Total Quality Management Practices and Supply Chain Management: Understanding Linkages from the Logistics Sector of Pakistan

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The study has the outcome of a conceptual framework that establishes the relationship between the total quality management (TQM) practices and supply chain management (SCM) practices. The six TQM practices have taken from the Malcolm Baldrige National Quality Award (MBNQA), these practices are leadership, strategic planning, customer focus, human resource management, process management and information analysis. The result is based on the logistics sector in Pakistan. Data is collected from 270 operation manager and top management. Multiple regression analysis is used to drive the results to form data. The results show the strong relationship between the variables. The results revealed that leadership, strategic planning, customer focus and human resource management were found significant relationship with SCM. However process management and information analysis were insignificant relationship with SCM. This study can be used for the implementation of both the system in the organization to drive better results.

Keywords: Supply chain management; total quality management; logistics; Pakistan

Introduction

Companies are constantly studying to providing best goods and services that satisfy human wants, and thus identify the capability to meet human wants well can be a worthwhile source of economic advantage in all over the world market place. One way of satisfying this advantage is having a best SCM process. Even though there have been need to be implementing innovative ideas and technology to improve the supply chain development then the performance of the supply chain has never been worse (Fisher, Hammond, Obermeyer, & Raman, 1997). But sometimes costs have increased to supreme levels because of aggressive relations between supply chain partners and dysfunctional industry practices such as over confidence on price raises (Fisher et al., 1997). The suggested solution to these issues to implement the TQM and its related practices. TQM has recognized to solve the problems that prevent the distribution of information and products to the final goal. The TQM procedure includes decision makers concentrating on abstract components like relationships with customers and on continuous development (Curkovic, Vickery, & Dröge, 2000).

The theory of TQM has the ability to focus on quality such as Six Sigma and the Business Quality Model afford perfect solutions for organizations to solve the problems related to quality. But, during the use of TQM model it may not afford solution to other organizations with the best solution to sustain an economical advantage in their supply chain. Subject to the market place on which the company is focused or its recent relationships with

supply chain members, implementing these services may rise the process time of meeting the demands of the market. Otherwise other companies could instantly advantage from the TQM mechanisms, mainly to expand the relationships and improve on quality of the SCM process. The main aims of this paper to focus on the overall effect of TQM implementation and its effect on the "market responsive" and "physically efficient" supply chains types, and the consequent effect on the firm's sustainable economic advantage. The other parts of this paper are structured as follows: the following section assessments both selected supply chain and TQM literature.

Next a theoretical model representing the relationship of TQM and supply chains is presented, along with testable research propositions. Last the article is concluded with future research directions.

Literature Review

TQM

After reviewing the literature the useful management principles will improve the performance of the organization (Kanji & Wong, 1999). There management principles are process management satisfaction of customers ,teamwork strategic leadership , systems thinking , continuous improvement , and scientific management as advocated by (Kanji & Wong, 1999).

These above-mentioned management principles identified in TQM. The major prerequisite of the success factor is TQM considering nowadays. The seminal research by Deming (1981) the TQM emerged in the US and embodied in the different management thoughts and develop a set of practices to focus on the quality. TQM has many definitions which are changing from time to time with the purpose of implementation. These changing creating issue with the organization who developed a partnership to the deployment of TQM standards.

SCM

The TQM was considered as a major component of SCM defined by the many authors. In this study, the definition developed by the (Mentzer et al., 2001) is used. He defined the SCM as the systematic coordination of the business functions with the purpose of improving long-term performance and the organization. The definition involves the sales& marketing, finance, production, research and development, purchasing, customer service, information system and logistics. Their components have the relationship inside and between the organizations.

TQM and SCM Linkages

While in the examination of both concept together, it has clear evidence of focusing on the business process improvement and excellence. Some researchers uncover that there is a disconnection in SCM and business process. Particularly (Kanji & Wong, 1999) stated that insignificance of SCM model which includes cooperation and quality culture and creation, close relationship development, process management other than logistics, the role of leadership in SCM, cost, and quality required by the customers, and continuous improvement in the process. These observation generated from the tradition SCM model. The SCM focus on the sustainable relationship in information sharing and logistics integration process. The SCM passing on the long-term

relationship between the stakeholders. The SCM implementation doesn't mention the hurdles and difficulties in the establishing long-term relationship. Changes in the organizational culture help to improve the SCM process. (Kanji & Wong, 1999) stated that the material flow management and in information flow is the goal of SCM. They also claim that SCM focused on the customer satisfaction and high customer service level. Furthermore, they argued that the quality and cost information should be shared since it develops the transparent supply chain environment.

