. The results of these tests are summarised in Table 1.0. For each TQM deploying constructs, the tables provide the mean score, standard deviation, and t-value. The results are also shown graphically in Figures 1.0 and 2.0

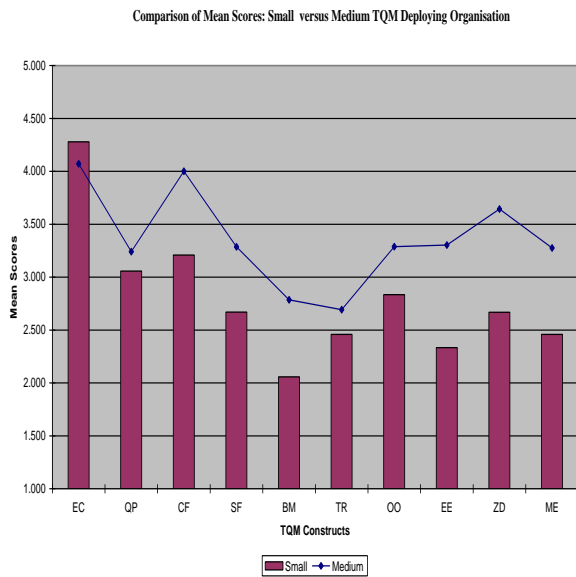


Figure 1.0: Differences in Organisation Size within TQM deploying Organisations

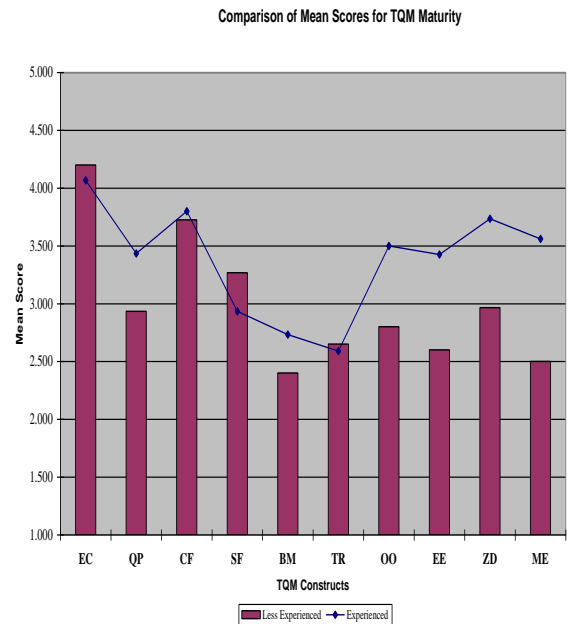


Figure 2.0: Differences in TQM Maturity within TQM deploying Organisations

With the exception of Supplier Focus (SF), no statistically significant differences between small and medium sized construction related organisations were observed. The better Supplier Focus observed by medium-sized organisations could be explained by enhanced collaboration with the suppliers. Executive Commitment (EC) was slightly higher in small-sized (mean = 4.27) than medium-sized (mean = 4.071). For the remaining constructs the medium-sized organisations had medium levels of TQM implementation (mean >3.0) apart from Benchmarking (mean = 2.785) and Training (mean = 2.693), which had low levels of TQM implementation. This finding is hardly surprising as usage of Benchmarking is low within the SMEs and in particular the Construction Industry (McCabe 2001; Dattakumar and Jagadeesh 2003). However the results of this study indicate that UK Construction related SMEs are beginning to realise the importance of process management strategies. The results demonstrate that size is not critical factor in the effective implementation of TQM elements.

