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Determinants of Information Sharing in Supply Chain among Manufacturing and Trading companies in Albania: A Discriminant Analysis

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Abstract. The competition among enterprises has gradually become the competition between supply chains, and it is more and more important for the cooperation among members of the supply chain to improve supply chain performance. Information sharing among members of supply chain can have an impact on supply chain integration.

This article studies the determinant factors of the level of information sharing in supply chain. The population of this study is manufacturing and trading companies in Albania. A questionnaire survey was conducted to study the level of information sharing by the targeted companies.

This study reveals that top management support, trust in partners, and commitment of partners are significant variables in determining the level of information sharing and in distinguishing between the organizations with high levels of information sharing and information quality and those with low levels of information sharing among supply chain partners. Manufacturing and trading organizations should be given strategic attention to information sharing because accurate, reliable and in time information can contribute to the improvement in organizational performance and competitive advantage.

Keywords: supply chain management, information sharing, discriminant analysis

1. Introduction

Effective supply chain management (SCM) has become a potentially valuable way of securing competitive advantage and improving organizational performance since competition is no longer between organizations, but among supply chains.

The interests of all members of the supply chain are relatively independent, and thus likely to cause delays and distortions in the information of supply chain. Members' own making decisions may not be able to achieve supply chain optimization. To achieve supply chain optimization, supply chain members must enhance cooperation for information sharing.

Success in designing and coordinating a competitive supply chain (SC) requires a firm and its SC partners to adapt readily to changes in a rapidly evolving marketplace. Managers must be aware of new information generated in its environment and adopt structures that enable fast decision making and practices that reduce information overload (Mendelson, 2000). Further, to enable SC coordination and collaboration, a company must be able to share relevant information with key SC partners in a timely manner. This need for immediate information has led to the development and adoption of technologies that enable the collection and transfer of large quantities of diverse information (Ofek and Sarvary, 2001)

Information sharing is a key ingredient for any SCM system (Moberg et al. 2002). The key to the seamless supply chain is making available undistorted and up-to-date data at every node within the supply chain (Childhouse and Towill, 2003). By taking the data available and sharing it with other parties within the supply chain, an organization can speed up the information flow in the supply chain, improve the efficiency and effectiveness of the supply chain, and respond to customer changing needs quicker.

Information sharing in supply chain influences the supply chain members' behavior and decision making as well as the performance of supply chain. Availability of information at the right time and place is essential to ensure the seamless flow of supply chain activities and processes (Childerhouse et al., 2003).

According to Lin et al. (2002), the higher level of information sharing is associated with the lower total cost, the higher order fulfillment rate and the shorter order cycle time. Some of the benefits a firm can achieve through better information linkages with its supply chain members include shorter lead-times, smaller batch sizes, reduced inventory levels, faster new product design, shorter order fulfillment cycles, improved coordination in supply chain activities, and improved purchasing, operations, and firm performance (Lee and Whang, 2000; Li, 2000).

To facilitate quality information sharing across supply chains, an understanding of the factors influencing information sharing is needed so that a strategy may be developed to overcome the barriers preventing information sharing and encourage seamless information flow in supply chains.

This paper identifies a set of factors, including top management support; trust in trading partners and commitment of supply chain partners that may impact information sharing in SCM.

A good relationship based on trust, commitment and shared vision is necessary to encourage information sharing and to overcome the fear of information disclosure and the loss of power over competitor (Boddy et al, 2000). Also, trust and commitment are needed to build long-term cooperative relationships between supply chain partners (Spekman et al, 1998).

