Information Sharing and Communication in Small Scale Industries

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Abstract

Information sharing and communication play a vital role now-a-days as the present world is corporate world and information sharing in this world is of immense utility. Information sharing in supply chain improves profitability, competitive strength, ensures promotion and distribution of products & services, enhances operational efficiency by reducing logistics costs, augmenting financial structure and functioning and promotes customer service. The paper analyses information sharing and communication in 44 small scale industrial units in district Udhampur of J&K State. The data after purification and validation through factor analysis was subjected to multivariate tools. The results of correlation, matrix test, hierarchical regression model and ANOVA revealed positive association between information sharing and channel relationships, operational performance depends upon information shared and communicated and perceptions regarding information sharing do not differ with regard to age difference.

Key Words: Information Sharing, Supply Chain Management, Channel Relationships.

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1. INTRODUCTION

Information sharing and communication acknowledge the true disclosure of facts and figures regarding business working within the channel members. Channel members are the intermediaries, partners, parties (suppliers, manufacturers, wholesalers, retailers, customers) who assists in smooth and amicable functioning of the business. Increasing level of information sharing and communication in a channel network provides rapid access to the required information, more sensitivity towards the needs of the customers and improves operational efficiency resulting in short development time (**Dyer**, **1996**), enhanced design quality (**Takeishi**, **2001**), reduction in uncertainty (**Daft** and **Lengel**, **1986**), improvement in development performance and delivery schedule compliance (**Brown** and **Eisenhardt, 1995**). Past studies report positive relationships between information sharing and improved performance at market place (**Armistead** and **Mapes**, **1993**; **Cousins** and **Menguc**, **2006**; **Kim**, **2006**; **Zailani** and **Rajagopal**, **2005** and **Li** *et al.*, **2002**). Suppliers' share sensitive information such as the cost of each process and market information (**Helper**, **1991** and **Humphreys** *et al.*, **2004**). The competitive value of information sharing is widely heralded – it substitutes for inventory, speeds new product design, shortens order fulfillment cycles, drives process reengineering and coordinates supply chain activities (**Cachon** and **Fisher, 2000**; **Clark** and **Hammond, 1997**; **Hult** *et al.*, **2004**; **Kulp** *et al.*, **2004** and **Lee** *et al.*, **2000**). The other benefits of information sharing in supply chain management are fewer inventories, shorter cash flow cycle times, reduced logistics and material purchasing costs (**Lee**, **2000**), increased workforce efficiency and improved customer responsiveness (**Lummus** and **Vokurka**, **1999**).

2. 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** and **Oliveira**, **2001**), resources, rewards (**Phillips** *et al.*, **2000**) and responsibilities as well as jointly make decisions and solve problems. 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** and **Ghose**, **2005**). **Li** and **Ye** (**1999**) included logistics coordination and organizational 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** and **Steeple**, **2000**) resulting in reduced cost, delivery speed and reliability, quality and flexibility, overall efficiency and ability to provide and differentiated customer services. The nature of information exchange encompasses diverse areas such as product, customer, supplier, manufacturing procedure, transportation, inventory, competitive, sales and markets etc. The paper focuses on information sharing and communication existence in small manufacturing firms of district Udhampur, J&K State.

3. TESTABLE HYPOTHESES

Information sharing enhances operational efficiency and refers to cost control in performing business activities. It acts as a competitive tool (**Eccles** and **Pyburn**, **1992**; **Neely**, **1998**; **Beamon**, **1999** and **Medori** and **Steeple**, **2000**). Operational efficiency with the aid of information sharing focuses on distribution initiatives, enhanced transactional profitability, achievement in company goals & strategies, timely availability of information for ensuring market flexibility (**Medori** and **Steeple**, **2000** and **Waller** *et al.*, **1999**). It also improves competencies in specific areas of supply chain including cost, delivery, speed, quality & flexibility and ability to provide a differentiated customer service at a lowest possible cost (**Fawcett** and **Clinton**, **1996**). Past studies report positive relationships between the level of supply chain information sharing on collaborative performance at market place (**Cousins** and **Menguc**, **2006** and **Kim** *et al.*, **2006**). Perceptions regarding information sharing differs between superiors-subordinates supply chain channel members/intermediaries (**Zailani** and **Rajagopal**, **2005**) and size of the firms. Partners in supply chain that are embedded in the rich and meaningful information network are likely to trust each other and consequently engage in collaborative relationships. Partners that are embedded in rich and meaningful information network are likely to share information and consequently engage in collaborative joint efforts. Collaborative relationships among supply chain partners depends upon effective two-way frequent, open, accurate, timeliness and credible communication and evolving personal contacts between buying and selling personnel (**Krause** and **Ellram**, **1997**). On the basis of above literature, the following hypotheses had been framed:

