

# The Impacts of Organizational Contingency Factors on Inter-organizational Information Sharing and Supply Chain Integration Performance

**Hsu, Li-Ling**

Department of Information Management  
National Kaohsiung First University of Science and Technology  
2, Juoyue Rd., Nantz District, Kaohsiung 811, Taiwan, R.O.C.  
[karenhsu@ccms.nkfust.edu.tw](mailto:karenhsu@ccms.nkfust.edu.tw)

Yang, Ju-Ann Ginny

Department of Financial Operations  
National Kaohsiung First University of Science and Technology  
2, Juoyue Rd., Nantz District, Kaohsiung 811, Taiwan, R.O.C.  
[ginnv@ccms.nkfust.edu.tw](mailto:ginnv@ccms.nkfust.edu.tw)

## ABSTRACT

*As the environmental changing violently, almost all enterprises can't survive without other enterprises' cooperation. Many firms have tied with each other and formed an industrial chain structure relationship aggressively called as 'Supply Chain Relationship'. Therefore, many enterprises had striving for industrial stream integration. With these integration processes, may go through some methods to achieve firms' goals of reducing cost, shorten product lifecycle, quick response customers' demand etc.. Supply chain integration may assist enterprises to keep their competitive advantage by improving the enterprise processing effectively for facing the changeable market. 'Supply Chain Integration' could be divided into four parts to discuss that include cash flow, logistic flow, product flow and information flow. Before firms want to integrate cash flow, logistic flow, product flow it's better to integrate 'information flow' firstly. According to all product flow, logistic flow and cash flow of firms are based on their smoothing information operation. Therefore, it is not hard to find that information integration is a key factor for supply chain integration. Although information integration is a very important factor for supply chain integration, there are existing some dilemmas on sharing information within many firms. It is necessary for most of firms to contain the parts of private information that may increase their bargaining power but that secret contains of information sharing for individual firm are helpless for related firms to achieve supply chain integration. Therein, inter-organizational information sharing is a key issue worthily in supply chain integration. The result of this study had proposed 14 propositions may further engage in some empirical study in the near future.*

## INTRODUCTION

To maintain a leadership position in the fierce competition of the global market, capability for global logistics is the key point. To address that issue, modern businesses invest in supply chain management (SCM) to effectively integrate activities between manufacturers and suppliers.

Through SCM, manufacturers and suppliers are able to maintain a tight partnership, remain agile and flexible in manufacturing, early involve in the manufacturing process, synchronize between business processes, and implement supplier-improvement programs (Christopher & Towill, 2000; Dyer et al., 1998; Mason-Jone & Towill, 1997; Lamming, 1993). As a result, more and more businesses realize the importance of SCM as a core element in their competitive advantages. Moreover, to realize the value of SCM in the complex competition of the modern business world, information sharing between organizations plays a critical role as it is the key to achieve the maximum performance of SCM.

The advancement in information technology (IT) also enables the integration of business supply chains. But as it is usually a large-scale project and often involve multiple parties, viewpoints from psychology, technology, and management are needed. Nevertheless, no matter which dimension was adopted, the underlying key point is the integration of information for better performance, and it lies on the foundation of an seamless information integration channel between trading partners.

In earlier times, EDI, VAN, ISDN, and POS were used for the purpose of communication between trading partners, but large investment requirements for software and hardware when building up the infrastructure also became unavoidable costs for businesses trying to build a SCM system. With the emergence of the Internet and the Web, however, IT becomes a viable weapon for inter-organizational information integration because of the standardization of network technologies and platforms.

Other than the advancement in IT, it is also notable that through division of labor and network connection among trading partners, businesses are now able to effectively conduct information transmission and sharing, forming a ‘virtually integrated but physically distributed’ organization. From the viewpoint of the whole supply chain system, a complex relationship, which is cooperative but competitive as well, exists among trading partners. Participating businesses on the one hand need to pursue maximum self-benefits, but also need to give up a reasonable (endurable) level of profits for cooperation with upstream and downstream partners on the other. Such trade-off also stimulates the authors of many important issues which are to be investigated in this study. These issues include the investigation of type of businesses that are more receptive to information sharing, of the form of information sharing that are conducted, and the influence of information sharing on inter-organizational cooperation and supply chain integration.