2. Information sharing

Information sharing refers to the extent to which critical and proprietary information is communicated to one's supply chain partner (Monczka et al, 1998). Information sharing should address the following issues; 'what to share', 'whom to share', 'how to share', and 'when to share' of which if properly addressed would minimize sharing cost, information deficiency or overload and improve supply chain responsiveness (Sun and Yen, 2005). The ability of firms to gain competitive advantage and to ensure product availability in supply chain is being determined by how information is used in the supply chain (Mason-Jones and Towill, 1997; Ramayah and Omar, 2010)

Many researchers have emphasized the importance of information sharing in SCM practice. Lalonde (1998) considers sharing of information as one of five building blocks that characterize a solid supply chain relationship. As observed by Stein and Sweat (1998) sharing demand related information vertically among supply chain members has achieved huge impact in practice. According to Stein and Sweat, by "exchanging information, such as Point of Sales (POS), forecasting data, inventory level and sales trends, these companies are reducing their cycle times, fulfilling orders more quickly, cutting out millions of dollars in excess inventory, and improving customer service." Moreover, the negative impact of the bullwhip effect on a supply chain can be reduced or eliminated by sharing information with trading partners (Yu et al., 2001). Simplified material flow, including streamlining

and making highly visible all information flow throughout the chain, is the key to an integrated and effective supply chain (Childhouse and Towill, 2003).

Sharing information within the entire supply chain can create flexibility (Jarrell, 1998), but this requires accurate and timely information. To reduce information distortion and improve the quality of information shared, information shared has to be as accurate as possible and organizations must view their information as a strategic asset and ensure that it flows with minimum delay and distortion.

Information sharing is essential as it provides the mechanism for coordination and integration of the processes or activities along the supply chain (Lee, 2000; Ramayah and Omar, 2010). To ensure that customer requirements in the supply chain can be fulfilled, it is fundamental to manage the information flow associated with the movement of products (goods or services) to the final customer (Singh, 1996). Effective flow of product and services is dependent on information sharing among supply chain members (Lee et al., 1997a).

The level of information sharing across the supply chain can be influenced by the supply network configuration and goal congruence of the supply chain partners (Samaddar et al., 2006). Information sharing is particularly important within the internal supply chain. If firms cannot share information internally, it would be difficult to share information externally with their partners (Rupple, 2004). Information can contribute to the improvement in organizational performance and competitive advantage (Li et al., 2006). To optimize supply chain performance, information about forecast, sales, promotional activities must be shared not only among the internal functions but also across the supply chain. The quality and quantity of information are important attributes which need to be stressed in information sharing.

Availability of the different types of information at the right time and how the information is communicated or accessed could enable managers to react to the situation and make decisions quickly enabling them to be responsive to market demand. Besides information sharing, information quality is also important in supply chain management (Lin and Li, 2006).

High level of information sharing and information quality is influenced by successful partner relationship (Monczka et al., 1998; Mason-Jones and Towill, 1997). However, the confidentiality of the information may influence the level of information sharing in the supply chain (Li et al., 2006). Consequently supply chain partners need to decide on the types of information that need to be shared. Supply chain partners should be aware of the information which is deemed relevant that must be shared with the supply chain partners for the successful functioning of the supply chain.

Depending on the need of the organization, information related to market, product, design, process, production, pricing, planning, inventory, logistic, demand forecasting, order, promotion strategies, customer demand, production schedule, distribution operation, technological knowhow, manufacturing methods and sales forecast can be shared with the supply chain partners (e.g. Yu et al., 2001; Zhang et al., 2006; Ramayah and Omar, 2010).

Information has little value if it is not shared among the supply chain partners. Trust among the supply chain partners seems to have influence on the information flow in supply chain. However, due to lack of trust, certain information may be withheld from supply chain partners. Relationship among supply chain members, which is based on trust and commitment, would facilitate information sharing among supply chain partners (Moberg et al., 2002). In support of this, information sharing reduces the level of behavioral uncertainty, which lead to improvement in the level of trust (Kwon and Suh, 2004).

