A Quality perspective of the various allied value chain activities

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ABSTRACT

Now-a-days quality is one of the main criteria by the help of which we can have more & more numbers of customers; so with time quality is becoming a very vital pillar in the success of an organization. This paper studies about how the various value chain activities can be studied or understood from the perspective of quality and how the various value chain activities affects the quality.

KEYWORDS: - Quality, supply chain & value chain activities.

INTRODUCTION

Supply Chain Management is an integrative philosophy to manage the total flow of a channel from the earliest supplier of raw materials to the ultimate customer; company’s survival & growth are highly affected by their supply chain practices. Specifically the service level and cost when changes affect the performance of organization. In this set a quality stand or a qualitative practice has to be taken up.

Interest in supply chain management (SCM) has steadily increased since the 1990 s, when firms saw the benefits that could be derived from its implementation. In the literature, we can find many authors who acknowledge that SCM can improve performance (Ellram and Cooper, 1990; Cooper, 1993; Gustin et al., 1994; The Global Research Team at Michigan State University, 1995; Clark and Hammond, 1997; Christopher, 1998; and more recently Stank et al., 2001; and Gimenez and Ventura, 2003), but very few studies analyse it empirically (Stank et al., 2001; Gimenez and Ventura, 2003).

SCM is “the integration of key business processes from end user through original suppliers that provides products, services, and information that adds value for customers and other stakeholders” (Lambert et al., 1998). It follows that SCM involves integration, co-ordination and collaboration across organisations and throughout the supply chain. It means that SCM requires internal (intra organisational) and external (inter organisational) integration.

There are many different theories and approaches in the field of Organisational Development that argue for different, and sometimes similar activities in order to enhance organisational performance, in order to keep a competitive advantage on the market. During the last decades, quality management has been put forward by a number of its promoters as a new management theory, but, the description of what quality management is differs, see, for example, Foley (2004). Despite the high aims of promoters of quality management, the failures of organisations trying to implement a successful quality management programme have been well documented, see Brown et al. (1994), Eskildson (1994), Harari (1997), Cao et al. (2000) or Nwabueze (2001).

LITERATURE REVIEW

Supply Chain Management is a network of facilities that produce raw materials, transform them into intermediate goods and then final products, and deliver the products to customers through a distribution system. It spans procurement, manufacturing and distribution (Lee & Billington 1995) the basic objective of supply chain management is to “optimize performance of the chain to add as much value as possible for the least cost possible”. In other words, it aims to link all the supply chain agents to jointly cooperate within the firm as a way to maximize productivity in the supply chain and deliver the most benefits to all related parties (Finch 2006). Adoption of Supply chain management practices in industries has steadily increased since the 1980s. A number of definitions are proposed and the concept is discussed from many perspectives. However Cousins et al. (2006); Sachan and Datta (2003); Storey et al. (2006) provided excellent review on supply chain management literature. These papers define the concept, principals, nature, and development of SCM and indicate that there is an intense research being conducted around the world in this field they critically assessed developments in the theory and practice of supply management.

Gunasekaran and McGaughey (2003) extended the scope of SCM beyond material management, partnership, information technology to the Total Quality Management areas like management commitment, organizational structure, training and behavioural issues. As firms’ survival lies on integration, a good understanding of the integration process is a key aspect in SCM. Mouritsen et al. (2003) discussed that basic hypothesis “the more integration (wider the scope) – the better the management of the chain” is not always true and proved that it depends very much on the “environment” of the supply chain and the power relations between the participants in the supply chain. Authors proposed a set of management techniques and tools to analyze successful SCM strategies. It is also observed that...
research is not limited to hypothesis testing and data analysis, but more advanced techniques like simulation, Artificial Neural Network, and Fuzzy logic are also used for optimization and decision making in SCM.

Koh and Tan (2006) used the principles of fuzzy logic for analyzing and monitoring performance of suppliers based on the criteria of product quality and delivery time where as Chiu and Lin (2004) showed how the concepts of collaborative agents and artificial neural networks (ANNs) can work together to enable collaborative supply chain planning (SCP). It appears from literature review that researchers have studied supply chain management from a system perspective, or the systemic natures of interactions between the participants of supply chain are observed. Although numerous studies views SCM from different perspectives, this paper gives the better understanding of supply chain activities.