However it is interesting to note that small-sized TQM deploying UK constructional related organisations scored Customer Focus as the second most important (mean = 3.21). This finding is similar to Ahire and Golhar (1996) who found small organisations to be more Customer oriented. Powell (1995) reported similar medium levels of Customer Focus (mean = 3.98) for the high performing cluster of manufacturing and service TQM deploying organisations. Hypothesis H₁₋₁₀ states that the advancement of the ten TQM constructs is different between medium and small TQM deploying UK constructional related organisations. Respondents were asked to rate on a Likert scale of 1-5 where 5 were highly advanced and 1 was low, the rate of advancement on the 10 TQM deployment constructs. Discriminant Analysis tested this hypothesis. In this case since there were only two sample groups, namely small and medium, DA yielded only one function (dimension). This function yielded a chi-square of ($p=0.000$) with 10 degrees of freedom, which was significant. This generated the standardized weights of the ten deployment constructs, which are reported in Chileshe (2004). If the weight is positive, it means that medium construction related TQM deploying UK organisations are relatively stronger than smaller organisations. If the weight is negative, it means small organisations are relatively stronger. If the weight is close to zero, it means there is no difference.

FINDINGS ON ORGANISATION SIZE

Executive Commitment

There is no statistical difference (at $p<0.01$) between small-sized (mean = 4.27) and medium-sized (mean = 4.071) organisations. This reveals that the UK Construction related TQM deploying organisations of all sizes generally perceive executive commitment in the same way. However, the small size of the standard deviation for the medium sized organisations (s.d = 0.729) shows the existence of relatively good understanding among the medium sized UK constructional related organisations of the role of executive commitment in TQM implementation. Managers of Medium-sized UK Construction related organisations put more emphasis on committing fully to a quality program, actively championing their quality program and actively communicating the quality commitment to employees. In summary the medium-sized organisations emphasised the "3Cs" more than the small-sized organisations.

Adopting the Quality Philosophy

Statistically there is no difference (at $p<0.01$) between small (mean=3.06) and medium-sized (mean=3.24) organisations. This reveals that the UK Construction related TQM deploying organisations of all sizes generally perceive adopting the Quality Philosophy in the same way. This means that perception of adopting the Quality Philosophy as a quality improvement practice varies with the implementation of TQM in the SMEs. The medium sized UK Constructional related SMEs put more emphasis on including the quality principles in their vision and mission statements, on an overall theme based on their quality programs and entering the EFQM Excellence Model award competition.

Customer Focus

However it is interesting to note that small-sized TQM deploying UK constructional related organisations scored Customer Focus as the second most important (mean = 3.21). This finding is similar to Ahire and Golhar (1996) and Gustafsson et al, (2003) who found small organisations to be more Customer oriented. Powell (1995) reported similar medium levels of Customer Focus (mean = 3.98) for the high performing cluster of manufacturing and service TQM deploying organisations. The TQ-SMART Model (Chileshe et al, 2003; Chileshe, 2004) takes into account the size of the organisation in determining which of the Implementation constructs needed further consideration. Ahire and Golhar (1996) found that size does not have an effect on the implementation of TQM; however, no cut off point has been suggested, as to the minimum number of employees required before an organisation can embark on a formal TQM implementation program. This research posits that there are differences in the weights attached to the implementation constructs. The SME's organisations should be further classified into the macro, micro, small/medium and an adjustment factor applied to the Implementation Constructs. Due to the number of organisations in the sample, only the small-sized and medium sized organisations were considered. On the

contrary, Mann and Kehoe (1995) found small organisation to have a lower difficulty of implementing TQM as opposed to larger organisations.

FINDINGS ON TIME LAG (TQM MATURITY)

Degrees of Decline in the Implementation of the Construct

However contrary to the notion that TQM maturity would result in a higher degree of the TQM implementation was rejected in three of the constructs. These were Executive Commitment, Supplier Focus and Training. In order to ascertain the degree to which the observation of those constructs declined as opposed to improving the gap between the less experienced and experienced was taken as three years. This is supported in literature (Ahire, 1996).

The slope in Figure 4.0 shows the extent of degree of decline, which can be computed using simple trigonometry. The angle is equivalent to the degree of decline and the bigger the value, the more the decline. Using the differences in the mean score obtained from Table 2.0 and as plotted on the Y-axis and dividing that by the 3-year gap generated, the following values for Executive Commitment, ($\Delta_{EC}= 2.29\%$), Supplier Focus ($\Delta_{SF}= 18.0\%$), and Training ($\Delta_{TR}= 0.95\%$) could be determined.

