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Effect of critical success factors (CSFs) on the organizational performance

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Abstract

Mediation analysis aims to uncover causal pathways along which effects are transmitted from potential causes. In present case, our interest in assessing the effective performances to which ultimately organizational performance can be affected. The former concerns the "direct effect" and the "indirect effect" or the "effect mediated.
In this paper, the developed model can provide some insights about the under lying process to identify causes for certain effects. This work is initiated in response to questions and suggestions from organizations how CSFs indicator to ensure that it more efficiently measures the performance effectiveness. While the modified indicator technical specification is being finalized, we encourage organizations to use quality improvement tools to understand more about the use of unconventional spaces or flow in their company.

1. Introduction

Critical Success Factors (CSFs) are predictors of performance effectiveness of organizational system or subsystems. There has been widespread interest in association between system's goal and its performance in context of organization. Organizations use to apply various strategies, stratagems and tactics like Toyota Production System (TPS), Lean manufacturing, Supply Chain Management (SCM), Just-In-Time (JIT), Six-sigma etc. to excel performance, TQM is one of them, organizations use to apply holistically. The performance of the organization mainly the aggregation of its financial, non-financial and operational performance. In a combination of these, the organization gets outcome such as effectiveness, efficiency, development and participant's satisfaction. After using all supports and efforts when the organization produces a product or service that is called the organizational performance. Performance measurement can facilitate the alignment of the goals of all individuals, teams, departments and processes with the strategic aims of the organization and incorporate the voice of the stakeholders in all planning and management activities, Oakland (2003). TQM is basically a strategy (towards continuous change), as well as an operationalized process, and can be also described as a holistic approach which seeks, through the improvement of quality, productivity and competitiveness (Pfau, 1989), to integrate all organizational functions and organizational objectives in a focus on meeting customer needs (Kumar et al., 2008). Performance of a company reflects to what degree the company accomplishes the corporate strategy and goals stated Öztayşi and Kutlu (2011). The General Accounting Office (GAO) study was one of the first studies trying to establish a link between TQM practices and the performance of companies, see GAO (1991). In his study, Malcolm Baldrige recipients and companies that had received a site-visit (i.e., companies that in a sense were close to receiving an award)

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were evaluated. The main conclusion from the GAO study was that the companies investigated had improved their operating results. There are several studies which have been carried out to determine the linkages or predictive correlations between TQM elements or factors and performance measures, Barros, S. et al. (2014). Demirbag, M. et al. (2006) conducted a study to determine the critical factors of TQM and measure their effect on organizational performance of SMEs operating in the Turkish textile industry. Critical success factor (CSF) theory was originally applied in other industries and areas, including general project management, manufacturing systems, and reengineering (Holland & Light, 2003). Yusuf. et al. (2007) emphasizes that as per TQM philosophy the customer requirements and business goals are inseparable. G. Muruganantham et al. (2018) mentioned that TQM provides a set of guidelines, which help to improve the performance of organization. Although in the way of measuring the MBNQA performance Wilson & Collier (2000) states that manufacturing system influence their performance variables through its mediating variables (leadership, information and analysis, strategic planning, human resource management, process management, business results and customer focus and satisfaction), but quality model, as he considered MBNQA model, directly influences company performance. To reinforce the benefits of TQM it is also advisable by Santos et al. (2007) to facilitate comparison across studies by avoiding differing conceptualizations and TQM-related measures. Above and all endorsed by Steven E. Brigham (1993) of reports survey by A. T. Kearney, TQM: A Business Process Perspective that TQM is an integrated management strategy that uses a collection of strategies to achieve corporate goals. TQM is most effective when it is a central, planned component of an organization's forward drive, one that necessitates top-level leadership, is based on a strong commitment to customers, and stresses significant improvements in "core" processes.

The development of operational strategies in alignment to firm's competitive strategy can serve to improve and tailor the product offering for customers as well as improve the internal efficiency and effectiveness of manufacturing plants (Robson et al., 2013). Therefore, an operational strategy is a subset of a firm's competitive strategy, Sahoo, (2020). Matching the dots, it can anticipate that the TQM drivers and enablers (CSFs) will positively affect the overall performance of the organization through positively affecting TQM performance shown in the figure. The TQM CSFs will enable the organization to perform better for its targeted goal.