H1 :   There exists positive relationship between information sharing and channel relationships
H2 :   Operational performance is dependent upon information shared and communicated
H3 :   Perception regarding information sharing do not differs with regard to age difference

4. RESEARCH METHODOLOGY

The primary data for the study was collected from 44 functional manufacturing SSIs units registered under District Industries Centre (DIC), Udhampur of J&K State 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). Census method was used to elicit response from owners/managers of the SSIs. Information was collected by administering self developed questionnaire prepared after consulting experts and extensive review of literature which comprised of general information and 48 items of information sharing were included in the questionnaire. Items 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. Multivariate tools such as correlation, hierarchical linear regression model and ANOVA were used to test hypotheses and drawing meaningful inferences.

5. DATA ANALYSIS AND INTERPRETATION

The suitability of raw data for factor analysis obtained from SSI managers was examined through Anti-image, KMO value, Bartlett's Test of Sphercity (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 29 statements out of 48 statements originally kept in the domain of information sharing. The KMO value (0.701) and Bartlett Test of Sphercity (742.94) indicates acceptable and significant values. Therefore, factor loadings in the final factorial design, are consistent with conservative criteria, thereby resulting into six-factor solution using Kaiser Criteria (i.e., eigen value ≥1) with 71.71% of the total variance explained. The communality for 29 items ranges from 0.63 to 0.90, indicating moderate to high degree of linear association among the variables. The factor loadings range from 0.546 to 0.890 and the cumulative variance extracted ranges from 17.60 to 71.71 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:

5.1. Factor 1 (Improvement in production capacity)

It comprises of six items of information sharing: "Information sharing enhances production process", "Results in effective organisational purchasing", "information sharing enhances profitability", "Information is exchanged regarding material handling techniques", "IT assists in speedy communication" and "Information sharing enhances production capacity". The items attained mean values between 3.95 – 4.18, significant factor loadings and commonalities. The factor acknowledges the importance of information sharing among managers of SSI's for promoting supply chain management relationships.

5.2. Factor 2 (Competitive strength)

This factor proclaims five items namely "Share operations, logistic & strategic planning data", "Inaccurate information results in inventory positioning problems", "ICT (Information Communication Technology) acts as a tool for enhanced communication", "SCMIS (Supply Chain Management Information System) strengthens SC linkages" and "Information sharing is vital for competitive strength" which connotes average mean values fluctuating between 3.81 – 4.18 but identifies significant factor loadings and communalities. "SCMIS (Supply Chain Management Information System) strengthens SC linkages" educed with highest communality depicting attention of supply chain managers that its need of the hour to maintain strong relationships.

5.3. Factor 3 (Distribution & promotion)

Items underlying this factor includes "Information of delivery dates & time in transit promotes business", "Information is exchanged regarding price level & services", "Information sharing improves promotional effectiveness" and "Diverse markets can be reached by proper information sharing", representing significant mean values ranging between 4.00 – 4.13, good factor loadings and high communalities. "Information of delivery dates & time in transit promotes business" gushed to be strongest among all with high mean value (4.13), factor loading (.791) and communality (.831).

5.4. Factor 4 (Profitability)

This factor concentrated on three items namely, "Information sharing assists in fixing contract items, discounts & margins", "Information sharing maximises warehousing usage" and " IT enhances idea sharing process" which it speaks significant mean values ranging between 4.02 – 4.18, factor loadings between .546 - .840 and communalities .652 - .848. Information sharing assists a lot to managers of SSI's in different forms.

5.5. Factor 5 (Customer service)

The items "Needed information is assessable & compatible" and "Qualitative information improves SC decisions" are taken into consideration by this factor which supports the items with significant mean values 4.13 & 4.13, high factor loadings values .890 & .874 and communalities with values .866 & .863 respectively. This factor clearly demonstrates that information sharing improves supply chain decisions.