Table 1.0: Mean Score Comparison of Less Experienced and Experienced TQM Deploying Organisations (n=20)

Hypothesis	Implementation Constructs	Less Experienced (N=10)		Experienced (N=10)		t-value
		Mean _a	sd	Mean _a	sd	
H ₁₋₁	Executive Commitment	4.20	.819	4.07	.782	.372
H ₁₋₂	Adopting the philosophy	2.93	.751	3.44	.686	-1.557
H ₁₋₃	Customer Focus	3.73	1.050	3.80	.832	-.177
H ₁₋₄	Supplier Focus	3.27	.813	2.93	.734	.964
H ₁₋₅	Benchmarking	2.40	1.062	2.73	1.498	-.573
H ₁₋₆	Training	2.65	1.075	2.60	1.164	.110
H ₁₋₇	Open Organisation	2.80	1.326	3.50	1.218	-1.229
H ₁₋₈	Employee Empowerment	2.60	1.324	3.43	.874	-1.644
H ₁₋₉	Zero Defects	2.97	1.282	3.73	1.205	-1.381
H ₁₋₁₀	Measurement	2.50	1.106	3.56	1.204	-2.051
	Average Mean	3.005		3.379		

Source: (Chileshe, 2004),

The values are obtained as follows; Executive Commitment Degree of Decline = Δ Mean Score / 3 Years = $(4.20-4.07) / 3 = 0.04$, therefore the formula used can be summarised as follows: degree of decline (DoD) = (Δ) change in mean score divided by difference in the years of TQM maturity.

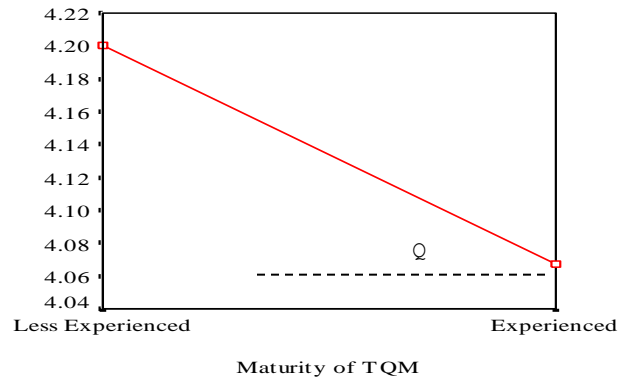


Figure 3.0: Degree of Decline for the Executive Commitment Construct

The Implications of the findings were as follows; with the TQM Implementation maturing, complacency for the executive commitment seeps in, as they are comfortable; as it was hypothesized that executive commitment would increase with time. However, this is not the case with the UK Construction related SMEs. On a positive side, the actual degrees of decline are minimal compared with that of Supplier Focus ($\Delta_{SF} = 18.00$). The implication of this finding is that the Supplier Relations do not improve over time for the UK Construction-related SMEs. This is very consistent with literature on Supply Chain Management within the Construction Industry (Holits et al, 2000; Akintoye et al, 2000; Egan, 1998)

Training Construct

On the training construct, there is not any remarkable difference with the training aspirations of organisations relative to the time since the implementation started. This could be attributed to the cost associated with training which rules out the need for that. Alternatively some of the new employees may bring with them the necessary skills in problem solving and quality principles. The major finding is that time does not change the "training ethos" of UK Constructional related SMEs, as it is associated with cost. This implies that UK Construction related SMEs do not change attitudes with respect to training. On the contrary, as organisations grow, the needs of training become apparent as indicated in Table 1.0.

OTHER METHODS CONSIDERED

Other methods considered are the usage of Total Quality Management Index (TQMI) (gap) between early implementers and experienced implementers. Furthermore time is considered in the model (see Forza and Fillippin, 1998). Secondly time lag between the variation in a casual and the consequent variation of the caused construct is not great.