However, sufficient research has not been carried out in this context. Therefore, we tried tends to the answer of following research questions through this study.

RQ1: Will Human Resource Management factors affect the performance of TQM?

RQ2: Will Top management commitment factors affect the performance of TQM?

RQ3: Will Process management factors affect the performance of TQM?

RQ4: Will Customer focus/ Customer Centricityfactors affect the performance of TQM?

RQ5: Will Supplier partnership/ Supplier's management factors affect the performance of TQM?

RQ6: Will Training and education factors affect the performance of TQM?

RQ7: Will Quality Information/Information Quality factors affect the performance of TQM?

RQ8: Will Strategic quality planning factors affect the performance of TQM?

RQ9: Will Culture and communication factors affect the performance of TQM?

RQ10: Will Benchmarking factor affect the performance of TQM?

RQ11: Will Social and environmental responsibility factors affect the performance of TQM?

RQ12: Will Innovation factor affect the performance of TQM?

The study involves formulation of hypotheses related to CSFs of TQM and its performance. Hypotheses are tested using the information and responses gathered from the experts of FMCGs industry. The study intends to investigate the relation between TQM CSFs and its performance in the Indian FMCGs industry. The main construct outlines the effects of TQM CSFs in FMCGs industry. The latent variables of all constructs have reflective type of observed variables. The intent is to understand the association of effect of TQM CSFs with sub factors on performance of TQM. The measurements models of the constructs developed were tested for fitness of data for further modelling.

The remaining part of the study is organized as follow. Section 2 explores the literature related to TQM CSFs and TQM performance and explains hypothesis development. Section 3 discusses research methodology comprising of hypothesis testing along with the data collection method. Section 4 deals with results and discussion, including the measurement model and SEM model of the study.

2. Literature Review

The critically examined factors which were responsible for success to achieve the intended goal is critical success factors of that system. Marais et al. (2017) states that CSFs are those aspects that must be well managed in order to achieve success. CSFs are combinations of activities and processes which are designed to support the achievement of the goals (Brotherton & Shaw, 1996, p. 114). Furthermore, CSFs are actionable, controllable by management to a variable extent, and potentially measurable (Brotherton & Shaw, 1996, p. 114). Walsh et al. (2002) states that a link existed between the source of the TQM initiative and driving force behind the TQM initiative in many organizations. Many organizations' TQM efforts originated in the quality department and also driven by the need for improved quality. Dixon et al. (1990) introduce two concepts, first, the link between strategies, actions and measures; and second, the acceptance of changing

performance measures. Performance measurement provides the feedback required to control and improve actions, which are themselves taken as a result of decision taken on strategies the organization is to follow, stated Sinclair and Zairi (2000). Odiorne (1987) states that the things for which we can devise indicators can be managed and the things for which we have no indicator can be out of control before realizing it. Performance measures derived from organization strategy with the purpose to implement the strategy, evaluate business performance, provide feedback and ensure communication, help in creating learning environment and continuously improving the organization. Zairi (1994) identifies that performance measurement has been the systematic assignment of number of activities. He further suggested that the function of measurement is to develop a method for generating a class of information that will be useful in a wide variety of problems and situations. Wilson & Collier (2000) states that manufacturing system influence their performance variables through its mediating variables (leadership, information and analysis, strategic planning, human resource management, process management, business results and customer focus and satisfaction) , but quality model, as he considered MBNQA model, directly influences company performance.

The performance solely depends on critical success factors is challengeable, for this some justification required, which need hypothesis development. The postulates were developed by the researchers for the estimation in this context which were under consideration for the study. The developed hypothesis needs further testing for whether that fits or unfits for the considered study, then acceptance or rejection of that hypothesis is decided. The testing of hypothesis is fundamental in statistics, and it could be considered as a "method" of making statistical decisions using experimental data.

The hypotheses are developed to test whether the TQM CSFs are positively related with financial, non-financial and operational performance of TQM. The responses were gathered through the questionnaire developed, based on the theoretical background of hypothesis. The hypotheses developed are as follows.

