Supply Chain Effectiveness With The Value Of Shared Information By Retailers

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Key Words:
1.Supply Chain (SC)
2.Retailers Relationship
3.Supply Chain Management (SCM)

Abstract

Retailers are the last link from supply side who ultimately deals with the customers and possesses repository of information. Valuable information shared by retailers ultimately brings into notice the on going and changing needs, tastes, preferences, likings of the customers. Products can be premeditated according to customers' choice if retailers share valuable information. The paper introspects supply chain effectiveness with the abet of valuable information shared by retailers. A sample of 120 retailers selling products of small manufacturing firms was contacted in district Udhampur of J&K State. The data after purification & validation through factor analysis was subjected to multivariate tools. The results of hierarchal regression analysis, correlation and one way ANOVA revealed business performance, relationship building and customer service as the predictors of supply chain effectiveness with the help of information sharing, positive influence of information sharing on supply chain relationships and indifference of retailers perception with regard to age groups. The study emphasized on bringing attitudinal changes among retailers through education & collaborative activities

INTRODUCTION

Supply chain in simple words means sequence of partners/members/intermediaries engaged or involved to supply & manage the flow of manufactured products to the ultimate customers. These partners/members/intermediaries are known as channel functionaries encompassing suppliers, manufacturers, wholesalers, retailers and the ultimate customers. These members collaborate and work together by forming a chain (to ensure the goods to the markets (customers)) known as supply chain. Supply chain is often known as all the parties/channel members involved in satisfying the end customers.

The APICS dictionary defines the term supply chain as either the "processes from the initial raw materials to the ultimate consumption of the finished product linking across supplier-user companies", or as the "functions within and outside a company that enable the value chain to make products and provide services to the customer. Supply chain management often refers to the entire supply activity of the firm. Whilst it is interesting to note that many authors do not like the term, SCM has been adopted by the global academic community, despite several attempts to advance the debate and offer new terms such as pipeline management, network sourcing, demand management and value stream management (Christopher, 1992; Croom et al., 2000; Farmer and van Amstel, 1991; Hines et al., 1999; Lamming, 1993). Effectiveness refers to efficacy or efficiency which binds the supply chain partners on one track. The effectiveness can be enhances by mutual goal setting, collaborative decision making, shared information and communication and with other means.

Retailers are channel partners or members that break the bulk of wholesalers. They are the last link from supply side who ultimately deals with the customers. Customers are the direct consumers of the products and they purchase all the items from the retailers. The retailers being the last link in SC and close to markets possesses valuable information and willing to share with upstream members for mutual collaborative benefits. The major benefits of information sharing in inter firm relationship are fewer inventories, shorter cash flow cycle times, reduced logistics & material purchasing costs (Lee & Whang, 2000), increased workforce efficiency and improved customer responsiveness (Lummus and Vokurka, 1999). Information sharing enhances operational efficiency among supply chain partners and refers to cost control in performing business activities as a competitive tool (Eccles & Pyburn, 1992; Neely, 1998; Beamon, 1999 and Medori & Steeple, 2000). Information sharing focuses on distribution initiatives, enhanced transactional profitability, achievement in company goals & strategies, timely availability of information for ensuring market flexiblility (Medori & Steeple, 2000; Lee & Whang, 1998 and Waller, Johnson & Davis, 1999). It also improves competencies in specific areas of supply chain including cost, delivery,

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speed, quality & flexibility and ability to provide a differentiated customer service at a lowest possible cost (Fawcett & Clinton,1996).