The review of literature suggest that in order to find various parameters of an organization that have an impact on quality practises followed by an organization we have adopted the quantitative method employing personal (direct) survey was selected and for this purpose the descriptive type of research has been done. The study is based upon the primary survey and data was collected from 120 intermediaries of cement manufacturing units in Jammu region (J&K); INDIA with the help of a well designed pre-tested structured questionnaire. The present study is descriptive and conclusive in nature and the sampling technique used was convenience sampling. The function of descriptive statistical analysis has been performed for each of the section and also factor analysis was used to get the respective factor loadings; which signifies the respective important variable of that factor; with the help of SPSS. The deduced variables are modelled as linear combinations of the potential factors, plus "error" terms. The information gained about the interdependencies between observed variables can be used Table 1 shows the reliability of the data. The sample was first checked for the reliability using Cronbach’s Alpha . A value of 0.6 or less generally indicates unsatisfactory results (Malhotra, 2007, p. 282 and Hair, 2007, p.88). The Cronbach alpha is widely used in different research fields(Peterson, 1994). The acceptable score of reliability coefficient of Cronbach Alpha is 0.5-0.6 for new scales (Davis, 1964). The value of cronbach alpha for the sample selected for the study came .789 which is greater than .6; it implies that data collected was reliable.

SCM can be divided into three main activities – purchase, manufacture and transport (Thomas et al., 1996). Cooper et al. (1997) analyzed the three elements of SCM – supply chain business processes, supply chain management components, and supply chain network structure. The information flow is like an individual system to link the whole supply chain from supplier and manufacturer to consumer. Unimpeded information flow could increase the operation accuracy for cost saving and promote the competitiveness of firms. The product flow proceeds through the whole production processes from material supply via manufactories till providing the finished products to consumers. The items in vertical direction show the various management tasks within the supply chain. Particularly, the return flow, or reverse logistic, is one of the elements in the system but with converse direction from the others.

**RESEARCH METHODOLOGY**

later to reduce the set of variables in a dataset. After getting the factor loadings we can quantify the relationship between quality and other selected variables. The linear regression model has been used; as stated in equation (1).

\[ Y = \beta_0 + \beta_1 Y_1 + \beta_2 Y_2 + \ldots + \beta_n Y_n + \mu \ldots \] (1)

Here; \( Q = \sum(Y_1 + Y_2 + \ldots + Y_n) \) \[ \text{---------}\] (2)

Where “Q” is Quality variables. Then data is interpreted along with the analysis to make it more understandable to evaluate the impact of various variables.

**DATA INTERPRETATION AND ANALYSIS**

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.789</td>
<td>86</td>
</tr>
</tbody>
</table>

**TABLE 1**:- Reliability Statistics

that the factor analysis test is suitable for the data/samples collected (Kaiser, H. F. (1963), Bartlett, M. S. (1950). Kaiser–Mayer– Olkin measure of sampling adequacy employed to analyze the strength of association among variables (Haque et al., 2009). High values (between 0.5 and 1.0) indicate adequacy of data for the use of Factor Analysis (Malhotra, 2007, p. 588). (Hair et al., 1992) minimum loading necessary to include an item in its respective constructs. They also suggested that variables with loading greater than 0.30 is considered significant, loading greater than 0.40 more important, and loading 0.50 or greater are very significant.

**FACTOR LOADING TABLES: 1) TRANSPORTATION**

<table>
<thead>
<tr>
<th>FACTOR LOADINGS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation is one of the</td>
<td>0.912</td>
</tr>
<tr>
<td>best thing of your organization</td>
<td></td>
</tr>
<tr>
<td>Your transportation system is quite</td>
<td>0.587</td>
</tr>
<tr>
<td>reliable</td>
<td></td>
</tr>
<tr>
<td>Transportation strikes are very low in your organization</td>
<td>0.661</td>
</tr>
</tbody>
</table>

**TABLE 2:** KMO and Bartlett's Test

Table 2 shows the value of KMO, which is 0.779 and which should be above 0.5. High values (between 0.5 and 1.0) indicate adequacy of data for the use of Factor Analysis (Malhotra, 2007, p. 588). The value of Bartlett’s test is significant with the value equal to 1225 so it can be assumed
Transportation is main facilitator in your logistics operation 0.957
You incur quite a lot amount of money due to transportation 0.870
Quite a lot number of orders have not been delivered on time 0.829
Most of your efforts are on improving Transportation cycle time .414
Most of your deliveries are on time .568
You incur huge losses due to late delivery of goods in past one year .637
You spend large amount of money on handling of finished goods .745
Maximum factor loading is of “Transportation is main facilitator in your logistics operation” ie .957. The minimum factor loading is of “Your transportation system is quite reliable”, i.e 0.587. A good transport system performing in logistics activities brings benefits not only to service quality but also to company competitiveness (TSENG et al., 2005)