As information sharing and exchange play an important role in the supply chain context, this study focuses on the integration of information flow in the SCM context. Based on the contingency theory, this study aims at investigating the influence of organizational contingency factors on inter-organizational information sharing and supply chain integration performance.

## **LITERATURE REVIEW**

### ***Supply Chain Management***

‘Supply chain’ refers to a set of suppliers and customers, with members including retail stores, wholesalers, distributors, warehouses, and manufacturers. The chained relationship that converts

raw materials to end products and finally delivers these products to customers forms the supply chain. Many researchers and scholars put various definitions:

- (1) SCM emphasizes the management of upstream and downstream relationships and the role of supply chain optimization to increase customer value at less cost (Christopher, 1998; Handfield, 1999).
- (2) Integrated management approach for planning and controlling the flow of materials from suppliers through the distribution channel to the end user an integrative philosophy to manage the total flow of a distribution channel from the supplier to the ultimate user (Ellram et al, 1991; Klaus, 1998).
- (3) Suppliers and customers are inextricably linked throughout the entire sequence of events that bring raw materials from their source of supply, through different value-adding activities to the ultimate consumer. Success is no longer measured by a single transaction; competition is, in many instances, evaluated as a network of co-operating companies competing with other firms along the entire supply chain (Spekman et al., 1998).
- (4) Supply Chain Management is the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other shareholders.

Supply chain members are interdependent to each other, so enterprises have to make a thorough review on each aspect of supply chain and avoid the occurrence of ‘Bull-whip effect’ (Forrester, 1961).

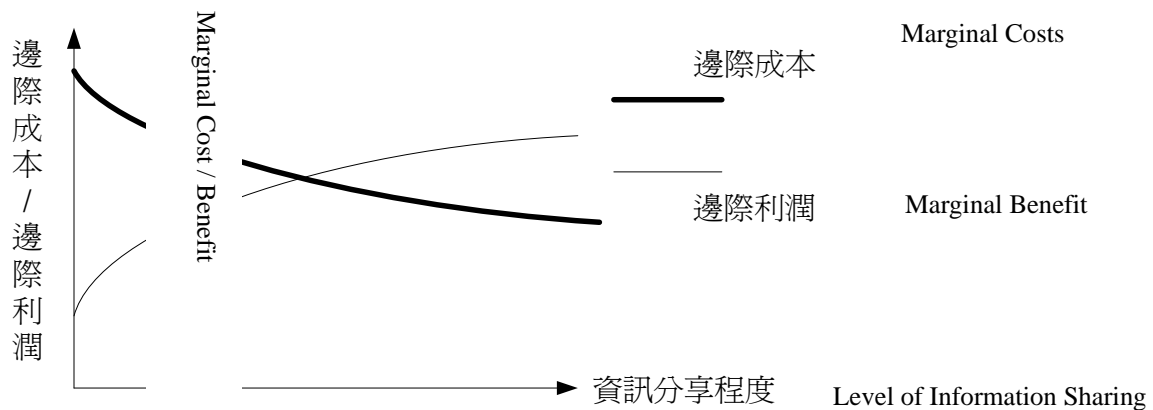
### ***Supply Chain Integrated-performance***

The investigation of supply chain integrated-performance aims to efficiently and efficiently satisfy customer needs and enhance customer satisfaction (Copancino, 1997; Beamon, 1998). This is the key element for possessing competitive advantages (Weng, 1999). A better customer service results in a long-term, win-win situation between customers and suppliers. Any associated activities implemented for a better customer service and for customer satisfaction is the ‘Supply Chain Performance’.