REVIEW OF LITERATURE

Existing literature portrays information sharing and communication among supply chain intermediaries and is vitally significant as it assists in handling market diversity, reflects competitive pricing and strategies, maintains optimum product life cycles (Stank et al., 1999 and Barrat & Oliveira, 2001), resources, rewards (Phillips et al., 2000) and responsibilities as well as jointly make decisions & solve problems (Spekman et al., 1998). In fact effective relationship is based on timely sharing of right information which in lieu develops mutual trust, openness, shared risk and shared rewards that yield a competitive advantage resulting in better performance (Bowersox et al., 2000) The literature regarding information sharing and communication, has been overwhelmingly framed along efficiency criteria and its benefits (Gal-Or & Ghose, 2005). Li & Ye (1999) included logistics coordination & organisational relationship linkages, incentive alignment, collaborative performance systems, process improvements by imparting operational efficiency. A firm can inculcate operational efficiency in performing business activities with the help of proper information sharing and communication (Medori & Steeple, 2000) resulting in reduced cost, delivery speed & reliability, quality & flexibility, overall efficiency and ability to provide & differentiated customer services. The nature of information exchange encompasses diverse areas such as product, customer, supplier, manufacturing procedure, transportation, inventory, competitive, sales & markets etc. The paper focuses on the relevance of information sharing and communication by retailers of district Udhampur, J&K State.

RESEARCH HYPOTHESES

On the basis of in-depth analysis of existing review of literature and its meaningful conclusions, the following hypotheses had been emerged in order to make the study more reliable and responsive. The main hypotheses are:-

Hyp1: Supply chain effectiveness is dependent upon information shared and communicated by retailers.

Hyp2: Information sharing has positive influence on supply chain relationships.

Hyp3: Perception of retailers regarding information sharing do not differs with regard to age difference.

Obj: To analyse the impact of information sharing in improving supply chain effectiveness.

RESEARCH DESIGN AND METHODOLOGY

Rsearch design and methodology comprises area of research, nature of data/information (Primary or secondary), questionnaire/schedule, research tools applied etc. The research methodology adopted proceeds as follows:

Sampling and data collection

The primary data for the study were collected from 44 functional manufacturing SSIs out of 49 units registered under District Industries Centre (DIC), Udhampur of J&K State. Five units were found to be non functional. The nature and number of downward members in Supply Chain included in the study were 120 retailers which were the main respondents included in the study. An in depth analysis of these wholesalers was the main purpose of the present study. Their response was the main basis for drawing meaningful inferences. The manufacturing units were sub-divided into ten lines of operation comprising cement (8), pesticide (3), steel (3), battery/lead/alloy (5), menthol (2), guns (2), conduit pipes (2), gates/grills/varnish (5), maize/atta/dal mills (3) and miscellaneous (11). The miscellaneous category includes small scale units namely M/s Supertech Industry, M/s Luxmi Electronics Works, Shaj Nath Vanaspati Ltd., M/s Aditiya Cables, Poles and Transformers, Shankar Lime Industry, M/s Unique Carbon Industries, M/s B.S Traders, M/s Vijay Candles, Everest Health Care Products, M/s J.K Petro Chemicals, M/s Ajay Ice Factory. Census method was used to elicit response from owners/managers of the SSIs and snowball/referral sampling for obtaining data from retailers. The number of retailers identified was cement (22), pesticide (4), steel (4), battery/lead/alloy (20), menthol (2), conduit pipes (8), gates/grills/varnish (5), maize/atta/dal mills (33) and miscellaneous (27).

The Survey Instrument

Information was collected by administering self developed questionnaire prepared after consulting experts and review of literature which comprised of general information and 29 statements of information sharing. Statements in the questionnaire were in descriptive form, ranking, dichotomous, open ended and five -point Likert scale, where 1 stands for strongly disagree and 5 for strongly agree. The data collected was further analysed with the help of SPSS (Version 16.00) for data purification, checking validity and reliability.

Collection of data

The primary data were collected by making three to four visits for getting response from respondents. Snowball/Referral sampling method was applied for collecting data from the respective respondents (Retailers).

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The secondary information was collected from various sources namely books, empirical papers from online & hard copies of journals. Multivariate tools such as mean, standard deviation Regression analysis, correlation and ANOVA were used to test hypotheses and for drawing meaningful inferences.

Reliability

Three factors are obtained after scale purification falling within the domain of information sharing in supply chain management. The Cronbach's reliability coefficients for all 16 scale items underlying three factors ranges from 0.94 to 0.96. The alpha reliability coefficients for F1 (0.95), F2 (0.94) and F3 (0.96) is higher than the criteria of 0.77 obtained by Gordon and Narayanan (1984) indicating high internal consistency. However, the overall alpha reliability score for all factors reveals exorbitant value (0.95) which is considered highly satisfactory reliable value. Adequacy and reliability of sample size to yield distinct and reliable factors is further demonstrated through Kaiser-Meyer-Olkin Measure of Sampling Adequacy that is 0.853 and all factor loadings between items and their respective constructs being greater than equal to 0.55.