2) SOURCING

Sourcing is one of the best things of your organization .816
Your sourcing system is quite reliable .466
Partners can handle orders within very short span of time .469
Too much of quality checks are done for sourcing .959
Maximum factor loading is of “Too much of quality checks are done for sourcing” ie .959. The minimum factor loading is of “Your sourcing system is quite reliable”, i.e 0.466

3) INFORMATION TECHNOLOGY

IT is main facilitator between logistics and other activities .771
Your work force is very well worse with IT .466
You spend large amount of money on IT training .779
Your work force is resistant to implementation of new and better IT upgrades .879
Online is heavily used for order placement, tracking and receiving .893
New IT tool is always implemented about proper market survey and research .829
IT helps in managing overall logistics operations of organization .958
Maximum factor loading is of “IT helps in managing overall logistics operations of organization” ie .958. The minimum factor loading is of “Your work force is very well worse with IT”, i.e 0.466

4) TRANSPORTATION CYCLE TIME

Most of your privately owned vehicles helps in improvement of Transportation cycle time .891
Transportation cycle time is not very good because of third party logistics .823
You have lost money of yours in orders and delivery because of inappropriate Transportation cycle time .873
Transportation cycle time is one of the main criteria for being efficient .850
You have tried to implement some of the measures to control the deviation .679
High cost is incurred due to these deviations .465
Maximum factor loading is of “Your own privately owned vehicles helps in improvement of Transportation cycle time” ie .891. The minimum factor loading is of “Most of your efforts are on improving Transportation cycle time”, i.e 0.414.

5) DELIVERY

Most of your retailer and distributors are satisfied by delivery performance of your organization .872
Delivery of goods is done with the help of IT integration .789
Customer satisfaction is one of the criteria for delivery performance .771
You incurred huge losses due to late delivery of goods in past one year .637
You spend large amount of money on delivering of finished goods .745
Maximum factor loading is of “Most of your retailer and distributors are satisfied by delivery performance of your organization” ie .872. The minimum factor loading is of “Most of your deliveries are on time.”, i.e 0.568. At the logistics phase, customer orders are received and delivery of the goods is planned, this stage of supply chain management stage is aptly named Deliver. Johnson and Anderson (2000) suggested both the repositioning of final manufacturing into the distribution channel and the move towards customization-on-order are related to the implementation of postponed manufacturing.

6) INVENTORY

Storage facilities are of international standards .851
Regular inspection of stored material is done .760
Quality is one of the main criteria for raw .880
material and finished goods.

RFID and EDI are used for proper storage of goods. .670
Storage of raw material and finished goods is done by the help of latest technology/software/database. .953
Inventory of raw material is quite high. .571
Inventory of finished goods is quite high. .865

Maximum factor loading is of “Storage of raw material and finished goods is done by the help of latest technology/software/database.” i.e 0.953. The minimum factor loading is of “Inventory of raw material is quite high.”, i.e 0.571

7) QUALITY

<table>
<thead>
<tr>
<th>FACTOR LOADINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>About 10% of expenditure by organization is done on quality control</td>
</tr>
<tr>
<td>Quite a large number of complaints in past one year have you faced regarding quality</td>
</tr>
<tr>
<td>A batch of product undergoes too much number of times under quality test.</td>
</tr>
<tr>
<td>A quality check usually takes too much time.</td>
</tr>
<tr>
<td>Quality control mechanism is strictly being followed by quality department</td>
</tr>
<tr>
<td>Reliability of the whole process/machinery</td>
</tr>
<tr>
<td>Strict quality process is adopt for finished goods</td>
</tr>
</tbody>
</table>

Maximum factor loading is of “A batch of product undergoes too much number of times under quality test.” i.e .910. The minimum factor loading is of “Strict quality process is adopt for finished goods”, i.e .590.