3. Determinants of the level of information sharing in SCM

Top management support

Top management support is defined as the degree of top manager's understanding of the specific benefits of and support for quality information sharing with supply chain partners. Researchers (Balsmeier et al. 1996, Hamel et al. 1989) have regarded top management support as the most important driver for any successful change in the organization. To implement information sharing in supply chains, top management must understand and embrace the significant operational and market impacts of partnering and develop a good understanding of their potential partners and their top management (Mentzer et al. 2000). Top management has to share an understanding of the specific benefits of information sharing to overcome the inevitable divergence of interests between participating organizations. Top management must understand the importance of information sharing and provide vision, guidance, and support for its implementation, and create an organizational culture encouraging to information sharing and make sure information is shared without delay and distortion.

It can therefore be hypothesized as:

Hypothesis 1. The higher the level of top management support, the higher the level of information sharing in SCM.

Trust in supply chain partners

Trust in trading partners is defined as the willingness to rely on a trading partner in whom one has confidence (Monczka et al, 1998; Speakmen et al, 1998). Trust is conveyed through faith, reliance, belief, or confidence in the supply chain partner, viewed as a willingness to forego opportunistic behavior (Spekman et al, 1998). Trust has been considered by many researchers to be the essential factor in most productive partner relationships (Wilson and Vlosky, 1998). Parties who trust one another can find ways to work out difficulties such as power, conflict, and lower profitability.

A lack of trust among trading partners often creates a condition where every transaction has to be scrutinized and verified, thereby increasing the transaction costs to an unacceptably high level. Productivity is lost and efficiency and effectiveness cornerstones of supply chain goals will be compromised. Creating value added activities with such partners become almost impossible and the supply chain tools to improve efficiency, effectiveness and productivity eventually became ineffective. Under the less than open-trust conditions, decision makers often spend their time mostly on analyzing their trading partner’s credibility, reliability and trustworthiness, rather than optimizing their operations.

It can therefore be hypothesized as:

Hypothesis 2. The higher the level of trust in trading partners, the higher the level of information sharing in SCM.

Commitment of supply chain partners

Commitment of trading partners refers to the willingness of buyers and suppliers to exert effort on behalf of the relationship (Monczka et al, 1998; Spekman et al, 1998). Commitment is an enduring desire to maintain a valued relationship. It incorporates each party's intention and expectation of continuity of the relationship, and willingness to invest resources in SCM (Mentzer et al, 2000). Commitment has been identified as the variable that discriminates between relationships that continue

and that break down (Wilson and Vlosky, 1998). To a large degree, commitment makes it more difficult for partners to act in ways that might adversely affect overall supply chain performance.

It can therefore be hypothesized as:

Hypothesis 3. The higher the level of commitment of supply chain partners, the higher the level of information sharing in SCM.

4. Research methodology

The theoretical framework is served to investigate the determinant factors (independent variables) that may impact the level of information sharing (dependent variable) (Figure 1).

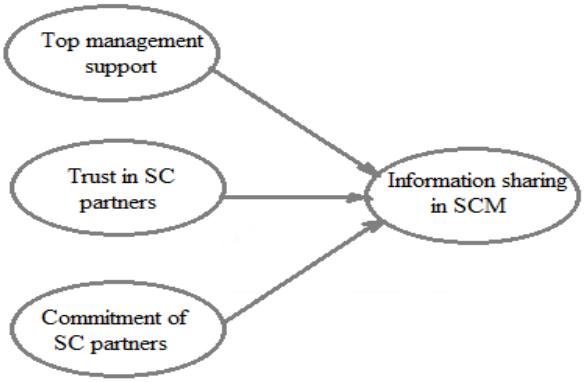

Figure 1. The framework of level of information sharing in Albania

The population of this study comprises of all the manufacturing and trading companies in Albania. Data collection was conducted based on personally administered questionnaire. In order to obtain sufficient samples for analysis, 270 questionnaires were distributed to top managers, executives and managers of targeted manufacturing and trading companies.