Methodology

This study, conducted in the logistics sector of Pakistan. In this study, the TQM is used as an independent variable. TQM has 6 dimensions that are leadership, customer focus, process management, Human resource management, and strategic planning and information analysis. These TQM variables are taken from the MNBQA. Whirs SCM has chosen from the study of (Vanichchinchai & Igel, 2011) which was developed on the base of (Li, Ragu-Nathan, Ragu-Nathan, & Rao, 2006), (Min & Mentzer, 2004), (Lee & Kincade, 2003), (Chen & Paulraj, 2004). The variable OP was taken from the study of Li et al. (2004). The organizational performance combination of marketing performance and financial performance. The Same combination also used in this research.

Hypothesis

H_{1a}: There is a positive association between Leadership and SCM in Pakistani logistics companies
H_{1b}: There is a positive association between Costumer Focus and SCM in Pakistani logistics companies
H_{1c}: There is a positive association between process management and SCM in Pakistani logistics companies.
H_{1d}: There is a positive association between human resource management and SCM in Pakistani logistics companies.
H_{1f}: There is a relationship between information management and SCM in Pakistani logistics companies.

The independent variable of this study is TQM practices is derived and adapted from the MBNQA. There are 5 to 7 questions asked for each practice. The measuring tool containing 33 questions. The questionnaire adopted from the study of (Sila & Ebrahimpour, 2005). The SCM variable is used in the study consists of 4 practices. Particularly these practices are information management, lean system, partnership management, strategy and organizations. The framework derived from the (Vanichchinchai & Igel, 2011). There were 5 questions asked for each SCM practice and total items were 20 to test the SCM. It has 5 items designed to five points Likert scale. In this study five-point, the Likert scale used to measure all the dimensions of TQM, SCM from 1 which strongly disagrees and up to 5 which shows strongly agree.

Population
The population for this study is all logistics companies in Pakistan. Major firms have very small numbers of employees and low set of operations not covering the scope of the current study. Therefore, the population is taken as all those logistics firms which at least have their operation in ten major cities of Pakistan which are TCS, DHL, Daewoo Cargo, Faiz Cargo, OCS, Leopard Currier's services, Pakistan railway, Pakistan post etc. As the unit of analysis of this study is operational staff and managers.
According to the (Kelloway, 1998) for rigorous state impact evaluations, there should be not less than 200. To fulfill the condition in this study 270 sample is used for analysis. If the population size is known, the (Yamane,

1967) formula also be used to determining the sample size is given. n = N / (1 + Ne^2), = 700/ (1+700(.05) ^2= 254

Where n=sample size, N =population size, and e =Margin of error.

Instrument

For the measuring of Cronbach's alpha, SPSS 22 is employed. The output file shows that there are 270 questionnaires which were added to the test. There are no missing values in the questionnaire. In the reliability test, the table shows the value of .979 which is excellent for further procedures and statistical analysis. The table gives below shows the reliability of the instrument used to measure the TQM. There were 6 dimensions and each dimension tested for reliability. According to parameter stated by (George & Mallery, 2003), the Cronbach's alpha shows the values as follows:

The values show the reliability of the instrument. Leadership has a value of .656 which refers to an acceptable level. Furthermore, values of customer focus and process management ranges between 0.7 and 0.8. This refer to the good reliability of the instrument. At the last the three dimensions HRM, SP and IA show the values less than .9 and more than .8 which refer to the perfect measurement of these dimensions. The value of Cronbach's alpha for strategy and organization shows the value of .905 which is excellent for the further statistical test. The value of standard deviation of all the constructs is less than 1 which means the average response near to the mean value. For further analysis regression was used to measure the effect of TQM on SCM. The TQM is chosen as independent variable. It has 6 dimensions. The SCM is taken as dependent variable.

All the variables and constructs have a similr standard error. It explained all the variables under the study had skewness and kurtosis with the standard range. Finally, the data shows in the light of given figures met the assumption. Durbin Watson value of 1.987 is in acceptable range so can further be processed the data. It also concludes error terms are independently distributed.

Result and Discussion

To measure the effect of TQM on SCM the hypothesis H1 is tested. There were 6 dimensions of TQM tested individually. The Durbin Watson shows the value of 1.796 which is in normal range. The p value shows the overall significance of the study which is less level of significance i.e. 5%.

Table 1- Model summary

Model	R	R^2	Adjusted R^2	Std. Error of Estimate	P Value	Durbin-Watson
	.633ᵃ	.401	.387	.495	.000	1.796

a. Predictors: (Constant); Information Analysis; Leadership; Customer Focus; Human Resource Management; Process Management; Strategic Planning.
b. Dependent Variable: SCM

In the Table 1- Model summary, R square explains variance explained by predictors. R^2 value shows the variable combined effect on OP. The R^2 value shows .401 which refer that the TQM has effect on SCM is 40%. The Durbin Watson value is 1.796 which is in acceptable range.