H_1: Human Resource Management factors (a) employee involvement (b) empowerment (c) recognition and reward (d) teamwork are positively related with Performance of TQM

H_2: Top management commitment factors (a) Top management support(b) Executive commitment (c) Leadership are positively related with Performance of TQM

H_3: Process management factors (a) Tools and techniques (b) Continuous improvement (c) Process design are positively related with Performance of TQM

H_4: Customer focus/ Customer Centricity factors (a) Customer and market focus (b) Customer satisfaction (c) Customer relationship are positively related with Performance of TQM

H_5: Supplier partnership/ Supplier's management factors (a) Cooperation with suppliers (b) Supplier quality management (c) Supplier relationship are positively related with Performance of TQM

H_6: Training and education factors (a) Learning (b) Knowledge and (c) Education & training are positively related with performance of TQM

H_7: Quality Information/Information Quality factors (a) Quality data and reporting (b)Internal quality information usage are positively related with Performance of TQM

H_8: Strategic quality planning factors (a) Quality policy (b) Quality planning (c) Vision &Plan statement are positively related with Performance of TQM

H_9: Culture and communication factors (a) Trust (b) Cultural change are positively related with Performance of TQM

H_{10}: Benchmarking factor (a) Competitors is positively related with Performance of TQM

H_{11}: Social and environmental responsibility factors (a) Wider community (b) Quality citizenship are positively related with performance of TQM

H_{12}: Innovation factor (a) Product innovation is positively related with Performance of TQM

3. Material & Methods

The present study attempts to (a) model a complex structure of TQM system and (b) Link the TQM CSFs with its performance for validly support the hypotheses of interest.

Questionnaire is designed for research purpose to conduct a survey and collect data for studying the effect of TQM CSFs on TQM performance by using AMOS 22. Most of the questions are adapted from peer reviewed works of Nguyen et al. (2016), Sadikoglu and Zehir (2010), Lakhal et al. (2006), Kaynak (2003), Saraph et al. (1989). The questionnaire sent to 500 quality experts, managers of quality departments of India based FMCGs industries to collect data from companies using TQM. A total of 395 respondents came back; of 395 responses, 30 responses are removed because of incomplete answers. As a consequence, the sample size of this research is 365, with the rate of response is 73%. Primary data (quantitative) was collected through a questionnaire comprising of structured questions and secondary data was collected from existing sources such as books, articles, journals, reports, and websites. Secondary data was found quick, easily accessible and inexpensive way of collecting data to better define the problem. Reliability analysis for the questionnaire as a whole, it is concluded that the questionnaire of the whole *Cronbach's* α value is 0.792, close to 0.8, so that the questionnaire has good reliability. In general, if the $\alpha > 0.9$, the questionnaire reliability is very good, if $0.8<\alpha< 0.9$, the questionnaire reliability is good, it is generally believed the questionnaire reliability is greater than 0.5 is reasonable. At the same time, the *Cronbach's* magnitude of each influencing factor is greater than 0.6, indicating that the reliability of each influencing factor is also better and credible.

The selection of variables considered its Magnitude, Articulation, Generality, Interestingness and credibility (MAGIC criteria suggested by Robert P. Abelson (1995)). The variables are transformed only for substantive reasons, not

statistical ones. In the view of Robert P. Abelson (1995), magnitude of any experimental effect(s) observed. Differences which are highly statistically significant are more persuasive than ones which are less significant or not at all significant. Articulation refers to the level of detail at which scientific results are presented. Results expressed in quantitative terms typically have more impact than those expressed only qualitatively, and, of these, more specific claims have greater impact than less specific. The generality of effects observed, by which appears to mean the extent to which observed effects are replicable and generalizable beyond the particular experimental context in which they were observed. Next is the interestingness of claims, which is a combination of their significance for current theories and their degree of surprisingness. The more general and the more interesting is a claim, the greater, typically, is its impact on an academic community.