This study measures the level of information sharing among manufacturing and trading organizations in Albania. All items for assessing the level of information sharing were adopted from the study of Lin and Li (2006). A total of 3 items were used to measure information sharing, 4 items for top management support, 3 for commitment of supply chain partners and 4 items for trust in supply chain partners (Appendix A). All items for each variable were measured on a 1 to 5 Likert scale from 'strongly disagree' to 'strongly agree'. The level of information sharing was measured by differentiating organization with high level of information sharing and those with low level of information sharing on the basis of high and low values for the information sharing compared to the sample mean for the information sharing.

Discriminant analysis was used to determine whether statistically significant differences exist between the average score profile on a set of variables for two a priori defined groups and so enabled them to be classified. Besides, it could help to determine which of the independent variables account the most for the differences in the average score profiles of the two groups (Hair et al. 1998). In this study, discriminant analysis was the main instrument to classify the organizations with low level of

information sharing and those with high level of information sharing. It was also utilized to determine which of the independent variables would contribute to the level of information sharing.

5. Results

The sample data was obtained from 78 organizations from Albania, which constituted 29 percent response rate, a percentage acceptable for the data analysis. Majority of the respondents were from Tirana and from Durres. Forty-four percent of organizations had less than 100 employees, and only 6 percent of them had more than 501 employees. Forty-one percent had the annual turnover less than 1 million euro and only 13 percent had annual turnover more than 10 million; also 36 percent have been operating from 6 to 10 years and about 40 percent of these companies have been operationg as well in other countries.

Reliability Analysis

The items that represent each individual variable were subjected to reliability analysis. Determination of Cronbach's alpha coefficient of internal consistency is to ensure that the items comprising factors produced a reliable scale. A higher score will indicate a higher reliability, with a range from 0 to 1. The generally agreed upon lower limit of Cronbach's alpha is 0.7 with the lowest registering a value of 0.70 (information sharing) and the highest 0.90 (top management support). The rest of the variables commitment (0.85) and trust (0.83) have satisfactory alpha value (Table 1).

Independent Variable	No. of items	Cronbach's alpha
Top management support	4	0.90
Commitment of trading partners	3	0.85
Trust in trading partners	4	0.83

Table 1. Reliability of Independent Variables

Descriptive Analysis

In order to find out the determinant factors for level of information sharing, three independent variables were used to classify the 78 organization by conducting the descriptive analysis. In this analysis, the mean was applied as a measure of central tendency, which indicated that only two variables were above their midpoint level (Table 2). Out of the three independent variables, commitment of supply chain partners was the highest in rating (M =3.19), followed by top management support (3.16) and trust in supply chain partners (2.75).

SCM practice	Mean	Std. Dev.

Top management support	3.1603	0.8982
Trust in supply chain partners	2.7521	0.7075
Commitment of supply chain partners	3.1923	0.7760

Table 2. Descriptive of Aggregated Variables

Discriminant and Predictive Validity

Based on Wilk's Lambda and Univariate ANOVA to assess the significance between the means of the independent variables for the two groups, all variables showed significant univariate differences between the two groups at 0.01 level. According to Hair et al. (1998), discriminant loadings were considered relatively more valid than weights as a means of interpreting the discriminating power of independent variables because of their correlational nature, and any variables exhibiting a loading of ± 0.30 or higher were considered substantive. The results show that the discriminant loadings of the three significant variables carry positive values (Table 3). This indicates that organizations with high level of information sharing have paid more attention than those with low level of information sharing on all the variables. In conclusion, the discriminant analysis has supported the three hypotheses.

Independent variables	**Discriminant loading**	**Univariate F ratio**
Top management support	0.929	45.466**
Trust in supply chain partners	0.889	41.597**
Commitment of supply chain partners	0.610	19.609**

Note: ** Significant at 0.01 level, * Significant at 0.05 level

Table 3. Summary of interpretive measures for discriminant analysis

Validation of the results

The classification results from the discriminate model indicating a hit rate of 75 percent that is approximately 75 percent of the companies were classified correctly by the discriminant model. According to Hair et al. (1998), the classification accuracy or hit rate should be at least 25% greater than that achieved by chance.

