Information Sharing In Managing Collaborative Relationships: An Analytical And Empirical Investigation

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INTRODUCTION

Advances in information technology have changed modern business practices, making collaborative supply-chain management (SCM) possible (Cachon and Fisher, 2000 and Chatfield et al., 2004). It provides rapid access to the required information, sensitizes service providers towards the needs of the customers, and improves operational efficiency by shortening development time (Dyer, 1996), enhances design quality (Takeishi, 2001), reduces uncertainty (Daft & Lengel, 1986), and leads to improvement in development performance & delivery schedule compliance (Brown & Eisenhardt, 1995). The past studies report positive relationships between the level of supply chain information sharing on collaborative performance at the market place (Cousins & Menguc, 2006 and Kim et al., 2006). The other benefits of collaborative information sharing are fewer inventories, shorter cash flow cycle times, reduced logistics & material purchasing costs, increased workforce efficiency, and improved customer responsiveness (Lee and Whang, 2000).

LITERATURE REVIEW

More and more companies are collaborating in the supply chain because of market diversity, competitive pricing and shorter product life cycles. Collaboration can best be described as an interorganisational relationship, in which the participating partners/parties agree to invest resources , mutually achieve goals, share information (Stank et al., 1999 and Barrat & Oliveira, 2001), resources, rewards (Phillips et al., 2000) and responsibilities, as well as jointly take decisions & solve problems (Spekman et al., 1998). Collaborative relationship is based on mutual trust, openness, shared risk and shared rewards that yield a competitive advantage, resulting in better performance (Bowersox et al., 2000) The literature regarding collaborative information sharing has been overwhelmingly framed along efficiency criteria and its benefits (Gal-Or & Ghose, 2005). Li & Ye (1999) included logistics coordination & organizational relationship linkages, incentive alignment, collaborative performance systems, process improvements by imparting operational efficiency. Operational efficiency refers to cost control in performing business activities as a competitive tool (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 products, customers, suppliers, manufacturing procedure, transportation, inventory, sales & markets, etc. The paper focuses on information sharing behaviours of partners in supply-chain collaborative relationships in small manufacturing firms of the district Udhampur, J&K State.

TESTABLE HYPOTHESES

❁ **Information Sharing and Supply Chain Intermediaries Relationships:** Perceptions regarding information sharing differs between superiors-subordinates (Hardy et al., 2003), supply chain channel members/intermediaries (Zailani & Rajagopal, 2005) and size of the firms (Carr & Pearson, 1999). Partners in the supply chain that are embedded in the rich and meaningful information network are likely to trust each other and consequently, engage in collaborative relationships (Danny et al., 2006). Wholesalers and retailers take possible network effect into account when shaping their relationships. Accordingly, the first hypothesis is :

H_1: Perceptions of wholesalers and retailers differs significantly on the dimensions of information sharing.

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❁ **Information Sharing and Operational Efficiency :** Operational efficiency in collaborative relationships is enhanced through information sharing by controlling costs (Eccles and Pyburn, 1992), quick response from implemented technologies and related inventory management initiatives (Kincade, Vass and Cassill, 2001) sophisticated delivery speed & reliability (Medori & Steeple, 2000), improved quality (Beamon, 1999), and higher flexibility (Chen & Paulraj, 2004) leads to satisfactory customer service (Ford et al., 2003), improves asset productivity & inventory turns (Christopher, 2000), fosters trust (Danny, 2006 & Croom et al., 2000). To ascertain the association between information sharing and operational efficiency, the second hypothesis is:

H_2: There exists a positive association between information sharing and dimensions of operational efficiency.

❁ **Predictors of Information Sharing in Collaborative Relationships:** Partners who are embedded in a rich and meaningful information network are likely to share information and consequently, engage in collaborative joint efforts (Danny & Geoffrey, 2006). Collaborative relationships among SC partners depend upon effective two-way frequent, open, accurate, timeliness and credible communication (Krause, 1999) and evolving personal contacts between buying & selling personnel (Krause & Ellram, 1997). The nature of information sharing varies from material problems, design issues, process capability buyers, information retrieval, etc. Such free flow of communication design provides consistency to all functions in the supply chain network, enhances profitability (Disney & Towill, 2002), reduces cost, ensures quality material (Salvodar et al., 2001) and builds market share (Giunipero, 1990). Accordingly, the study hypotheses:

H_3: Information sharing in SC collaboration is dependent upon trust, partners' behaviour, availability of IT tools and open communication & willingness to share information.