Beamon (1999) extended the traditional concept of performance evaluation to supply chain management, and categorized it into three aspects: resources, output, and flexibility. The traditional measurements that were widely used are: cost, quality, time and flexibility (Neely et al., 1995). These four evaluation measurements are related to one another, so enterprises must take these measurements into consideration in the evaluation of supplier performance. The most important task of supply chain management is to effectively satisfy customers and distribute resources, which is ‘flexibility’. We will discuss the supply chain integrated-performance in more detail from the aspect of ‘Transaction flexibility’, ‘Buyer Performance’ and ‘Supplier Performance’.

### ***Inter-organizational Information Sharing***

A manifest dilemma always exists in the buyer-supplier relationship. Buyers share data with suppliers or customers to reduce costs and increase efficiency. Sharing of information reduces the buyer’s bargaining (Lamming, 1993). As Figure 1 has shown, if the parties share higher level of information, the marginal cost and marginal benefit will be reduced as well.



**Figure 1:** Relation between Information Sharing and Marginal Cost / Benefit.

Seidmann and Sundararajan proposed theory of ‘the level of information sharing’. They categorized information sharing into ordering information, operational information, strategic information, and operational and strategic and competitive information. There should be levels of information sharing for mutual benefits and cooperation. In addition, the information exchange in a supply chain mainly encompasses product information, customer information, supplier information, manufacturing procedure information, transportation information, inventory information, supply chain alliance information, competition information, sales and market information, supply chain process and performance information (Handfield & Nichols, 1999).

### ***Contingency Theory***

The basis of Contingency Theory is anchored on the dichotomy of the Organic Theory and Bureaucracy Theory. Organic Theory emphasizes the impact of uncertainty on organizations. Three constructs that are frequently brought up in the investigation of contingency theory are ‘Normalization’, ‘Centralization’, and ‘Specialization’ (Burns & Stalker, 1961; Hage, 1965; Lawrence & Lorsch, 1967). Bureaucracy Theory emphasizes on firm sizes, public accountability (Pugh et al., 1968), environmental hostility (Khandwalla, 1977), CEO personality (Miller et al., 1988), and national culture (Hickson & McMillan, 1981; Lammers & Hickson, 1979). In addition, technology factor is also the main issue of Bureaucracy Theory (Perrow, 1967; Thompson, 1967; Woodward, 1958, 1965).

This study will divide organizational contingency factors into: internal factors (organizational structure, organizational climate) and external factors (environmental uncertainty, technological dynamics). These two aspects will be the measurements in the investigation of inter-organizational information sharing.

## PROPOSITIONS

### *Organic Theory*

Organizations with a high level of formulation have a greater reliance on the implementation of SOP. In terms of information processing, organizations with a high level of formalization usually have formulated tables, formats, explicit rules, policies, and procedures governing the work activities. Specified rules and procedures allow the information to be systematically managed. In other words, exchange of information through a formalized procedure enhances a company's 'information transparency'. With rules and procedures specified, organizations increase supplier's 'visibility' by obtaining information from them.

In highly 'centralized' systems, organizations need to delegate greater design-making authority. In highly centralized systems, executors must provide managers with relevant information to give them decision-making authority. In this study, we infer that, in the highly centralized organization, a smooth information system is required for executors to have power to make decisions and carry out tasks. In this circumstance, organizations have higher demand for external information in order to give decision makers the power to make decisions. To the entire organization, centralization increases the 'information visibility' of external organizations. Centralized systems are usually practiced together with specified definite procedures, therefore the level of formalization is high as well, and so is the level of 'transparency'.

Organizational specialization is a key element that affects the barriers and interactions with internal and external environments. Organizations must work with suppliers to achieve competitive advantages. Organizations with a high level of specialization are more interdependent with supply chain suppliers, which fosters the sharing of information. Organizations not only increase the level of 'transparency' to the supply chain partners, but also provide a higher level of 'information visibility' to the external environment.

P 1: Higher level of 'Organizational Structure' enhances the level of transparency.