5.6. Factor 6 (Optimum inventory control)

The final factor of information sharing envisages three items, "Information sharing helps in target marketing", "Reduces buffer inventory stocks" and "Assists in planning and improved implementation" with significant mean values (4.02 – 4.20), factor loadings (.666 - .860) and commonalities (.715 - .787). This indicates that information sharing positively assists the business in achieving target markets and inventory turns.

5.7. Reliability

Six factors were obtained after scale purification falling within the domain of information sharing and communication in supply chain management. As evident from the Table 1.1, the Cronbach's reliability coefficients for all 29 scale items underlying six factors ranges from 0.60 to 0.81. The alpha reliability coefficients for F1 (0.81), F2 (0.78), F5 (0.80) and F6 (0.77) is higher than the criteria of 0.77 obtained by **Gordon** and **Narayanan** (**1984**) indicating high consistency. F3 (0.70) and F4 (0.60) are also at a minimum acceptable level of 0.50 as recommended by **Brown et al.** (**2001**) and **Kakati** and **Dhar** (**2002**) thereby obtaining satisfactory internal consistency. However, the overall alpha reliability score for all factors is very much satisfactory at 0.74. 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 0.701 and all factor loadings between items and their respective constructs being greater than equal to 0.55.

5.8. Validity

The six factors obtained alpha reliability higher and equal to 0.50 and satisfactory KMO value at 0.701, indicating significant construct validity of the construct (**Hair et al.**, **1995**).

In Tables 1.2, the single metric dependent variable information sharing and communication and channel relationships sub – divided into six dimensions (factors) namely, optimum inventory control and finance function, enhancement in production capacity, optimum distribution and promotion, customer service, competitive strength and profitability was examined. The significant correlation coefficients emerged were "Competitive strength" (.743), "Optimum inventory control" (.629), "Distribution & promotion" (0.300) and "Production capacity" (.285). The insignificant correlation coefficient values in descending order were 0.230 (Customer service) and 0.229 (Profitability). Thus, the hypothesis "There exists positive relationship between information sharing and channel relationships" is accepted for four dimensions and rejected for two dimensions.

Tables 1.3 shows output from regression analysis. The result of step-wise linear regression analysis enticed four independent factors as significant in predicting the dependent variable. These were: "Competitive strength", "Distribution and promotion", "Customer service" and "Profitability". The correlation between predictor and outcome is positive with values of R as .638, .730, .763, and .798, which signifies high correlation between predictor and the outcome. In

model 1, R is .638 which indicates 63% association between dependent and independent variables. R-Square for this model is .410 which means that 41% of variation in information sharing and communication can be explained from the four independent variables. Adjusted R square (.403) 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. "Competitive strength" has emerged as the strongest predictor whereas "Profitability" 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 5% confidence level. Errors in regression are independent as indicated by Durbin-Watson value (2.213). The aforesaid findings support the hypothesis "Operational performance is dependent upon information shared and communicated".

To test 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 1.4) depicted that manufacturers belonging to different age group have same level of perception regarding information sharing as the p value is more than .05 (Sig. .266). Therefore, the results support the hypothesis "Perception regarding information sharing does not differ with regard to age difference".

6. CONCLUSION

Information sharing and communication among channel partners create relational advantages. Information sharing in channel relationships represents one medium through which partners in supply chain can improve operational efficiency by reducing logistics costs, augments financial structure & functioning, reduction in behavior uncertainty leading to overall competitive strength. The study provides fresh insights into multiple dimensions of information sharing. Positive association between information sharing and channel relationships 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 cordial & friendly environment would enables the parties to solve any problem tactically without jeopardizing the interest of others. The findings of the study are limited to small-scale industries registered under DIC Udhampur of J&K State, so results drawn cannot be generalized for medium or large- scale industries functioning in other parts of country having dissimilar business environment.

