Study and Analysis of Total Supply Chain Quality Management (TSCQM) and Factors Effecting It

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Abstract— A large number of studies have been conducted on quality management and supply chain management area and considering their importance in the organization these number of studies is not surprising. But at the present scenario where the end customer is now more aware of the product price, its specification, and its quality. The challenge for a firm is to meet its customer expectation of which quality being the most important one. That's why the quality of the product needs to be maintain throughout the supply chain. The present work tries to achieve this goal by introducing the concept of Total Supply Chain Quality Management (TSCQM). Also in many a case it was observed that the product quality that at the manufacturer or at supplier end is quite better than that of the product received at dealers end or at customer end. It has been tried to minimize this difference by the use of TSCQM.A case study has been presented showing the implementation of TSCQM concept. This research work consist of thorough study of case company and this provide the information about the quality management practices of the case company with respect to the supply chain they represent. The case study provides the information regarding the integrated approach of the firm towards the QM and SCM practices implementation. Other than this qualitative survey method is employed here to see current state of Indian industries in Pithampur industrial area with factors effecting it to be found out and shortcomings has been pointed out. The survey has been conducted to see the actual condition of QM and SCM practices, to provide a look on the current state of the quality management practices in their respective supply chain of Indian industries (In this study it is Pithampur Industrial Area) and factors effecting the firms. The survey put light on the governing factors that effects the implementation of SCM and QM practices in the firm. This work will be helpful in deciding the factor for establishing the TSCQM framework in the surveyed firms and also in firms which faces the same problem. Conclusion will be framed on the basis of survey conducted on the small sample in Pithamppur Industrial Area.

Key words: QM and SCM, TSCQM

I. INTRODUCTION

Supply chain term was first coined in the early 1980s to describe the range of activities coordinated by an organization to procure and manage supplies (Oliver and Webber, 1982). A Supply Chain is composed of all the organizations taking part in fulfilling a customer's order. It consist of end suppliers, the manufacturers, retailers, distributors, end customer. SCM enables organizations to manage the value addition in goods and services throughout the SC as a single process with a common goal of customer satisfaction. With increase in competitiveness and the evolution of new technologies firms are forced to look into the new areas. Quality has been a big influence all over the world since 1980s. It has been one of the major research areas in the operations management. Over the years it has evolved to incorporate new practices (e.g. supply chain management (SCM)) and methodologies (e.g. Six Sigma). If the simultaneous implementation can be accomplished, the organization should reap great benefits. In a dynamic international market, quality is not enough. Supply at the right time, place and cost is also critical for competitive advantage as a means of exploring and implementing the new areas and competitive advantage many of the firms now been moving from SCM concept to TSCQM. So TSCQM has been an increasing area of interest for the researchers as well its implementation for the firms.

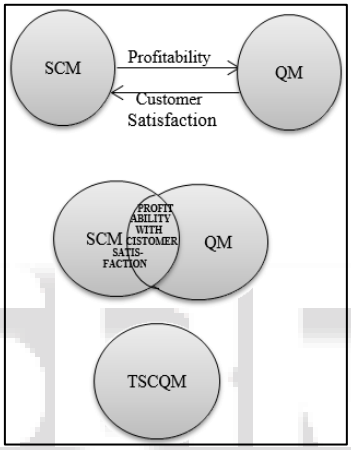

Fig. 1: SCM and QM Integration Diagram

A. TSCQM

TSCQM can be simply referred to as meeting customer satisfaction through quality management in the given supply chain. Though it is not limited to that only as TSCQM is the formal coordination and integration of business processes (QM and SCM) involving all partner organizations in the supply channel to measure, analyse and continually improve quality of products, services and processes in order to create value and achieve satisfaction of intermediate and final customers in the market place.

II. RESEARCH OBJECTIVES

- To define the concept of TSCQM by the use different literature review.
- Defining the QM and SCM elements for establishment of TSCQM concept.
- Analysing the actual conditions of the the firm related to QM and SCM practices in Indian Scenario and factors affecting it.
- The purpose of this project is to show how the quality practices are as relevant to supply chains as they are to an individual firm.
- This will also help in comparative study of the customer satisfaction through TSCQM as compared to that of traditional QM and SCM.