RESEARCH METHODOLOGY

The total number of registered SSIs with Directorate of Industries and Commerce, J&K is 49,426 providing employment to over 2,25,963 persons. Of these, 3838 units are registered in the district Udhampur and 90 percent of functional SSIs representing 44 in number are included in the present study. The respondents were contacted during Oct, 2010 to March, 2011. These manufacturing units are further sub-divided into ten lines of operation comprising of - 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). Census method was used to elicit response from owners/managers of the SSIs and snowball/referral sampling was used for obtaining data from 74 wholesalers and 120 retailers. The number of wholesalers identified under various categories are : cement (12), pesticide (2), steel (2), battery/lead/alloy (12), menthol (1), guns (3), conduit pipes (2), gates/grills/varnish (5), maize/atta/dal mills (14) and miscellaneous (20). Some of the major wholesalers contacted were M/S Raj Battery Corporation, M/S DBN Traders, M/s Swastik Enterprises, M/S Binothia Hardwares, Allied Agencies, Devika Agencies, Samgam Automobiles, M/S Inder Medical, ESS Traders, etc.

The product-wise retailers identified were 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 main retailers contacted during the study were Krishna Agencies, Prakash General Store, United Auto Spares, Highway Motors, Armstrong Transformers, Bagawati Sales Agencies, Dogra Cements, etc. Information was collected by administering self developed questionnaire prepared after consulting experts and review of literature, which comprised of general information and 48 statements of information sharing. Statements in the questionnaire were in the descriptive form, ranking, dichotomous, open-ended and five -point Likert scale, where 1 stands for strongly disagrees and 5 for strongly agrees.

The raw data obtained from owners/managers of SSIs were purified and reduced through factor analysis on SPSS (Version 16.00) using the Principal Component Analysis (PCA) with Varimax rotation (Kakati & Dhar, 2000), being the best rotation procedure which minimizes the number of items with high loadings on one factor, thereby enhancing the interpretability of the factors (Malhotra, 2002). The process of R-Mode Principal Component Analysis (PCA) with Varimax rotation in 20 iterations brought the construct to 29 statements of information sharing. Multivariate tools such as Chi-square test, t-test, and hierarchal linear regression model were used to test hypotheses and drawing meaningful inferences.

DATA ANALYSIS AND INTERPRETATION

❁ **Mean Difference Between Wholesalers' and Retailers' Regarding Information Sharing:** The Table 1 avows the output from t test & the $p<0.05$ indicates significant mean differences in the perception of wholesalers and retailers regarding all the statements of information sharing in collaborative relationships. The statement, "Information sharing provides improved customer service" egresses with the highest t-value (61.841) and the statement, "Information technology reduces buffer-inventory stocks" with lowest t - value (50.767) for both wholesalers and retailers respectively as represented in the Table 1. The mean perception of retailers regarding all the statements is found to be higher than that of wholesalers.

❁ **Information Sharing and Operational Efficiency :** The Table 2 shows output from Chi-square test and reveals positive association of 7 statements and insignificant association of 4 statements of operational efficiency with information sharing. The statement, *"Information sharing improves asset productivity"* is highly significant among all, with significance value of .023 ($p<0.05$). The statements, *"Information sharing results in transaction cost economies"*; *"Information sharing optimizes inventory positioning & control"*; *"Enhancement in production capacity is due to open information sharing"*; *"Information sharing improves promotional effectiveness"*; *"Information sharing improves financial structure"; "Information sharing leads to a reduction in cycle time & on-time delivery"* exhibits significant association with operational efficiency as the $p<0.05$. The other statements were found to be insignificant. Overall, the hypothesis is accepted for 7 statements and rejected for 4 statements.