This result further suggests that three variables identified in this paper are able to successfully distinguish between organizations having high level of information sharing and those having low levels of information sharing with supply chain members.

6. Conclusions and future research

Responsiveness to customer demand, and overall customer satisfaction, cannot be achieved without proper management of the goods movement and associated information flow throughout the supply chain.

The goal of this paper was to identify factors that were significantly related to information sharing in SCM so managers could develop strategies for increasing inter-organizational information sharing. The results show that information sharing is impacted positively by top management support, trust in supply chain partners and commitment of supply chain partners.

These findings are important because they reinforce the importance of building strong relationships with trading partners and making an effort to improve the accuracy, timeliness, and formatting of information that is sharing within the supply chain. The effectiveness of information sharing is a critical component of SCM because supply chain managers need more guidance about methods they can use to facilitate and increase the effectiveness of information sharing.

Information sharing may be influenced by contextual factors, such as the type of industry, firm size, a firm's position in the supply chain, supply chain length, and type of supply chain, which are not included in this study. Future research can expand this research by adding the contextual factors as an additional independent variable.

The survey factors do not consider future potential value in information sharing. The incorporate future potential value of information sharing, panel information is needed. In future research, a longitudinal research can be developed.

7. References

Balsmeier PW, Voisin W, (1996), Supply chain management: a time based strategy, *Industrial Management* 38 (5) 24–27.

Barut GDM, Faisst W, Kanet JJ (2002). Measuring supply chain coupling: an information system perspective. *European Journal of Purchasing & Supply Management* 8: 161-171.

Boddy D., MacBeth D., Wagner B., (2000), Implementing collaboration between organizations: an empirical study of supply chain partnering, *Journal of Management Studies* 37 (7) 1003–1017.

Childerhouse P, Hermiz R, Mason-Jones R, Popp A, Towill DR (2003). Information flow in automotive supply chains – present industrial practice. *Industrial Management & Data Systems*, 103(3): 137-149.

Childhouse P., Towill D.R., (2003), Simplified material flow holds the key to supply chain integration, *Omega, International Journal of Management Science* 31 (1) 17–27.

Hair, J.F, Black, W., Babin B.J, Anderson, R.E. (2009). *Multivariate Data Analysis*, 7th edition, Prentice Hall.

Hamel GD., Prahalad C.K., (1989), Collaborate with your competitors and win, *Harvard Business Review* .

Jarrell JL., (1998) Supply chain economics, *World Trade* 11 (11) 58–61.

Kwon IG, Suh T (2004). Factors affecting the level of trust and commitment in supply chain relationships. *Journal of Supply Chain Management*, pp. 4-20.

Lalonde BJ., (1998), Building a supply chain relationship, *Supply Chain Management Review*, 2 (2) 7–8.

Lee H (2000). Creating value through supply chain integration. *Supply Chain Management Review*, pp. 30-36.

Lee HL, Padmanabhan V, Whang S (1997a). The bullwhip effect in supply chains. *Sloan Management Review*, 38(3): 93-102.

Lee HL, Whang S., (2000), Information sharing in a supply chain, *International Journal of Technology Management*, Vol. 20 No. 3/4, pp. 373-87.

Li L., (2000), "Information sharing in a supply chain with horizontal competition", *Management Science*, Vol. 48 No. 9, pp. 1196-212.

Li S, Lin B (2006). Accessing information sharing and information quality in supply chain management. *Decision Support Systems*, 42: 1641-1656.

Li S, Ragu-Nathan B, Ragu-Nathan TS, Rao SS, (2006). The impact of supply chain management practices on competitive advantage and organizational performance. *Omega, International Journal of Management Science*, 34: 107-124.

Lin F., Huang S., Lin S., (2002), Effects of information sharing on supply chain performance in electronic commerce, *IEEE Transactions on Engineering Management* 49 (3) 258–268.