P 2: Higher level of 'Organizational Structure' enhances the level of visibility.

### *Organizational Climate*

'Organizational Climate' is related closely to the level of information sharing in an organization (Karen Hsu, 2001). In a harmonious atmosphere of 'Organizational Climate', the level of information sharing within an organization increases. In terms of information as organizational resources, 'organizational climate' influences the sharing of information within organizations, thus 'organizational climate' is considered as an important factor which influences internal information sharing.

When the organization has a higher level of information sharing and a narrower information barrier between departments, the level of 'information transparency' will be higher as well. The increased level of transparency will also affect the level of transparency of external suppliers as well as 'information visibility'. Hence:

P 3: Greater 'organizational climate' enhances the level of 'transparency'.

P 4: Greater 'organizational climate' enhances the level of 'visibility'.

### ***Environmental Uncertainty***

Over the past decades, 'Environmental Uncertainty' has been one of the most important factors in the innovation of business transaction management. To date, there are numerous researches in the management, such as JIT Manufacturing, Quick Response, mass customization, postponement, CPFR, concurrent engineering. 'Environmental Uncertainty' results from 'Bull-whip Effect', 'Clockspeed Amplification', and 'Parallel Interactions'.

'Bull-Whip Effect' refers to information submitted in the form of orders tends to be distorted and can misguide upstream members in their inventory and production decisions..... the variance of (replenishment) orders may be larger than that of sales (to end customers), and the distortion tends to increase as one moves upstream. This phenomenon is caused by the industrial dynamics, or demand placing differences, or wrong market information (Forrester, 1996). 'Parallel Interactions' refers to the interaction between supply chain members producing identical or similar products in a parallel position. Activities between these suppliers will also affect the whole supply chain (Wilding, 1998). Sometimes, parallel interactions between suppliers may reveal several incidents that just happened or will happen, and influence the level of 'transparency' and 'visibility' of shared information. 'Clockspeed Amplification' refers to the impact of market volatility on environmental uncertainty of the supply chain. The most noteworthy example is Moore's Law: 'Computing speed/Data density will double approximately every 18 months'; the volatility of industrial environments will be affected by the clock-speed amplification of its industry (Fine, 1998). In order to seamlessly integrate with upstream and downstream partners, as well as in responding to 'Clockspeed amplification', an organization needs to increase the level of 'visibility' to upstream suppliers and downstream customers.

P 5: Higher level of 'Environmental Uncertainty; enhances the level of 'transparency'.

P 6: Higher level of 'Environmental Uncertainty' enhances the level of 'visibility'.

### ***Technical Dynamics***

The possession of key technology, the improvement of material quality, breakthrough in manufacturing process, or advance of mass production techniques achieves just one segment of the supply chain, and cannot contribute to competitive advantages of the organization without the collaboration with upstream and downstream suppliers. Thus, 'Technical Dynamics' influences the market value of products, and has a positive impact on the 'transparency' of 'inter-organizational information' to cooperative suppliers, and the 'visibility' to upstream suppliers and downstream customers. Hence:

P 7: Greater 'technical dynamics' enhances the level of 'transparency'.

P 8: Greater 'technical dynamics' enhances the level of 'visibility'.

### ***Transaction Flexibility***

Both the depth and breadth of information communicated to suppliers or customers, i.e. increasing ‘transparency’ and ‘visibility’) are very important in the ‘flexible’ transactions. Hence:

P 9: Higher level of ‘transparency’ enhances the ‘transaction flexibility’.

P 10: Higher level of ‘visibility’ enhances the ‘transaction flexibility’.

### ***Buyer Performance***

To improve ‘Buyer Performance’, buyers need to increase suppliers’ ‘information visibility’, through which enhance their bargaining power. Buyers with high level of information visibility are able to monitor supplier’s performances in product quality and delivery commitment, and enhance their competitive advantage. Nevertheless, to achieve higher levels of performance, enterprises must also provide suppliers with a considerable level of ‘transparency’ for the creation of mutual benefits.