Table-1.1: *Results Showing Factor Loadings and Variance Explained After Scale Purification (Rotated Component Method) for Information Sharing and communication*

Factor-wise Dimensions	Mean	S.D	F.L	Eigen Value	Variance Explained %	Cumulative Variance %	Comm-unality	α
F1 Improvement in production capacity	4.06	.398		7.184	17.606	17.606		.8180
Enhances production process	4.04	.370	.854				.811	
Effective organisational purchasing	4.04	.301	.822				.886	
Enhances profitability	4.09	.362	.812				.743	
Material handling techniques	4.06	.255	.791				.909	
Assists in speedy communication	3.95	.608	.563				.728	
Enhances production capacity	4.18	.495	.510				.675	
F2 Competitive strength	4.01	.524		3.205	12.090	29.696		.7800
Share operations & logistic data	3.97	.590	.765				.686	
Inaccurate information creates problems	4.04	.568	.741				.788	
ICT works as enhanced communication	3.81	.620	.729				.749	
Strengthens SC linkages	4.06	.397	.585				.825	
Vital for competitive strength	4.18	.445	.562				.814	
F3 Distribution and promotion	4.09	.439		2.649	11.447	41.143		.7051
Promotes business	4.13	.462	.791				.831	
Price level and services	4.00	.528	.690				.727	
Improves promotional effectiveness	4.13	.347	.586				.758	
Diverse markets can be reached	4.09	.421	.555				.633	
F4 Profitability	4.08	.658		1.809	10.664	51.787		.6050
Assists in fixing contract items	4.04	.713	.840				.766	
Maximises warehousing usage	4.02	.762	.826				.848	
Enhances idea sharing process	4.18	.498	.546				.632	
F5 Customer service	4.13	.377		1.523	10.128	61.915		.8070
Assessable and compatible	4.13	.408	.890				.866	
Improves SC decisions	4.13	.347	.874				.863	
F6 Optimum inventory control	4.09	.420		1.286	9.795	71.710		.7706
Helps in target marketing	4.86	.397	.860				.787	
Reduces buffer inventory stocks	4.02	.456	.692				.776	
Assists in planning and improved implementation	4.20	.408	.666				.715	

Footnotes: KMO Value =.701; Bartlett's Test of Sphercity = 742.94, df = 276, 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.

Table-1.2: *Correlation Matrix of Information Sharing and Communication with channel relationships*

Variables		Optimum inventory control	Production capacity	Distribution & promotion	Customer service	Competitive strength	Profita bility	Inf. Sharing has positive impact on operational performance
Optimum inventory Control	Pearson Correlation	1						
Production Capacity	Pearson Correlation	.307(*)	1					
Distribution and Promotion	Pearson Correlation	.328(*)	.431(**)	1				
Customer Service	Pearson Correlation	.111	.513(**)	.164	1			
Competitive Strength	Pearson Correlation	.215	.526(**)	.363(*)	.373(*)	1		
Profitability	Pearson Correlation	.465(**)	.508(**)	.210	.203	.598(**)	1	
Inf sharing has positive impact on operational performance	Pearson Correlation	.629(**)	.285(*)	.300(*)	.230	.743(**)	.229	1

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

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

Table-1.3: *Regression Model Summary*

Model	R	R2	AdjustedR2	Std. Error of Estimate	F value ANOVA	Sig. level	β	t	Sig. level	Durbin-Watson
1.	.638	.410	.403	.3412	68.128	.000	.653	8.431	.000	
2.	.730	.534	.521	.3023	55.423	.000	.384	5.073	.000	2.213
3.	.763	.596	.574	.2764	45.109	.000	.267	3.876	.003	
4.	.798	.634	.618	.2608	41.234	.000	.196	2.230	.009	

a) *Predictors: (Constant), Competitive strength*

b) *Predictors: (Constant), Competitive strength, Distribution and Promotion*

c) *Predictors: (Constant), Competitive strength, Distribution and Promotion, Customer service*

d) *Predictors: (Constant), Competitive strength, Distribution and Promotion, Customer Service, Profitability*

e) *Dependent variable: Information sharing and communication enhances operational performance*

Table-1.4: *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	2.161	2	1.081	1.368	.266
	21 – 30 yrs	4.5703	Within Groups	32.384	41	.790		
	31 – 40 yrs	4.4586	Total	34.545	43			
	41 – 50 yrs	4.3276						
	51 – 60 yrs	4.1433						
	Above 60 yrs	4.2133						

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