DISCUSSION OF RESULTS

The findings reported are different from Ahire (1996) who observed that various TQM implementation elements would be more extensively implemented in more TQM experienced firms as compared to less experienced TQM firms. On the contrary, the less experienced UK Constructional related TQM deploying SMEs had slightly extensive implementation of the three constructs namely Executive Commitment, Supplier Focus and Training. The finding promoted the intuition for the sub hypothesis that TQM excellence not only lies with organisation size but also partially affected by time factor. The findings were contrary to the organization learning theory which proposes that the implementation effectiveness of TQM will increase with TQM maturity in the firm (Ahire and Dreyfus, 2000) and that of the learning curve, which states that the longer the firm remains in operation, the better is the learning of management knowledge and experience. Sohail and Hoong (2003). According to Garvin (1993), this is associated with an organisation's ability to explore the unknown and to identify and pursue novel solutions, which can be equated, to innovation. Chileshe and Watson (2005) developed a simple matrix for the assessment of the continua, which enables the UK Construction-Related SMEs to ascertain the best fit in terms of pursuing a

"control" or "learning" approach. The findings indicate that the TQM deploying UK Construction-Related SMEs were neither at the end of both continua; instead they exhibited both the Customer and Process orientation.

Whilst this study does not advocate the change of organisational size as an instrument of becoming more TQM oriented, it is worthwhile for a Manager to know the variation in TQM implementation levels as a function of size in the UK Construction Industry, in particular among the small and medium sized organisations. The influence of organisation size on TQM implementation has been investigated before. However, support for organisation size in making an indirect contribution to the implementation of TQM is somewhat mixed in both manufacturing and service industries. While some studies (Brah et al, 2002; Powell, 1995; Goldschmidt and Chung, 2001) find support for a correlation between organisation size and TQM, in contrast several earlier and recent studies (Ahire and Golhar, 1996; Taylor and Wright, 2003; Yeung et al, 2003) have failed to find support for a direct relationship. In addition, most of the studies are conducted in large organisations. In this study, the medium sized organisations were put in a different category from the small-sized organisations. An analysis of the levels of TQM implementation showed that the medium-sized organisations were not significantly different from the small ones. While the mean of the level of TQM implementation in medium-sized organisations is higher than that of small-sized organisations, the difference is not significant. For instance, the small-sized scored the Customer Focus as the second most important mean. This is in agreement with earlier studies by Ahire and Golhar, 1996; and a recent study by Gustafsson et al (2003), which concluded that small organisations to be more customer oriented.

CONCLUSIONS

The findings of this study are significant as they contribute to the debate on the impact of organisation size and maturity of quality initiatives to the implementation process. Furthermore the study contributes to the theory development in contingency studies. The findings in this study are also significant because none of the previous studies isolated and investigated the position of small and medium sized organisations within the construction-related environment. The study is also unique as it allowed the control variable of environmental factors in determining the impact of TQM on business and organisational performance. Furthermore, organisation size does not impede the implementation of TQM. The interpretation of the impact of the implementation of TQM associated with the maturity drew some interesting findings. First with the learning curve, it was hypothesized that the experienced TQM deploying UK Constructional related SMEs exhibited a high level of advancement of the ten TQM constructs compared with the less experienced TQM deploying UK constructional related SMEs. However contrary to the notion that TQM maturity would result in a higher degree of the TQM implementation was rejected in three of the constructs. These were executive commitment, supplier focus and training. In order to ascertain the degree to which the observation of those constructs declined as opposed to improving the gap between the less experienced and experienced was taken as three years. This is supported in literature as provided by (Ahire, 1996).

Sousa and Voss (2002) identified one important factor in the practice performance model that requires further research as that of time lag between the implementation of quality management practices and performance. This study contributes to knowledge by extending the work of Sousa and Voss (2002). This study further extends the work of Reed et al (1996); Taylor and Wright (2003). In particular, Taylor and Wright as they reported only the degree of success as very successful, quite successful or unsuccessful. No analysis on the actual extent of implementing the deployment constructs. Furthermore, the study contributes and extends the works of Taylor and Wright (2003) who proposed exploring the trends in the five performance variables namely Customer Satisfaction, Employee Satisfaction, Process Management, Sales and Financial Performance by including the variables apart from process management in the TQ-SMART Performance element of the model SMEs.

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