REGRESSION ANALYSIS

Table 3: β value table

<table>
<thead>
<tr>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficient</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td>B</td>
</tr>
<tr>
<td>Constant</td>
<td>.526</td>
<td>.187</td>
<td>2.820</td>
</tr>
<tr>
<td>Delivery</td>
<td>.290</td>
<td>.073</td>
<td>.250</td>
</tr>
<tr>
<td>TCT</td>
<td>- .300</td>
<td>.070</td>
<td>-.227</td>
</tr>
<tr>
<td>IT</td>
<td>.259</td>
<td>.056</td>
<td>.233</td>
</tr>
<tr>
<td>Sourcing</td>
<td>.674</td>
<td>.055</td>
<td>.709</td>
</tr>
<tr>
<td>Transportation</td>
<td>.243</td>
<td>.051</td>
<td>.279</td>
</tr>
</tbody>
</table>

It is concluded from the table 3, the variables were found significant at 5% of significance. Using the regression analysis ; the equation between the quality and the other variables can be formulated as shown below :-

\[ Q = 0.290 \times X_1 - 0.300 \times X_2 + 0.259 \times X_3 + 0.674 \times X_4 + 0.243 \times X_5 - 0.526 + \mu(\text{error}) \]

Where,

\[ Q = \text{Quality}; \ X_1 = \text{Delivery}; \ X_2 = \text{TCT}. \]
\[ X_3 = \text{IT}; \ X_4 = \text{Sourcing}; \]
\[ X_5 = \text{Transportation} \]

LIMITATIONS

1. Geographical location limitation: - Survey was conducted in Jammu region and the data was collected from different manufacturing units, distributors and retailers. It was difficult to reach all the respondents.

2. As the data was collected through a questionnaire so correctness of the responses cannot be judged authentically. Moreover the awareness level of the respondents was quite low.

3. Other limitations include the qualitative variables used in the study which might have reflected on making some causal errors.

CONCLUSION

This paper covers broadly from logistics activities required in the cement plant. It attempts to determine the role of quality upon the different logistics activities through extensive review. The main contents of the research include a review of logistics development in the cement plant. The data came out to be reliable with the cronbach alpha of 0.789 for the sample of 86 items. The F-value came to significant with a significance of 0.00 so the null hypothesis was accepted thus, the quality is a function of transportation, sourcing, transportation cycle time, information technology and delivery.

A factor analysis was applied to the 48 variables which reduced the data to the 8 variables. The value of KMO came
out to be 0.779. A regression was run on the 8 deduced variables. The value of R square came out to be .910 with significance level of .000. This showed that there is a certain relationship between quality and different the variables selected in the study.

This research examined the status of quality management practices in logistics. Overall, the results indicated that many firms have successfully implemented quality programs in logistics functions and the quality is a function of transportation, sourcing, transportation cycle time, information technology and delivery as shown in above equation.

This research covers broadly from logistics activities to transportation systems and attempts to determine the role of transportation in logistics systems through extensive review. Transportation variable adds 0.243 to quality according to the regression analysis.

The main contents of the research also include a review of logistics development, the characters of various transport operations in logistics activities, the applications of logistics in various fields, city logistics, future direction in logistics development, and its cooperation with transport systems. To sum up, logistics and transportation have some relevance.

1. Logistics system has a more and more important position in our society activities. (2) Transportation and logistics systems have interdependent relationships that logistics management needs transportation to perform its activities and meanwhile, a successful logistics system could help to improve traffic environment and transportation development.

3. Since transportation contributes the highest cost among the related elements in logistics systems, the improvement of transport efficiency could change the overall performance of a logistics system. (4) Transportation plays an important role in logistics system and its activities appear in various sections of logistics processes. Without the linking of transportation, a powerful logistics strategy cannot bring its capacity into full play.

IT infrastructure capabilities provide a competitive positioning of business initiatives like cycle time reduction, implementation, implementing redesigned cross-functional processes. Several well known firms involved in supply chain relationship through information technology. This study attempts to present a theoretical viewpoint, supported by empirical evidence, on understanding IT value creation through digitally enabled supply chain integration.

This research work provides empirical justification for a framework that identifies the criticality of strategic sourcing and supply chain agility and its positive association/impact on the organizational performance in the context of manufacturing companies. It provides measurement scales for strategic sourcing, supply chain agility, strategic supplier partnership, flexibility in sourcing, supplier evaluation, trust in supply chain and organizational performance. This research has identified factors that constitute strategic sourcing and determined their impact on performance. Supplier partnership is the strongest area of strategic sourcing to consider when organizations plan to make their demand management and distribution effective.

REFERENCES

15. Eskildson, L. (1994), Improving the odds of TQM’s success, Quality Progress, Vol. 27 No. 4, pp. 61-63