A. TSCQM Elements

TSCQM elements refers to the ideology or the concept of having different supply chain and quality management elements whose presence is a must for the achievement of TSCQM concept and their importance already been established by different authors. Researchers have identified a number of elements pertaining to SCM and QM.

B. QM Elements

The QM elements pointed out by different researchers is shown in below diagram and Table A showing researcher's name and year.

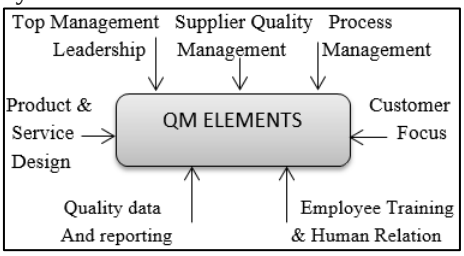

Fig. 2: QM elements

S. No	QM Elements	Researcher's Name & Year
1	Top management leadership	Crosby[1],1984;Deming[2],1986; Andersonet al.[3], 1995; Ahire et al.[4],1996; Black & Porter[5], 1996; Adam et al.[6], 1997; Kaynak[7], 2003; Wong[8], 2003
2	Supplier quality Management	Ahire et al.[4], 1996; Black & Porter[5], 1996; Crosby[1], 1984; Deming[2],1986
3	Customer Focus	Ahire et al.[4], 1996; Black & Porter[5], 1996; Adam et al.[6], 1997;Deming[2], 1986
4	Product and Service Design	Ahire et al.[4], 1996; Black & Porter[5], 1996; Adam et al.[6], 1997; Ahire & Dreyfus[9], 2000; Kaynak[7], 2003
5	Process management	Ahire et al.[4], 1996; Black & Porter[5], 1996; Anderson et al.[10], 1995; Crosby[1], 1984; Deming[2], 1986
6	Employee training and human relations	Ahire et al.[4], 1996; Black & Porter[5], 1996; Adam et al.[6], 1997; Crosby[1], 1984; Deming[2], 1986
7	Quality Data and Reporting	Ahire et al.[4], 1996; Black & Porter[5], 1996; Crosby[1], 1984; Deming[2],1986;Kaynak[7],2003

Table 1: QM elements

C. SCM Elements

Below shows different SCM elements and also table below shows the researcher who pointed out these and in which year.

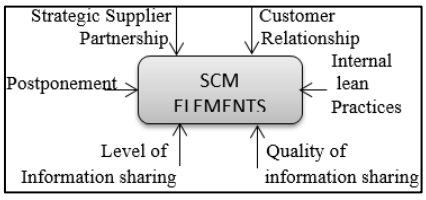

Fig. 3: SCM elements

S. No	SCM Elements	Researcher's Name & Year
1	Strategic supplier partnership	Gunasekaran et al.[11],2001;Tan et al.[12], 2002; Li et al.[13],2005;
2	Internal lean practices	Handfield & Nichols[14],1999; Mason-Jones& Towill[15], 1997
3	Customer relationship	Aggarwal[16], 1997; Tan et al.[12],2002; Li et al.[13],2005; 2006
4	Level of information sharing	Li & Lin[17], 2006; Li et al.[13],2005; 2006
5	Quality of information sharing	Li & Lin[11], 2006;Li et al.[13], 2005; 2006
6	Postponement	Zografose& Giannouli [18], 2001; Li et al. [13], 2005; 2006

Table 2: SCM elements

D. TSCQM Framework

The TSCQM framework is based on the dependency of QM and SCM on their elements which leads to improved organizational performance and competitive advantage.

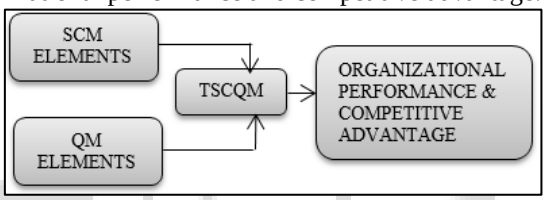

Fig. 4: TSCQM framework

III. Methodology

Qualitative survey method is employed here to see current state of SCM and QM practices in Indian industries in Pithampur industrial area. This survey will be helpful in throwing light on the governing factors that effects the implementation of SCM and QM practices in the firm.