Validity

All the three factors obtained alpha reliability higher and equal to 0.50. Apart from these measures, KMO value is also satisfactory at 0.85, indicating validity of the construct (Hair et al., 1995).

DATA ANALYSIS AND INTERPRETATION

The suitability of raw data for factor analysis obtained from retailers is examined through Anti-image, KMO value, Bartlett's Test of Sphercity and (p-value = 0.000), indicating sufficient common variance and correlation matrix (Dess et al., 1997 and Field, 2000). The process of R-Mode Principal Component Analysis (PSA) with Varimax Rotation brought the construct to the level of 16 statements out of 29 statements originally kept in the domain of information sharing. The KMO value (0.853) and Bartlett Test of Sphercity (3597.535) indicates high acceptable and significant values. Therefore, factor loadings in the final factorial design are consistent with conservative criteria, thereby resulting into three-factor solution using Kaiser Criteria (i.e. eigen value ≥ 1) with 88.41% of the total variance explained. The communality for 16 items ranges from 0.75 to 0.94, indicating high degree of linear association among the variables. The factor loading ranges from 0.655 to 0.885 and the cumulative variance extracted ranges from 30.94 to 88.41 percent. The communalities and % of variance explained by each factor is displayed in the Table 1.1. A brief description of factors emerged are as under:

Factor 1 (Business performance): The first factor included six variables namely "Proper information sharing maximises warehousing usage", "Changes improper sharing process", "It reduces buffer inventory stocks", "Assists in fixing contract items, discounts & margins", "Inaccurate information results in inventory positioning problem" and "Information is shared regarding price level & services". The variables heralded significant mean values, high factor loadings and communalities. The variance explained by this factor is 30.94%. Retailers enjoy the benefits like maximum warehouse usage, promotion of inventory turns and they do share market information with their upstream partners.

Factor 2 (Relationship building): The five variables identified by this factor are: "Information sharing critical for maintaining healthy SCM relationships", "You share operation, logistics & strategic planning data, "ICT acts as tool for enhanced communication", "SCMIS strengthens SC linkages" and "Information sharing is vital for competitive strength" which evinced significant mean values, high factor loadings and commonalities. Retailers perceive information sharing as critical tool for maintaining healthy SCM relationships.

Factor 3 (Customer service): "The needed information is assessable & compatible", "Qualitative information improves SC decisions", "Intra & inter organisational communication enhance efficiency", "Internal audit identifies communication problems" and "Proper information sharing provides improved customer service" are the five variables which emanated from this factor. The mean values for all the variables are significant engrossed with high factor loadings and communalities. Retailers strongly perceive that proper information sharing improves efficiency, SC decisions and customer service.

Retailers' Perception Regarding Information Sharing & Communication in SC

Table 1.2 shows mean response of retailers with regard to information sharing & communication. The retailers' mean perception regarding information sharing & communication fluctuates between 4.20 – 4.42. The statement "Information sharing is critical for maintaining healthy SCM relationships" emerges to be strongest with mean value 4.42 and the statement "SCMIS strengthens supply chain linkages" as the weakest with mean value 4.20. The overall mean values for 16 statements among retailers' is 4.28. The retailers being the last link in SC and close to markets

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possesses valuable information and willing to share with upstream members for mutual collaborative benefits.

Table 1.3 shows output from regression analysis. The result of step-wise linear regression analysis enticed three independent factors as significant in predicting the dependent variable. These were: "Business performance", "Relationship building" and "Customer service". The correlation between predictor and outcome is positive with values of R as .887, .907, and .912 which signifies high correlation between predictor and the outcome. In model 1, R is .887 which indicates 88% association between dependent and independent variables. R-Square for this model is .787 which means that 78% of variation in information sharing and communication can be explained from the three independent variables. Adjusted R square (.785) indicates that if anytime another independent variable is added to model, the R-square will increase. Further beta values reveal significant relationship of independent variables with dependent variable. "Business performance" has emerged as the strongest predictor whereas "Customer service" was found to be the weakest as represented by relative t-values. Change in R square is also found to be significant with F-values significant at 5% confidence level. Errors in regression are independent as indicated by Durbin-Watson value (2.363). The aforesaid findings support the hypothesis "Supply chain effectiveness is dependent upon information shared and communicated by retailers".