❁ **Predictors of Information Sharing in Collaborative Relationships :** Table 3 shows output from multiple regression analysis using 47 statements of information sharing to predict the dependent variable, *"Information sharing is critical for maintaining healthy collaborative relationships."* . The result of step-wise linear regression analysis enticed six independent variables as significant in predicting the dependent variable. These are: *"Information sharing depends upon the willingness of channel members"*; *"Frequent personal contacts improve information sharing"*; *"Trust among partners improves Information sharing"*; *"Quality of information depends upon behaviour of channel partners"*; *"Availability of IT tools assists in information sharing"* and *"Inventory turnover motivates information sharing"*. The correlation between predictor and outcome is positive with values of R as .641, .672, .753, .790, .803, and .827, which signifies high correlation between predictor and the outcome. *"Information sharing depends upon the willingness of channel members"* emerged as the strongest predictor, whereas, *"Inventory turnover motivates information sharing"* is 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 the 5% confidence level. Errors in regression are independent as indicated by the Durbin- Watson value (1.98) being close to 2. The aforesaid findings support the hypothesis, *"Information sharing in SC relationships is dependent upon trust, partners' behaviour, availability of IT tools and open communication & willingness to share information"*.

CONCLUSION AND MANAGERIAL IMPLICATIONS

Advances in information technology have espoused logistics researchers to new relationship paradigms to create relational advantages. Information sharing embedded in collaborative relationships represents one medium through which partners in the supply chain can improve operational efficiency by reducing logistics costs, augment financial structure & functioning, reduce behaviour uncertainty, leading to overall competitive strength. The study provides fresh insights into multiple dimensions of information sharing from the perspective of managers, wholesalers and retailers. Retailers being the last link in SC are found to have a repository of customers and updated market information and are willingly to share the same with upstream members for mutual benefits. Positive association between information sharing with operational efficiencies educates mangers 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 collaborative relationships. Frequent sharing of business information in a cordial & friendly environment would enable the parties to solve any problem tactically, without jeopardizing the interest of others. Above all, trust should be inculcated through commitment, cooperation, fair intentions so that partners are willing to share information for effective and efficient supply chain performance. The findings of the study are limited

Table 1 : Mean Difference Between Wholesalers and Retailers Regarding Information Sharing

Statement	Pair	Mean	t value	df	Sig (2 tailed)
1. Information sharing is critical for maintaining collaborative relationships.	Wholesalers Retailers	4.36 4.42	-58.788	193	.000
2. You share operations, logistics & strategic planning data with partners.	Wholesalers Retailers	4.16 4.24	-58.788	193	.000
3. ICT acts as a tool for enhanced communication.	Wholesalers Retailers	4.10 4.21	-59.182	193	.000
4. SCMIS strengthens supply chain linkages.	Wholesalers Retailers	4.10 4.20	-58.192	193	.000
5. Information sharing enhances competitive strength of partners.	Wholesalers Retailers	4.12 4.25	-60.966	193	.000
6. Inaccurate information results in inventory positioning problems.	Wholesalers Retailers	4.13 4.22	-58.058	193	.000
7. Information is shared between SC members regarding price level & services.	Wholesalers Retailers	4.12 4.25	-60.273	193	.000
8. Information assists in fixing contract items, discounts & margins.	Wholesalers Retailers	4.12 4.22	-60.079	193	.000
9. Proper information and communication maximizes warehousing usage.	Wholesalers Retailers	4.13 4.26	-54.977	193	.000
10. Information sharing enhances production capacity.	Wholesalers Retailers	4.13 4.25	-58.982	193	.000
11. IT changes improper sharing process.	Wholesalers Retailers	4.12 4.25	-56.506	193	.000
12. Information sharing enhances profitability.	Wholesalers Retailers	4.14 4.30	-60.884	193	.000
13. Information sharing results in effective organizational purchasing.	Wholesalers Retailers	4.16 4.29	-59.205	193	.000
14. Information sharing enhances logistic processes.	Wholesalers Retailers	4.14 4.30	-60.884	193	.000
15. Information is exchanged regarding material handling techniques.	Wholesalers Retailers	4.16 4.29	-57.657	193	.000
16. Diverse markets can be reached through proper information sharing.	Wholesalers Retailers	4.16 4.32	-60.957	193	.000
17. Information sharing assists in meeting delivery dates & time-in-transit.	Wholesalers Retailers	4.17 4.31	-60.957	193	.000
18. Information sharing improves promotional effectiveness.	Wholesalers Retailers	4.16 4.30	-61.351	193	.000