1) Step 1) Choosing the market where survey is to be carried out: Here it is Pithampur industrial area.
2) Step 2) Deciding the type and mode of survey:
   The survey is purely qualitative and is carried through direct interaction and through e-mail.
3) Step 3) Preparing the questionnaire:
   The questionnaire was developed to examine various aspects of quality and supply chain management practices in organizations in Pithampur industrial area. The questionnaire is divided into three parts:
   - General questions about the company.
   - Questions pertaining to quality management practices.
   - Question pertaining to supply chain management practices.
4) Step 4) Collecting the responses and Analysing them by the use SPSS software.

The questionnaire consist of 24 questions covering both SCM and QM practices. A total of 20 company's responses has been recorded and utilized for survey analysis purpose.

The list of surveyed companies is shown below:

1) Badve Engineering pvt ltd.
2) Simplex Metal Processor pvt ltd.
3) Italian Edibles pvt ltd.
4) LGC promochem india pvt.
5) JBM auto ltd.
6) Emkay auto pvt.
7) Rajratan Global Wire pvt ltd.
8) CEBBCO ltd.
9) SM Auto pvt ltd.
10) Belmaks Metal India ltd.
11) Porwal Auto.
12) Diversitech General ltd.
13) Pinnacle Industries ltd.
14) Kach Motors pvt ltd.
15) Spark Autometal Component pvt ltd.
16) Gatiman Auto pvt ltd.
17) Caparo Engineering India pvt ltd.
18) Suneel Auto Comp pvt ltd.
19) IPF Vikram (I) ltd.
20) ITL Industries ltd.

IV. SURVEY ANALYSIS

The responses taken from different firms is purely qualitative. Each firm were asked to give certain points ranging from 1 to 7. These points representing level of agreement from the firm on particular activity for e.g. 1= extremely disagree upto 7 = extremely agree. The responses are collected from 20 firms of pithampur area against 24 questions covering the quality and supply chain management practices of firms. The analysis is done by the use of SPSS software.The reliability analysis for 24 variable and 20 respondent companies is shown below through the data editor screen of SPSS.

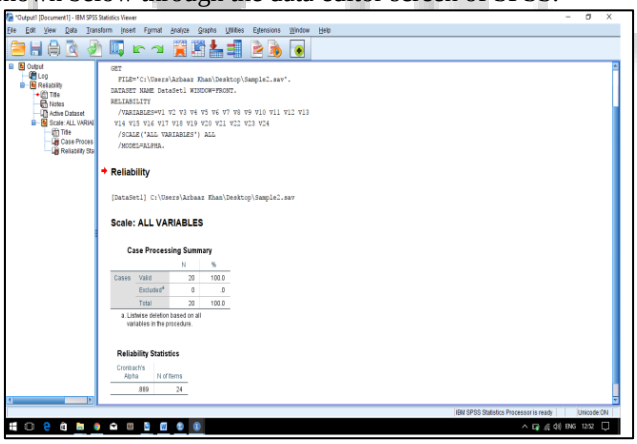

Fig. 5: Reliability Analysis Output

V. INTERPRETATION

In our case the value for Cronbach's alpha is .889 thus it can be interpreted as the 88.9% of variance the observed scale would explain in the hypothetical true scale composed of all possible items in the universe. Alternatively, it can be interpreted as the correlation of the observed scale with all possible other scales measuring the same thing and using the same number of items.

After conducting the reliability analysis test the factor analysis is to be performed using SPSS so as to obtain selected factors effecting the firms SCM and QM practices.