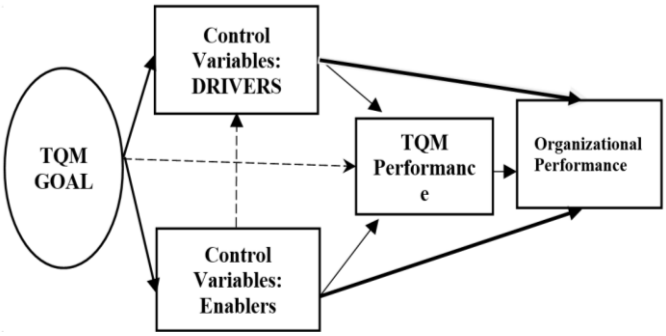

Figure 1: The basic usage of structural equation modelling (SEM) in path analysis with mediation.

The aim of this research is to develop links between different sets of variables. Through questionnaire data is collected on TQM performance in an Indian FMCGs industry. Responses are expressed in five-point Likert scale. We gathered data on TQM drivers and enablers, combined called critical success factors: (Human Resource Management (HRM); Top management commitment (TMC); Process management (PM); Customer focus and satisfaction (CFS); Supplier partnership (SP); Training and learning (TL); Information/analysis/data (INF); Strategic quality planning (SQP); Culture and communication (CC); Benchmarking (BHM); Social and environmental responsibility (SER); Innovation (INV)). To conduct multiple regression analysis on each independent variable with all of the TQM CSFs, we applied SEM for the connection between e.g. HRM factors (employee involvement, employee empowerment, recognition & reward and teamwork) on TQM performance. So, after determining that TQM performance is affected by HRM factors, we use data from the questionnaire survey to interpret the reasons for such connection. Through SEM, we dabbling into canonical correlation among the variables (dependent/independent). Kenneth and Judea (2013) regarded SEM as an inference engine that takes in two inputs, qualitative causal assumptions and empirical data, and derives two logical consequences of these inputs: quantitative causal conclusions and statistical measures of fit for the testable implications of the assumptions. Structural Equation Modelling (SEM) is used to test the relationships between TQM CSFs (Dependent and Independent variables) and TQM performance (unobserved) variables to test the hypotheses and confirm relationships between them. Amos, a structural equation modelling (SEM) software is used to accomplish this part of work. SEM can quickly create models to test hypotheses and confirm relationships among observed and latent variables--moving beyond regression to gain additional insight. This method is preferred by the researcher because it estimates the multiple and interrelated dependence in a single analysis. Every post-hoc analysis in CFA is guided not only with a statistical argument but also with conceptual appropriateness. After all, the CFA is meant to test a hypothesized model that is based on established theory. There's much to be discussed and described about what factor analysis is and what structural equation modelling is, and what the relation between them. Factor analysis is a method (or, more accurate, class of methods) of reducing the observed data into more compact "constructs". This is the "official" or "mainstream" definition. There are various ways (methods) of reducing data, and factor analysis becomes a little complicated in this regard.

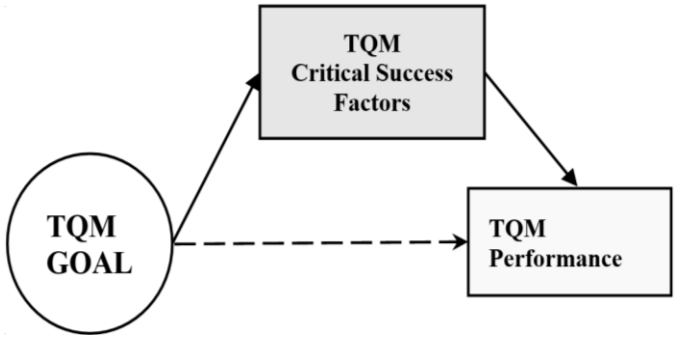

Figure 2: Proposed model for extroversion

Using SEM to understand a domain, if not even the causal relationships between different variables, many specific approaches have been developed but most of them involve much more stringent rules on the data generation, variability and observability of all relevant information than is usually the case anyway. In fact - the field of observational methods (i.e. SEM and other robust estimators) for estimating causal impact really do not care much about the interpretability of a model - because the causal interpretation is derived from the model predictions, not its structure. SEM is potentially one such methodology, as it allows for modelling complexities in behaviour (e.g., model loops, cross-lagged effects, autocorrelation structures, etc.), given adequate sample sizes. One of the strengths of SEM is its flexibility, which permits examination of complex associations, use of various types of data (e.g., categorical, dimensional, censored, count variables),

and comparisons across alternative models. However, these features of SEM also make it difficult to develop generalized guidelines regarding sample size requirements (MacCallum et al. 1999).