P 11: Higher level of ‘transparency’ enhances the ‘buyer performance’.

P 12: Higher level of ‘visibility’ enhances the ‘buyer manufacturing performance’.

### ***Supplier Performance***

‘Supplier Performance’ refers to the production performance, supply performance and flexibility of an enterprise when being as a supplier. With the increased ‘information visibility’, enterprises accommodate the forecasts to customer’s plans, and improve customer satisfaction. By the increase of ‘information visibility’, the organization makes use of resource distribution more efficiently to improve the production and supply performance, and provides suppliers with a more flexible supply of products. On the other hand, in order to obtain customer’s trust and a long-term business relationship, they should provide a higher level of ‘information transparency’ to customers to help customers understand them more. Then, customers are willing to provide relative support to suppliers and help suppliers to achieve ‘Supplier Performance’. Hence:

P 13: Higher level of ‘transparency’ enhances the ‘Supply Performance’.

P 14: Higher level of ‘visibility’ enhances ‘Supply Performance’.

### ***Research Model***

In this section, we adopt multiple case studies to analyze the relativity of SCM to the interactions between buyers and suppliers. The research model is depicted in Figure 2, showing the research outcome MIS and related inter-organizational areas.

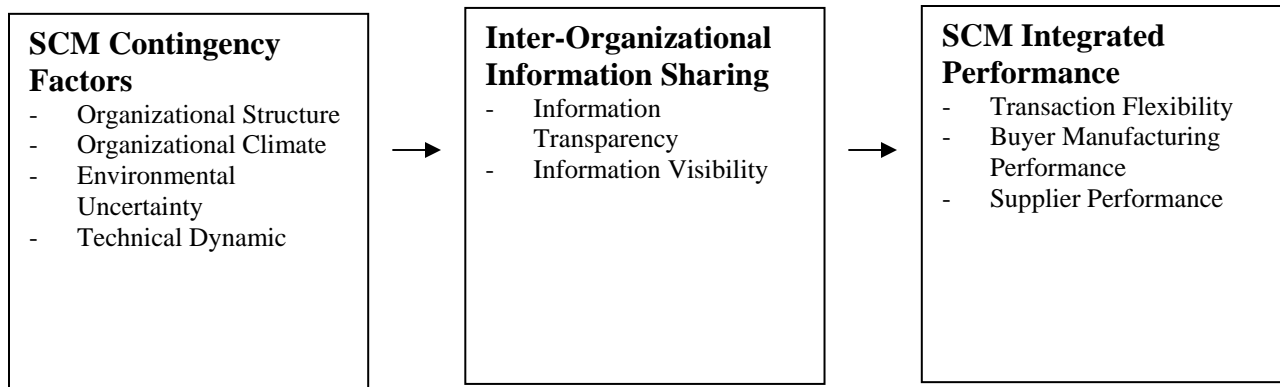


Figure 2: **The Research Model**

## CONCLUSIONS

In this study, we tried to adopt the ‘Contingency Theory’ as the theoretical foundation, and pointed out 14 propositions. Further study, we will continue to test this research model that will interview with eight firms to finish both the case study and sampling survey. Thus through the two research methodologies that we may investigate the impact of supply chain members among organizations on information sharing, and the impact of inter-organizational information sharing on the supply chain integrated-performance. Based on this study results show has some relationship desiring to test in the further empirical study (1) Supply chain partners within and between groups have a positive impact on inter-organizational information sharing. (2) Inter-organizational information sharing has a positive impact on the supply chain integrated performance. (3) Information sharing should be multi-dimensional concerns.

