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TQM and Firm Performance: A Meta Analysis

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Abstract: *Total quality management is an approach that originated in Japanese industry in 1950's and become part of manger's everyday lexicon. Total quality management is total system approach and an integral part of high-level strategy it works horizontally across functions and department involve all employees, top to bottom and extends backward and forward to involve the supply chain and the custom chain. This research is contribution to the relationship between total quality management and firm performance. Meta analytical technique is use to make generalization about the relationship between total quality management and firm performance. As might be expected TQM lead to improvement in firm performance. Further, companies implementing the TQM across the different regions of the world have significant difference in the value of their effect size.*

Key words*: TQM, firm performance and Meta analysis.*

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I. Introduction

Total quality management is a total system approach and an integral part of high-level strategy it works horizontally across functions and department involve all employees, top to bottom and extends backward and forward to involve the supply chain and the customer chain

Strategic planning institute of Cambridge, Massachusetta has been studies the relationship between quality, profitability and market share. The conclusion based on performance data of about 3000 strategic business unit. In study it was concluded that quality drives market share and when superior quality and market share are both present, profitability is virtually granted. There is no doubt that quality and profitability are strongly related. Whether profit measure is return on sales or return on investment. Business offering superior quality product/service clearly outperforms those with inferior quality.

TQM is an approach to the art of management that originated in Japanese industry in the 1950's and has become steadily more popular in the west since the early 1980's. Total quality is a description of the company that aims to provide and continuous to provide its customers with products and services that satisfy their needs (Singh, A. 2010).

World wide lot of research has been conducted to find out the total quality management effect on firm performance. Islam, R. (2013) analyzed the effect of national culture on total quality management and organizational performance. By using the regression coefficient and correlation coefficient conclude that soft and hard TQM has positive relation with performance and there is difference in organizational performance mean between the countries.

Tari, J et al. (2006), conducted a study to ascertain the relationship between quality management practices and their effect on quality outcomes. By using the structural equation modeling and correlation coefficient, they found that quality management practices have a positive impact on quality outcomes but correlation was only .399. They also found that firm could transfer the organizational forms and behavior underlying quality management to other countries with similar culture.

Su Qin et al. (2008) found that quality management practices will not have direct effect on firm performance. In fact, Quality management practices indirectly contribute to business performance through two moderators: quality performance and R&D performance.

Researches in different continents have produced different results; this study was conducted to find out whether total quality management has similar impact on organizational performance over the different Continents.

II. Objective and Hypothesis

Main objective of the study is to find out whether there is any significant difference in the effect size generated by the studies conducted to find the relationship between total quality management and firm performance in Asian, European and Miscellaneous region. And to analyze whether there is any relationship between Total Quality Management and firm performance.

H2 : There is positive correlation between Total quality management and firm performance.
H2 : There is no significant difference across the mean values of effect size in different regions of the world.

III. Methodology

These days, its common to apply the meta analysis in different the disciplines including strategic and general management for the generalization of the various relationship and identification of moderator variables (Davar,2004). Meta analysis is interpreted as secondary analysis after other researchers had done their own analysis and the purpose of Meta analysis is go beyond what had been accomplished in the past (Chang, H.). Reviewing the research has an important place in scientific progress, as it is the means by which the generality of the results of the studies can be assessed. Total quality management is an approach which is applied by organization over the world. This Meta analytical study is conducted to make generalization about total quality management has similar effect on firm performance across the countries. In present study correlation coefficient of total quality management and firm performance has been used as effect size.

Sample

The sample of 39 studies was selected from the databases like Science Direct, J-Store, SSRN, Pro Quest and by checking the references of the studies retrieved. Keywords like Total quality management and firm performance, TQM, firm performance, Quality management Systems were used to retrieved the sample. Studies were included in sample if:

- They computed correlation coefficient between Total Quality Management and firm performance
- They performed T- Statistic which we converted in correlation coefficient with the help of given formulas.
- Conceptual studies and case studies are eliminated from the selected studies to conduct the data analysis.