3.1 Confirmatory Factor Analysis (CFA)

CFA can be accomplished with SEM (some say that CFA is a form of SEM, I happen to conceive it the other way around; we're probably both partly wrong). Anyway, once you have your conceptual model (a simple sketch on a piece of paper with arrows pointing between variables, showing how and who influences/predicts who), you may proceed to the 'testing'. And now, you have to deal with the type of SEM that's suited for testing (in this case, you'd need to use covariance-based SEM — for instance, use a software package like IBM(TM)'s AMOS).

Another way to look at this question is to start from the types of modeling. Basically, we could use PLS modeling or covariance-based modeling. The first is more suited for exploratory analyses of relations between latent variables, whereas the second is more adequate for measuring the adequacy of the models (how well the model fits the observed data). Once you grasp the common points and the differences between the two methods, you may proceed to make analogies with factor analysis (exploratory versus confirmatory).

3.2 Exploratory Factor Analysis (EFA)

EFA (exploratory factor analysis) can be used to identify (hypothesize) latent constructs (which underlie a group of (co)related measured variables) and based on this 'mathematical argument' the case can be made that several latent constructs are inter-related in a specific way (such as a model specifies). Of course, would not proceed testing/building models just because EFA suggests some underlying constructs. Rather, some dogmatic (theoretical) reasons should first guide your EFA.

NB: We would also have to consider the type of EFA (what method).

The symbols in this diagram are the same as defined earlier. The new representations are the functions which provide a general way to represent the connections between the variables within the parentheses to those on the left-hand side of each node. Composite reliability that achieved 0.70 or above means the scale has good reliability. In general, composite reliability is greater than 0.6 and average variance extracted (AVE) is greater than 0.5, indicating that the reliability of this model is good. Composite reliability (sometimes called construct reliability) is a measure of internal consistency in scale items, much like Cronbach's alpha.

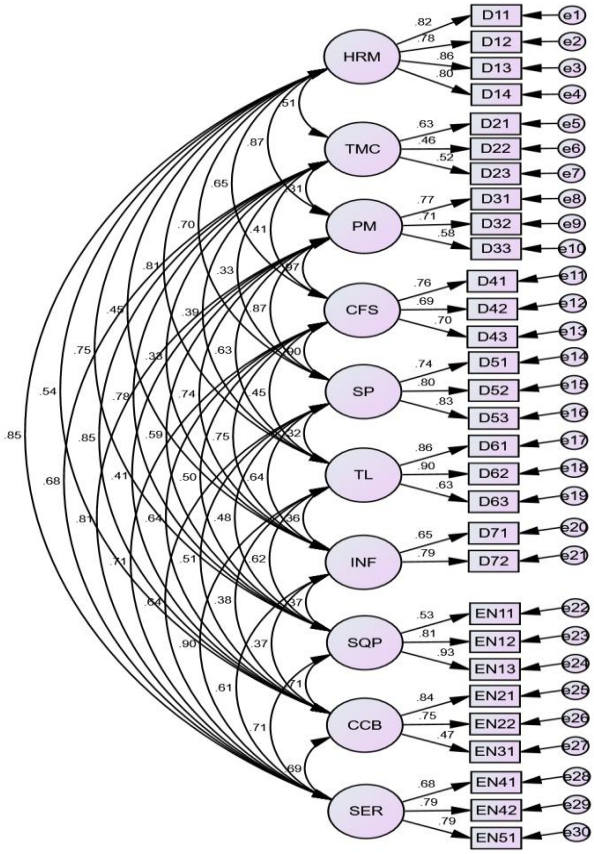

Figure 3: CFA Model

4. Results and discussion

According to the study, we hypothesized twelve paths including seven TQM drivers and five enablers (TQM critical success factors) and thirty sub-factors. Using the SEM investigated that impact of drivers, enablers and firm performance. Results exhibits all the paths are significant ($p < 0.05$). A SEM model divulges the critical success factors of TQM is directly and positively affects the TQM performance which further affect operational, financial and non-financial performances of TQM. Sideridis et al. (2014) advocated that SEM is potentially one such methodology, as it allows for modeling complexities in behavior (e.g., model loops, cross-lagged effects, autocorrelation structures, etc.), given adequate sample sizes. SEM models without measurement models are called path models.