Mason-Jones R., Towill D.R., (1997), Information enrichment: designing the supply chain for competitive advantage, *Supply Chain Management* 2 (4) 137–148.

Mendelson, H. (2000), "Organizational architecture and success in the information technology industry", *Management Science*, Vol. 46 No. 4, pp. 514-29.

Mentzer JT., Min S, Zacharia ZG., (2000), The nature of inter-firm partnering in supply chain management, *Journal of Retailing* 76 (4) 549–568.

Moberg CR, Cutler BD, Gross A, Speh TW (2002). Identifying antecedents of information exchange within supply chains. *International Journal of Physical Distribution and Logistics Management*, 32(9): 755-770.

Monczka RM., Petersen KJ., Handfield RB., Ragatz GL.,(1998), Success factors in strategic supplier alliances: the buying company perspective, *Decision Sciences* 29 (3) 5553-5577.

Ofek E., Sarvary M. (2001), "Leveraging the customer base: creating competitive advantage through knowledge management", *Management Science*, Vol.47 No.11, pp. 1441-56.

Ramayah T, Omar R (2010). Information Exchange and Supply Chain Performance. *International Journal of Infomation Technology and Decision Making*., 9(1): 35-52.

Rupple C, (2004). "An information systems perspective of supply chain tool compatibility: the roles of technology fit and relationships", *Business Process Management Journal.*, 10(3): 311-324.

Samaddar S, Nargundkar S, Dalcy M, (2006). Inter-organizational information sharing: the role of supply network configuration and partner goal congruence. *European Journal of Operational Research*., 174: 744-765.

Simchi-Levi D., Kaminsky P., Simchi-Levi E., (2000). *Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies*. McGraw-Hill Inc., New York.

Singh J, (1996). The importance of information flow within the supply chain. *Logistics Information Management*, 9(4): 28-30.

Spekman R.E., Kamauff J.W., Myhr N., (1998), An empirical investigation into supply chain management: a perspective on partnerships, *Supply Chain Management* 3 2) 53–67.

Stein T., Sweat J., (1998), Killer supply chains, *InformationWeek* 708 (9) 36–46.

Sun S, Yen J (2005). "Information supply chain: A unified framework for information-sharing", *ISI. LNCS* 3495, pp. 422-428.

Wilson DT., Vlosky RP., (1998), Inter-organizational information system technology and buyer–seller relationships, *Journal of Business and Industrial Marketing* 13 (3) 215–234.

Yu ZX., Yan H., Cheng TCE., (2001), Benefits of information sharing with supply chain partnerships, *Industrial Management and Data Systems* 101 (3) 114–119.

Zhang C, Tan GW, Robb DJ, Zheng X (2006). Sharing shipment quantity information in the supply chain. *Omega, International Journal of Management Science* 34: 427-438.

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Appendix A: Descriptive statistics for items of SCM practice

Items of SCM practice	Mean	Std. Dev

Top management support		
Top management considers the relationship between us and our trading partners to be important	3.33	1.053
Top management regards SCM as a high priority item	3.08	1.003
Top management participates in SCM and its optimization	2.44	0.934
Top management supports SCM with the resources we need	3.79	1.097
Trust in trading partners		
Our trading partners have been open and honest in dealing with us	2.92	0.864
Our trading partners respect the confidentiality of the information they receive from us	2.62	0.841
Our transactions with trading partners do not have to be closely supervised	2.72	0.754
Commitment of trading partners		
Our trading partners have made sacrifices for us in the past	3.69	0.761
We invest a lot of effort in our relationship with trading partners	3.44	0.906
Our trading partners abide by agreements very well	3.15	0.955
We and our trading partners always try to keep each other' promises	2.49	1.090
Information sharing		
Our trading trading patrners share proprietary information with us	3.49	0.990
Our trading partners share business knowledge of core business processes with us	3.72	0.910
We inform trading partners in advance of changing needs	2.95	0.820

Note: Items are measured based on a 5 point Likert scale; 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.