Table 2- ANOVA(a)

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	43.047	6	7.175	29.337	.000[b]
Residual	64.319	263	.245		
Total	107.367	269			

a. Dependent Variable: SCM
b. Predictors: (Constant); Information Analysis; Leadership; Customer Focus; Human Resource Management; Process Management; Strategic Planning.

Table 2 shows the fitness of model. In Table 2 the P value is .00 which is less then alpha. It refers that the model is fit for further analysis.

Table 3- Coefficients (a)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	1.272	.229		5.548	.000	.904	1.107
Leadership	.364	.041	.446	8.885	.000	.828	1.208
Customer Focus	.093	.040	.122	2.329	.021	.717	1.395
Process Management	.036	.040	.050	.890	.374	.784	1.276
HRM	.088	.036	.131	2.437	.015	.698	1.432
Strategic Planning	.001	.036	.001	.020	.984	.671	1.491
Information Analysis	.112	.037	.175	2.997	.003	.904	1.107

a. Dependent Variable: SCM

Table 3 above shows the results of hypothesis H1. Hypothesis H1a explains the relationship between leadership and SCM. B value of leadership shows that it has effect on SCM by .364 units while the level of significance in acceptable range. Thus, the alternate hypothesis is rejected. Hypothesis H1b explains the relationship between customer focus and SCM. The results shows the B value .093 which refer that the customer focus effect on SCM by .093 unit change, while the P value is less than alpha so null hypothesis is accepted. Hypothesis H1c explain the relationship between Process management and SCM. The B value of PM has effect the SCM by .036 units. While the P value is .374 which was more than .05 so alternate hypothesis is accepted. Hypothesis H1d explain the relationship between HRM and SCM. In the B value is .088. It refers that the HRM has effect on SCM by .088 units. The P value less then alpha so alternate hypothesis was rejected. Hypothesis H1e shows the relationship between SP and SCM. In the table above B value explains the effect of SP on SCM by .001 unit. While the P value show the .984 which is more than alpha so the null hypothesis is rejected. Hypothesis

H1f shows the relationship between information analysis and SCM. The B value is shows there is .112 effect of IA on SCM. While the P value is less then alpha so we reject the alternative hypothesis.

The value of tolerance should be more than .1 (Gujarati, 2009). In the Table 3 above value of tolerance is more .1 than which is considered normal. According to (Kennedy, 2003) the VIF value should not exceeds from 3. The results show there is no issue of multicollinearity in the data.

Results of Multiple Regression Analysis are shown in the following regression equation.

$Y = a + b_1 * X_1 + b_2 * X_2 + b_3 * X_3 + b_4 * X_4 + b_5 * X_5 + b_6 * X_6$
Whereby,
Y= Dependent variable (SCM)
a = Constant Coefficient

X= Independent variables (X_1- Leadership, X_2- strategic leadership, X_3- customer focus, X_4-hrm, X_5- process management, X_6- information analysis)
b1 - b6 = beta coefficients for X_1 .... X_6

For this study, the equation was as below:

According to the results shown in table above the regression equation shows the results as followings:
SCM = 1.272+.364 (X_1) + .093 (X_2) + .036 (X_3) +.088 (X_4) + .001 (X_5) + .112 (X_6) + random error

Conclusion

An organization facing the serious issues like quality as well as the working collaboration between customer and their suppliers. For the achievement of better performance, the organization must focus on the relationship between quality management and supply chain management. By the implementation of both systems parallel, the desired result can be achieved. TQM and SCM have a positive significant association. The correlation of the TQM and SCM was not examined earlier in Pakistan particularly in the logistics sector. This study has significantly contributed to the logistics sector. The implementation of both the system is the current priority for most of the organization. The study can help the top management to implementation of both systems, it will also improve the current practices.

Limitations

This study focused on the logistics sector and it has a relatively small sample size. The operations of the logistics also quite different from the other operational activities hence it can't be generalized to the other sectors. Another limitation of the study is the measuring tool adopted from the previous study. The nature of work and behavior vary from culture to culture. To measure it accurately the tool can be developed according to the working conditions of the country.

To verify the results of this research the study should be conducted in other countries too and draw a comparison of the results. Another limitation is the knowledge level of the respondents. Some of the employees

have limited knowledge about the TQM and SCM system but participated in the research. Hence, researcher feel that the structured interview can be the best choice to collect the data.

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