Prior to fitting our SEM, table 3 consist the TQM CSFs as drivers and enablers. The first diagonal element of TQM drivers (D_1) represents the variance of the TQM CSFs which are (arbitrarily) ordered first, the second diagonal element represents those ordered second, and so on. Further, the first off-diagonal element of TQM CSFs (i.e., *D*21) represent the covariance of TQM CSFs for the factors which are ordered second with those which are ordered first, and so on.

Table 1: CFA results of Identified Constructs

Construct	Items	Factor Loadings	Composite Reliability (CR)	AVE
HRM (D_1)	D_{11}	0.82	0.887	0.663
	D_{12}	0.78		
	D_{13}	0.86		
	D_{14}	0.80		
TMC (D_2)	D_{21}	0.72	0.785	0.549
	D_{22}	0.79		
	D_{23}	0.71		
PM (D_3)	D_{31}	0.77	0.732	
	D_{32}	0.71	0.507	
	D_{33}	0.65		
CFS (D_4)	D_{41}	0.76	0.760	
	D_{42}	0.69	0.515	
	D_{43}	0.70		
SP (D5)	D51	0.74	0.833	0.626
	D52	0.80		
	D53	0.83		
TL (D6)	D61	0.86	0.871	0.694
	D62	0.90		
	D63	0.73		
INF(D7)	D71	0.70	0.715	0.557
	D72	0.79		
SQP (E1)	E11	0.69	0.855	0.666
	E12	0.81		
	E13	0.93		
CC (E2)	E21	0.84	0.821	0.605
	E22	0.75		
BHM (E3)	E31	0.74	---	
SER (E4)	E41	0.88	0.861	0.674
	E42	0.79		
INV (E5)	E51	0.79		

Table 2: Model fit

Goodness of Fit Indices	Results	Recommended Standard Value
CMIN/DF-degree of freedom	2.657	< 3
NFI (normed fit index)	0.90	≥ 0.90
NNFI (non-normed fit index)	0.92	≥ 0.90
CFI (comparative fit index)	0.92	≥ 0.90
GFI (goodness fit index)	0.91	≥ 0.90
AGFI(Adjusted goodness of fit index)	0.85	≥ 0.80
RMSEA (root mean square error of approximation)	0.06	<0.10

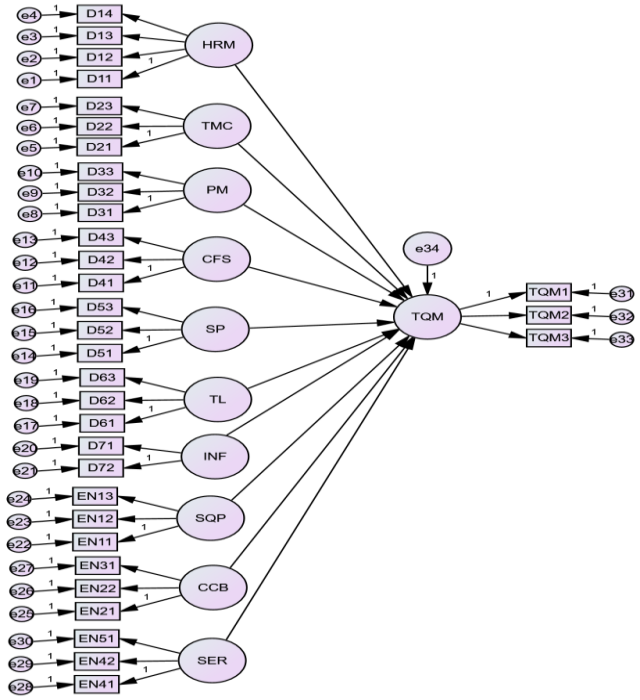

Figure 2: Path Diagram of Structural equation with twelve (two variables E_2, E_3 and E_4, E_5 are combined) explanatory variables