In Table 1.4, the single metric dependent variable information sharing sub – divided into three dimensions (factors) namely, Business performance, Relationship building and Customer service was examined. The significant correlation coefficients emerged were "Business performance" (.875), "Relationship building" (0.843), and "Customer service" (.765). Thus, the hypothesis "Information sharing has positive influence on supply chain relationships" is accepted for all the three dimensions.

To test the third and final hypothesis, age of the respondents was taken into consideration and the respondents age had been classified into six categories viz., upto 20 years, 21-30 years, 31-40 years, 41-50 years, 51-60 years and above 60 years. The result of ANOVA (Table 1.5) depicted that retailers belonging to different age group have same level of perception regarding information sharing and communication as the p value is more than .05 (Sig. .266). Therefore, the results support the hypothesis "Perception of retailers regarding information sharing do not differs with regard to age difference".

CONCLUSION & MAMAGERIAL IMPLICATIONS

Information sharing and communication really enhances supply chain effectiveness as it encompasses a true and viable response and functioning from all the different supply chain partners. Information in supply chain can improve Business performance, leads to building and sustaining of relationships and ultimately leads to customer delight by frequent sharing of information with customers. The study provides fresh insights into multiple dimensions of information sharing from the perspective of Retailers. They are the last link in channel partners who ultimately deals with the customers and are having repository of information. Positive relationship between information sharing and supply chain effectiveness educates retailers to design information sharing hub wherein information regarding order processing, purchasing, inventory, warehousing & stocking, transportation, customer service etc. is available to channel partners all times. Collaborative activities such as joint goal setting, problem solving, long range planning covering potential markets to be reached, technology acquisition, product development, profit sharing would strengthen supply chain relationships.

Limitations of the study

i.The study is area specific and cannot be generalised for other retailers operating in other parts of the country having dissimilar environmental business conditions.

ii.The conclusions drawn were not completely free from biasness for the responses obtained from the different stakeholders through surveys. Meaning and concepts of all scale items was explained to the respondents in local dialect as majority of them were neo-literate. Though utmost care was taken to entice correct information, an element of subjectivity cannot be ruled out as it made little difference in the originality of ideas obtained in the field survey and final interpretation.

Directions for future research

Future researches can also be undertaken from the perspective of manufacturers, wholesalers and other intermediaries for medium & large scale industries.

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Table 1: Results Showing Factor Loadings and Variance Explained After Scale Purification (Rotated Component Method) for Information Sharing (Retailers' Perceptions)

Factor-wise Dimensions	Mean	S.D	F.L	Eigen Value	Variance Explained %
F1 Business performance	**4.24**	**.495**		**11.442**	**30.947**
1. Proper information sharing maximises warehousing usage	4.22	.526	.841		
2. Changes improper sharing process	4.25	.493	.812		
3. It reduces buffer inventory stocks	4.23	.604	.751		
4. Assists in fixing contract items, discounts and margins	4.25	.453	.728		
5. Inaccurate information results in inventory positioning problem	4.22	.457	.718		
6. Information is shared regarding price level & services	4.25	.439	.655		
F2 Relationship building	**4.26**	**.455**		**1.160**	**28.737**
1. Critical for maintaining healthy SCM relationships	4.42	.496	.828		
2. Share operation, logistics & strategic planning data	4.24	.429	.784		
3. ICT acts as tool for enhanced communication	4.21	.452	.766		
4. SCMIS strengthens SC linkages	4.20	.368	.756		
5. Vital for competitive strength	4,25	.465	.739		
F3 Customer service	**4.37**	**.484**		**1.045**	**28.734**
1. Needed information is assessable & compatible	4.37	.486	.885		
2. Qualitative information improves SC decisions	4.37	.486	.882		
3. Intra & Inter organisational communication enhance efficiency	4.35	.479	.842		
4. Internal audit identifies communication problems	4.46	.501	.825		
5. Provides improved customer service	4.32	.470	.734		