Firms in the final sample represent manufacturing and service industries. The most represented industries are: electrical and electronics, fabricated metal, food and beverages, textile, wood, telecom, hotel and education. All sized firms i.e. small, medium and large are included in the sample. According to European Union criteria (recommendations of European commission 96/280/ce) there size segment were defined, small (10-49 workers), medium sized (50-249 workers) and large companies (250 or more employees).

Sample of 39 studies is divided into three groups i.e. 13 studies in each group. In first group studies conducted in Asian region was included, in second group studies conducted in European region was taken and third group is miscellaneous in which studies conducted in USA, Africa and Australia are included.

Meta Analysis

Glass (1976, p3) defined the Meta analysis formally as the statistical analysis of a large collection of analysis results from individual studies for the purpose of integrating the findings. According to Glass, the meta analyst a) uses objective methods to find studies for a review (b) describe the features of the studies in the quantitative or quasi quantitative terms (c) expresses treatment effects of all studies on a common scale of effect size and (d) uses statistical technique to relate study features to study outcomes.

There are various methodologies to conduct Meta analysis i.e. Hedges (1984), Hedges and Olkin (1985), Hunter, Schmidt and Jackson (1982), Rosenthal (1984), Slavin(1986) and Davar(2004). In terms of doing Meta analysis, the main issue is: which method should use. There are two ways to conceptualize Meta analysis: fixed and random effect model. The fixed effect model assumes that studies in the Meta analysis are sampled from a population in which the average effect size is fixed. The alternative assumption in random effect model is that the average effect size in the population varies randomly from study to study. In this study method given by Hunter, Schmidt and Jackson (1982) and Davar (2004) was used for data analysis. Main difference between these two methods is correction of measurement error. Davar (2004) provide the formula to correct the effect size for measurement error.

To combine effect sizes and in order to test hypothesis, Meta analytical method for correlation coefficients given by Davar (2004) and H, S and J(1982) and ANOVA model have been implemented with its usual assumptions being met by data set.

Assumption of ANOVA

1. Each group sample is drawn from a normally distributed population.
2. All populations have a common variance.

3. All samples are drawn independently by each other.

Table 1

group 1	author name	sample size	Correlations	group 2	author name	Sample size	correlation	group 3	author name	sample size	correlation
1	Mustafa Dilber et al.	50	0.2114	1	Hongyi Sun	316	0.4806	1	Hale kayank	214	0.2734
2	Ali Bakhit jaafreh et al.	384	0.771	2	Enrique claver et al.	85	0.225	2	Daliel I. Prajogo et al.	110	0.3782
3	shivkumar Burli et al.	80	0.4267	3	Juan Antonio Espin et al.	451	0.359	3	Fuzi Meftah et al.	65	0.2356
4	Tahir Iqbal et al.	212	0.4967	4	Micaela Costa et al.2004	713	0.2355	4	Robert chenhall	39	0.499
5	Vasanthara yalu et al	300	0.699	5	Jose Carlos Pinho	114	0.245	5	Daliel I. Prajogo et al.	194	0.35
6	Esin Sadikoglu et al.	373	0.5667	6	M. Mar Fuentes et al.	273	0.3462	6	Therese Joiner	80	0.63
7	Boo, V. H et al	63	0.168	7	Carlos A Saez et al.	256	0.213	7	Rahman	250	0.3483
8	Cemal Zehir et al.	261	0.4429	8	F.J.Llore ns Montes et al.	77	0.636	8	Thomas C powell	54	0.35
9	saumyaranj an, S et al	127	0.4973	9	Enrique claver et al.	301	0.3016	9	Joo Y. Jung et al.	230	0.5367
10	Muhamma d asif khan	250	0.798	10	Micaela Costa et al.2004	713	0.4455	10	Jayanth Jayaram et al.	394	0.5656
11	Mahfud Sholihin	52	0.588	11	J. carlos bou Llusar et al	446	0.4551	11	Fed Appiah Fening et al.	101	0.61
12	Yi chan chung et al.	79	0.4582	12	J.Merino diaz de Cerio	965	0.209	12	hale kayank et al	263	0.381
13	Masood ul hassan et al	171	0.4113	13	Juan Jose tari et al.	106	0.399	13	Sime Curkovi c	57	0.189

IV. Results and Discussion

The meta analytic results for correlations corrected for measurement error and correlation uncorrected for measurement error using Davar (2004) and H,S and J (1982) have been presented in Table 1. And results of ANOVA analysis have been shown in Table 2 and table3. The formulas for the mean estimates and true variance estimate have been listed in Annexure B.