## REFERENCES

- Beamon, B.M. (1998). Supply Chain Design and Analysis: Models and Methods. *International Journal of Production Economics*, 55, 281-294.
- Beamon, B.M. (1999). Measuring Supply Chain Performance. *International Journal of Operations & Production Management*, 19(3), 275-292.
- Burns, T. & Stalker, G.M. (1961). *The Management of Innovation*. London: Tavistock.
- Christopher, M. (1998). *Logistics and Supply Chain Management, Strategies for Reducing Cost and Improving Service, 2<sup>nd</sup> Edition*. London: Financial Times, Prentice Hall.
- Christopher, M. & Towill, D.R. (2000). Supply Chain Migration from Lean and Functional to Agile and Customized. *International Journal of Supply Chain Management*, 5(4), 206-213.



- Copacino, W.C. (1997). *Supply Chain Management: The Basics and Beyond*. APICS.
- Dyer, J. , Cho, D. & Chu, W. (1998). Strategic Supplier Segmentation: The Next 'Best Practice' in Supply Chain Management. *California Management Review*, 40(2), 57-77.
- Ellram, L.M. (1991). Supply Chain Management: The Industrial Organization Perspective. *International Journal of Physical Distribution and Logistics Management*, 21(1), 13-22.
- Fine, C.H. (1998). *Clockspeed: Winning Industry Control in the Age of Temporary Advantage*. Massachusetts: Perseus Book.
- Forrester, J.W. (1961). *Industrial Dynamics*. Cambridge, MA: MIT Press.
- Hage, J. (1965). An Axiomatic Theory of Organizations. *Administrative Science Quarterly*, 10, 289-320.
- Handfield, R.B. & Nichols, E.L. (1999). *Introduction to Supply Chain Management*. Upper Saddle River (NJ): Prentice Hall.
- Hickson, D.J. & McMillan, C.J. eds. (1981). *Organization and Nation: The Aston Programme IV*. Franborough, Hants, UK: Gower.
- Khandwalla, P. N. (1977). *The Design of Organisations*. New York: Harcourt Brace.
- Klaus, P. (1998). Supply Chain Management. *Gabler Lexikon Logistik*. 434-441,
- Lammers, C.J., & Hickson, D.J. eds. (1979). *Organizations Alike and Unlike: International and Inter-Institutional Studies in the Sociology of Organization*. Lodon: Routledge & Kegan Paul.
- Lamming, R.C. (1993) *Beyond Partnership*. Prentice Hall.
- Lawrence, P.R. & Lorsch, J.W. (1967). *Organization and Environment*, Harvard University Graduate School of Business Administration, Boston, MA.
- Mason-Jones, R. & Towill, D.R. (1997). Information Enrichment: Designing the Supply Chain for Competitive Advantage. *Supply Chain Management*, 2(4), 137-148.
- Miller, D., Droge, C. & Toulouse, J. (1988). Strategic Process and Content as Mediators Between Organizational Context and Structure. *Academy of Management Journal*, 31, 544-569.
- Neely, A., Gregory, M. & Platts, K. (1995). Performance Measurement System Design. *International Journal of Operations & Production Management*, 15(4), 80-116.

- Perrow C. (1967). A Framework for the Comparative Analysis of Organizations. *American Sociological Review*, 32, 194-208.
- Pugh, D.S., Hickson, D.J., Hinings, C.R., & Turner, C. (1968). Dimensions of Organization Structure. *Administrative Science Quarterly*, 13, 65-105.
- Spekman, Robert E. (1998). An Empirical Investigation into Supply Chain Management: A Perspective on Partnerships. *Supply Chain Management*, 3(2), 53-67.
- Thompson, J.D. (1967). *Organizations in Action*. New York: McGraw-Hill.
- Weng, Z. K. (1999). Strategies For Integrating Lead Time and Customer-Order Decisions. *IIE Transactions*, 31, 161-171.
- Wilding, R.D. (1998). The Supply Chain Complexity Triangle- Uncertainty Generation in the Supply Chain. *International Journal of Physical Distribution & Logistics Management*, 28(8), 599-616.
- Woodward, J. (1958). *Management and Technology*. Lodon: H.M.S.O.
- Woodward, J. (1965) *Industrial Organization Theory and Practice*. Oxford: Oxford University Press.