4.1 Assessment of model and hypotheses testing procedures

When the goodness of the model has been confirmed, the next is to test the hypothesized relationships among thevariables (TQM CSFs). Through the running of PLS Algorithm using Smart PLS, the hypothesized model is tested. Therefore, the path coefficients were generated as illustrated in the Figure 2. The p values in hypothesis testing are used to classify the data into two groups being 'significant' or 'insignificant' depending upon whether it 'rejects' or 'fails to reject' the null hypothesis. A level of significance (α level) is set between 0 and 1 as an arbitrary cut off value to determine statistical significance. Analysis of the linkage between the TQM critical success factors and the effectiveness of TQM provides an insight into the prevailing TQM system conditions that could improve/prohibit TQM effectiveness.

Table: 3 Bivariate correlations between variables. Shown below are the correlations between Human Resource Management (HRM); Top management commitment (TMC); Process management (PM); Customer focus and satisfaction (CFS); Supplier partnership (SP); Training and learning (TL); Information/analysis/data (INF); Strategic quality planning (SQP); Culture and communication (CC); Benchmarking (BHM); Social and environmental responsibility (SER); Innovation (INV)

TQM CSFs		D_1	D_2	D_3	D_4	D_5	D_6	D_7	E_1	$E_{2\&3}$	$E_{4\&5}$
TQM DRIVERS	D_1	--									
	D_2	0.51	-								
	D_3	0.87	0.31	-							
	D_4	0.65	0.41	0.97	-						
	D_5	0.70	0.33	0.87	0.90	-					
	D_6	0.81	0.39	0.63	0.45	0.32	-				
	D_7	0.45	0.33	0.74	0.75	0.64	0.36	-			
TQM ENABLERS	E_1	0.75	0.78	0.59	0.50	0.48	0.62	0.37	-		
	$E_{2\&}E_3$	0.54	0.85	0.41	0.64	0.51	0.38	0.37	0.71	-	
	$E_{4\&}$ E_5	0.85	0.68	0.81	0.71	0.64	0.90	0.61	0.71	0.69	-

Table 3: Hypotheses results and estimate

				Estimate	p value	Result
H_1	TQM	<---	HRM	.427	***	Fail to reject
H_2	TQM	<---	TMC	.740	***	Fail to reject
H_3	TQM	<---	PM	.571	***	Fail to reject
H_4	TQM	<---	CFS	.314	***	Fail to reject
H_5	TQM	<---	SP	.657	***	Fail to reject
H_6	TQM	<---	TL	.532	***	Fail to reject
H_8	TQM	<---	SQP	.560	***	Fail to reject
H_9,H_{10}	TQM	<---	CC&BHM	.454	***	Fail to reject
H_{11},H_{12}	TQM	<---	SER& INV	.642	***	Fail to reject
H_7	TQM	<---	INF	.475	***	Fail to reject

* Significant at 5% level of significance

Note: Human Resource Management (HRM); Top management commitment (TMC); Process management (PM); Customer focus and satisfaction (CFS); Supplier partnership (SP); Training and learning (TL); Information/analysis/data (INF); Strategic quality planning (SQP); Culture and communication (CC); Benchmarking (BHM); Social and environmental responsibility (SER); Innovation (INV). All pathways represent the influence of a factor independent from other influences in the model.

5. Conclusions

Structural equation modeling is a technique of modeling data based on the concept of "latent" variables/factors/constructs. It also has several purposes. It may be used to test predictions (and influences) or to measure (validate) models/theories. It also can be used in an "exploratory" fashion or for "confirmatory" purposes. Also, the modeling can be "variance-based" or "covariance-based". When testing predictions (and/or pathways of influence) one can think of a multiple regression model, which may have mediators and moderators. However, instead of using observed (measured) variables, using factors/constructs, which, in turn, are determined by (i.e. they are formative constructs) or are determining (i.e., they are reflexive constructs) the observed variables. Of course the SEM is not without limitations. The most widely used method of estimation is maximum likelihood (ML). Under the general assumptions of sufficiently large sample size, proper model specification, and residuals that are independent and normally distributed, ML provides asymptotically unbiased, consistent, and efficient parameter estimates and standard errors (Bollen, 1989).

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