Mean correlation

Correlation coefficient when not corrected for measurement error give mean by using the Davar(2004) formula is .4213 and by using H,S and J(1982) formula is .4157. If we correct correlation coefficient for measurement error by using the formula given by Davar(2004) to correcting correlation for measurement error in his article " Meta analysis : an improved version of Hunter, Schmidt and Jackson (1982) framework" then mean correlation raises from .421 to .5038 by using Davar (2004) Formula and from .4157 to .5 by using the H,S and J formula.

This means that in order to obtain the true picture of mean (r), we must correct 'r' values for measurement error as suggested by Davar(2004).

TABLE 1

	Davar (2004)		H,S and J(1982	
	Sample correlation uncorrected for measurement error	Sample correlations corrected for measurement error	Sample correlations uncorrected for measurement error	Sample correlations corrected for measurement error
Mean correlation	.4213	.5038	.4157	.5
Observed variance	.0264	.03684	.0274	.039
Sampling error variance	.01734	.0143	.0029	.0024
True variance	.00906	.0225	.0245	.0366
Standard deviation	.095	.15	.157	.605
Standard deviation as percentage of mean	22.59%	29.77%	37.64%	38.26%

True variance

Once the correlation coefficient have been corrected for measurement error, the true variance raises from .0096 to .0225 by using Davar(2004) formula and from .0245 to .0366 by using H,S and J(1982) formula. It means that measurement error could distort the true variance estimates. Value of true variance indicates that there is significant variance among the effect size of studies.

Standard deviation

Table 1 shows the value of standard deviation and standard deviation as percentage of mean correlation. Value of standard deviation as percentage of mean correlation raises from 22.59% to 29.77% in case of Davar formulas' and from 37.64% to 38.26% in case of Hunter, Schmidt and Jackson formulas. Analysis shows that there is significant deviation across effect size of the studies from their mean correlation.

Geographical location as moderator: ANOVA

Value of true variance and standard deviation as percentage of mean indicates that there is deviation among the effect size of studies. These variations may be due to moderator's factor i.e. geographical location of the firm, culture differences and nature of the industries. In this study geographical area has been identify as probable moderator variable. To analyze the geographical area as moderator data set of 39 studies is divided into three regions. 13 studies belong to each region i.e. Asia region, European region and Miscellaneous region. ANOVA test is performed to ascertain the difference among the regions correlation coefficients. Results of ANOVA are listed in Table 2 and in Table 3.

ANOVA

In table 2 descriptive statistics like mean values and standard deviation of different groups are shown.

Table 2 Descriptive statistic

Correlation					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
1	13	.50271	.188353	.052240	.38889	.61653	.168	.798
2	13	.35004	.129829	.036008	.27158	.42849	.209	.636
3	13	.41129	.143567	.039818	.32454	.49805	.189	.630
Total	39	.42135	.164541	.026348	.36801	.47468	.168	.798

Mean value of Asian studies is .5027, while mean value of European studies is .35004. By looking at the mean value they show the significant difference between but this may be due to the chance but statistically there is no significant difference across the groups. Mean value of miscellaneous groups is .41129.

Table 3
ANOVA

Correlation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.153	2	.077	3.156	.055
Within Groups	.875	36	.024		
Total	1.029	38			

Table 3 shows that calculated significance F value is .055 which is slightly more than .05 and .055 may be approximation of .05 and therefore we accept the null hypothesis at 5% level of significance and conclude that there is significant difference across the mean effect sizes of groups' i.e. each group is different from the other. Thus, we can say that geographical area may be a moderator which influences the relationship between total quality management and firm performance.