19. Information sharing improves asset productivity & inventory turns. way	Wholesalers Retailers	4.16 4.30	-58.208	193	.000
20. Information sharing provides improved customer service.	Wholesalers Retailers	4.16 4.32	-61.841	193	.000
21. Information sharing assists in planning & improved implementation.	Wholesalers Retailers	4.16 4.31	-61.593	193	.000
22.Technology in information sharing helps in target marketing.	Wholesalers Retailers	4.16 4.32	-61.841	193	.000
23. Information sharing reduces buffer-inventory stocks.	Wholesalers Retailers	4.20 4.23	-50.767	193	.000
24. Information sharing paves way for speedy communication.	Wholesalers Retailers	4.20 4.28	-54.638	193	.000
25. Extensive intra and inter organizational communication enhances collaborative relationships.	Wholesalers Retailers	4.21 4.35	-60.217	193	.000
26. The information shared is compatible.	Wholesalers Retailers	4.21 4.37	-61.030	193	.000
27. Qualitative information sharing builds trust among partners.	Wholesalers Retailers	4.21 4.37	-58.083	193	.000
28. Internal audit reduces communication problems.	Wholesalers Retailers	4.40 4.46	-58.252	193	.000

Table 2: Association Between Information Sharing And Operational Efficiency

Statement	Chi Square value	Sig. value	Outcome
Information sharing results in transaction cost economies.	17.943	.048	Significant
There is reduction in behavioral uncertainty.	1.673	.173	Not significant
Optimizes inventory positioning & control.	18.765	.047	Significant
Maximizes warehouse usage.	.113	.492	Not significant
Leads to enhancement in production capacity.	40.488	.025	Significant
Results in improved material handling techniques.	.313	.412	Not significant
Improves promotional effectiveness.	36.454	.028	Significant
Improves financial structure.	30.452	.031	Significant
Optimizes distribution network.	.024	.877	Not significant
Leads to reduction in cycle time & on-time delivery.	21.984	.041	Significant
Improves asset productivity.	44.000	.023	Significant

Table 3 : Regression Model Summary

Model	R	R^2	Adj R^2	SEE	F value ANOVA	Sig. level	Beta Coefficient	t-value	Sig. level	Durbin-Watson
1. (Constant)								2.887	.000	
Information sharing depends upon willingness of channel members.	.641	.400	.387	.427	29.251	.002	.655	6.297	.002	
2. (Constant)								3.233	.000	
Information sharing depends upon willingness of channel members.							.627	6.297	.002	
Frequent personal contacts improves information sharing.	.672	.483	.465	.400	19.456	.000	.430	3.553	.014	
3. (Constant)								2.586	.000	
Information sharing depends upon willingness of channel members.							.689	6.188	.003	
Frequent personal contacts improves information sharing.							.332	2.745	.009	
Trust among partners improves Information sharing.	.755	.564	.534	.392	18.344	.000	.319	2.626	.012	
4. (Constant)								1.319	.000	
Information sharing depends upon willingness of channel members.							.654	6.119	.003	
Frequent personal contacts improves information sharing.							.372	2.377	.022	**1.97**
Trust among partners improves Information sharing.							.369	3.238	.002	
Quality of information depends upon behaviour of channel partners.	.790	.598	.600	.375	17.729	.000	.319	2.756	.009	
5. (Constant)								1.114	.000	
Information sharing depends upon willingness of channel members.							.679	6.246	.018	
Frequent personal contacts improves information sharing.							.376	2.531	.015	
Trust among partners improves Information sharing.							.401	3.658	.001	
Quality of information depends upon behaviour of channel partners.							.320	2.899	.006	
Availability of IT tools assists in information sharing.	.803	.654	.642	.337	16.429	.000	.249	2.226	.032	
6. (Constant)								0.761	.000	
Information sharing depends upon willingness of channel members.							.628	7.113	.001	
Frequent personal contacts improves information sharing.							.444	3.639	.011	
Trust among partners improves Information sharing.							.383	3.723	.001	
Quality of information depends upon behaviour of channel partners.							.272	2.581	.001	
Availability of IT tools assists in information sharing.							.356	3.143	.014	
Inventory turnover motivates information sharing.	.827	.751	.711	.319	18.745	.000	.316	2.497	.003	

to small manufacturing firms registered under DIC Udhampur of J&K State. In future, the in-depth studies could be conducted on collaborative relationship performance, by including other stakeholders such as creditors, customers, Government and society at large.

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