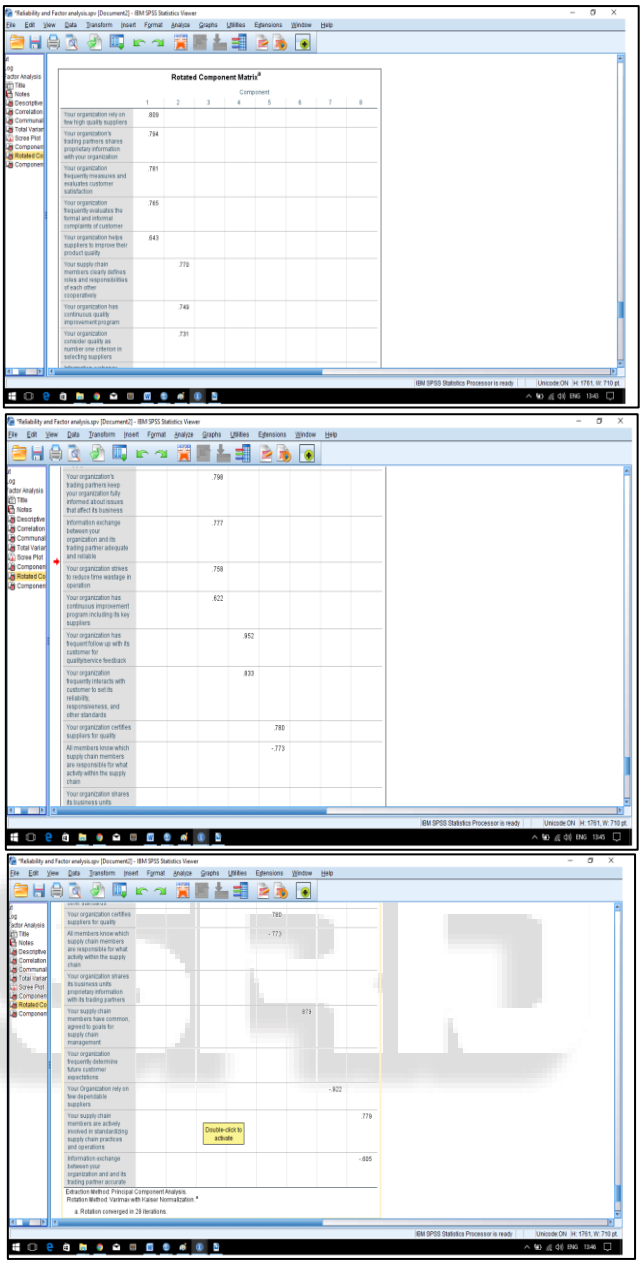

Fig. 6: Interpretation

The above image output shows the rotated component matrix and is the required matrix for which the factor analysis is done. The above matrix shows the number of component for reducing the number of variables. Here, 24 questions on a survey we designed to measure SCM and QM practices. Now we will cluster this questions into the factors or components. The relationship of each variable to the underlying factor is expressed by the so-called factor loading. Since factor loadings can be interpreted like standardized regression coefficients, one could also say that the variables has a correlation of with the factors. Here we are getting 8 factors out of which the factor numbered 7 is having negative loading value corresponding to variable question. Hence it should be discarded as it does not account for any dependency. So we left only with 7 components or factors. This factor are formed by combining the effect of variable question lying under there columns.

VI. RESULT AND CONCLUSION

Below table shows the factor loading correspond to the factor that are obtained through SPSS factor analysis. The factor loading is nothing but the average response obtain during survey. The average response column contains values ranging from 1 to 7 scale. Where 1 represent extremely disagree up to the point 7 representing extremely agree. The point lies at the center of scale and represent neutral response meaning a firm can adopt or reject certain practice based upon the situation. Any value below 4 point represent that the firm is not implementing the factor or bad state of factor while anything greater than 4 represents a good state of factor.

S. No	Factors	Average Survey Response
1	Organizations role in Supply Chain	3.95
2	Quality and responsibility	4.95
3	Information exchange and time wastage reduction	4.65
4	Customer Relationship	2.98
5	Quality suppliers	5.4
6	Supply chain member involvement	3.25
7	Standardization of SC practices	2.75

Table 3: Results

It is clear from the above table that the factors Supply chain members involvement, standardization of SC practices and Customer Relation are not been considered and implemented in the surveyed firms. While the factor like Quality and Responsibility, Quality Suppliers, Information exchange is up to the mark. Thus it can be concluded from the above result that QM practices are up to the acceptable level while that of the SCM practices need to be nurtured for TSCQM implementation.

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