V. Conclusion

The adoption of TQM as quality improvement tool is uniformly implemented worldwide. Meta analysis of the studies showed that total quality management has positive effect on the organization performance Results also indicate that there are some moderator variables which influence the relationship between total quality management and firm performance. In this study an attempt has been made to find geographical area as moderator variable. By analyzing the data, it has been finding that there is variability among the effect size of studies of different region. It means that geographical location of the firm plays important role to moderate the relationship between total quality management and firm performance.

But it can't be confirmatory truth that geographical area moderates the relationship between total quality management and firm performance because study is conducted with some limitations. Firstly, group wise sample size is very small i.e. 13 studies from each group, but according to Hunter, Schmidt and Jackson sample size of 15 is perfect sample size in case of meta analysis. And other grouping of the studies was not proper. In miscellaneous group vast diversify countries are included. Less number of studies of USA and Africa continents are available so these are combined together, besides combine these vast divers' continents data provide the accurate results.

References

[1]. Chung, Y. C. et al (2008). Am empirical study of relationship between total quality management activities and business operational performance among Taiwan's High-Tech manufacturers. Journal of applied science, 8(11), 2021-2030.
[2]. Davar, S C (2004), "Meta analysis : an improved version of Hunter, Schmidt and Jackson(1982) framework", Decision, 31(2): 210-238.
[3]. Davar, S C (2006), "Meta analysis of sample correlations: the validity of Hunter, Schmidt and Jackson (1982) framework", Decision, 33(2):111-140.
[4]. Glass, G.V. (1976), "Primary, secondary and meta analysis of research", Educational Researcher, 5:3-8.
[5]. Hedges, L and Olkin, I. (1985). Statistical methods for Meta analysis, Orlando (FL) Academic press.
[6]. Hunter, J.E., Schmidt, F.L. & Jackson, G. B. (1982), "Meta analysis: Cumulating research findings across studies, New Delhi: Sage publication India Pvt Ltd 1982.
[7]. Su Qin, et al., (2008), "the impact of quality management practices on business performance: An empirical investigation from china", international journal of quality and reliability management, Vol 25 No8, pp809-823.
[8]. Tari, J.J. et al., (2007), "The relationship between total quality management practices and their effects on quality outcomes", European journal of operational research, 183, 483-501.

Annexure B: formulas for the Mean Correlation and True Variance estimates

	Hunter, j and schimidt	S.C Davar
Correlation corrected for measurement error		$r_i = \frac{rxy}{\sqrt{rxx} \cdot \sqrt{ryy}}$
Mean correlation	$\bar{r} = \frac{\sum Ni \cdot ri}{\sum Ni}$	$\rho = \frac{\sum ri}{k}$
Observed variance	$S^2_{r=} \frac{\sum Ni\,(ri - \bar{r})^2}{\sum Ni}$	$\sigma^2_{r=} \frac{\sum(ri - \rho)^2}{k}$
Sampling error variance	$\sigma^2_{e=} \frac{(1-\bar{r}^2)^2}{N}$ k	$\sigma^2_{e} = \frac{(1-\rho^2)^2}{k}$

True variance	$\sigma_\rho^2 = \sigma_r^2 - \sigma_e^2$	$\sigma_e^2 = \sigma_r^2 - \sigma_e^2$

Annexure- C Glossary of Terms

Meta-analytic statistic: The statistic computed with the help of sample statistic produced by different studies is known as meta- analytic statistic e.g.,

Common or mean correlation: we obtain an estimate of a common correlation by averaging the sample correlation (corrected for measurement error) produced by various studies. The discussion about various methods to estimate a common correlation is available in Hedges & olkin (1985: 229-34)

Sample statistic: The statistic (e.g. correlation coefficient) based on the sample data is called a sample statistic.

Observed variance: It is Meta analytic statistic that measures the extent of variation in the correlation coefficient across studies.

Sampling error variance: It is Meta analytic statistic that reflects the variation in sampling error in the measurement corrected correlation coefficient.

True variance: The observed variance net of the sampling error variance is termed as Meta analytic statistic of true variance.

Measurement error: It is the error in the measurement of postulates (variables). Generally, the measurement error arises on account of the lack of construct validity and attenuates the magnitude of sample correlation coefficient.

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