Footnotes: KMO Value =..853; Bartlett's Test of Sphercity = 3597.535, df = 120, Sig. =.000;
Extraction Method Principal Component Analysis; Varimax with Kaiser Normalisation;
Rotation converged in 8 iterations; 'FL' stands for Factor Loadings, 'S.D' for Standard Deviation and 'α' for Alpha.

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Table 2: Statement-wise Mean Rating of Variables of Information Sharing by Retailers'

Statement	**Retailers'**
Information sharing/communication	**Mean**
1. Information sharing is critical for maintaining healthy SCM relationships	4.42
2. You share operations, logistics & strategic planning data with manufacturers	4.24
3. ICT act as a tool for enhanced communication	4.21
4. SCMIS strengthens supply chain linkages	4.20
5. Information sharing is vital for competitive strength	4.25
6. Inaccurate information results in inventory positioning problems	4.22
7. Information is shared between SC members regarding price level & services	4.25
8. Information assists in fixing contract items, discounts & margins	4.25
9. Proper information and communication maximises warehousing usage	4.22
10. Information sharing enhances production capacity	-----
11. IT enhances idea sharing process	4.25
12. Information sharing enhances profitability	-----
13. Information sharing results in effective organisational purchasing	-----
14. Information sharing enhances production process	-----
15. Information is exchanged regarding material handling techniques	-----
16. Diverse markets can be reached through proper information sharing -----	
17. Information of delivery dates & time-in-transit promotes operations	-----
18. Information sharing improves promotional effectiveness	-----
19. Information sharing improves asset productivity & inventory turns	-----
20. Information sharing provides improved customer service	4.32
21. Information sharing assists in planning & improved implementation -----	
22. Information technology helps in target marketing	-----
23. Information technology reduces buffer-inventory stocks	4.23
24. Information technology (software) assists in speedy communication	-----
25. Extensive intra and inter organisational communication enhance efficiency of SCM	4.35
26. The needed information is accessible and compatible	4.37
27. Qualitative information improves SC decisions	4.37
28. Internal audit & communication performance identifies communication problems	4.46
Total	**4.288**

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Table 3: Regression Model Summary (Retailers perspective)

Model	R	R^2	Adjusted R_2	Std. Error of Estimate	F value ANOVA	Sig. level	□	t	Sig. level	Durbin-Watson
1.	.887	.787	.785	.2536	435.214	.000	.887	20.862	.000	2.363
2.	.907	.823	.820	.2321	271.694	.000	.315	4.885	.000	
3.	.912	.832	.828	.2269	191.670	.000	.132	2.535	.013	

a) Predictors: (Constant), Business performance
b) Predictors: (Constant), Business performance, Relationship building
c) Predictors: (Constant), Business performance, Relationship building, Customer service
d) Dependent variable: Supply chain effectiveness is dependent upon Information sharing and communication.

Table 4: Correlation Matrix of Information Sharing and its various dimensions

Variables		Business performance	Relationship building	Customer service	Information sharing has positive influence on supply chain relationships
Business performance	Pearson Correlation	1			
Relationship building	Pearson Correlation	.707(**)	1		
Customer service	Pearson Correlation	.628(**)	.731(**)	1	
Information sharing has positive influence on supply chain relationships	Pearson Correlation	.875(**)	.843(**)	.765(**)	1

** Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed)

Table 5 : Age -wise ANOVA

Age	Description of Variable	Mean	Nature of Variable	Sum of Squares	df	Mean Square	F	Sig.
	Upto 20 yrs	4.3556	Between Groups	1.631	5	.408	1.694	.156
	21 – 30 yrs	4.5703	Within Groups	27.694	115	.241		
	31 – 40 yrs	4.4586	Total	29.325	120			
	41 – 50 yrs	4.3276						
	51 – 60 yrs	4.1433						
	Above 60 yrs	4.2133						