

# DEVELOPMENT OF ELECTRONIC MARKETPLACE FOR COLLABORATIVE SUPPLY CHAIN

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## ABSTRACT

Electronic marketplaces and supply chain management (SCM) are two notions, which have attracted much attention of both academicians and practitioners. However, the classification and implications of the relationship between two notions has been limited and fragmented. In the paper, we identify the importance of collaborative supply chain and the relationship between electronic marketplaces and SCM. Different perspectives of electronic marketplace will be shared by the stakeholders. Current trends of developing electronic marketplace and future research questions will also be discussed.

**KEYWORDS:** Electronic Marketplaces, Supply Chain Management, Collaborative Commerce

## INTRODUCTION

The world of business is being changing into an e-economy by new forces of global competition, increased information availability, informed consumers, changing relationships, rapid innovations, and increasingly complex products. No industry is left untouched. In today's customer-focused marketplace, supply chain management (SCM) has become a key to competitive advantage. Having accepted the challenge to create a synchronized supply chain that can compete in the future e-economy, what concrete capabilities of companies must then be mastered?

We see an increase in the number and functionality of business models that use information systems crossing-organizational boundaries, such as systems linking one or more firms with customers and/or suppliers. New business models emerge or old business models improvements and experience a renaissance. But they all have a very short history and still have to prove their profitability and function. So why not instead ask the question: which competencies must a business model, using the Internet medium, manage amidst a competition regarding "supply chain versus supply chain"? One of these business models is an "Internet-based business-to-business B2B electronic marketplace", which this paper is dealing with.

## **DEFINITIONS OF ELECTRONIC MARKETPLACES**

E-commerce can take place among businesses (B2B) or between businesses to consumers (B2C) but the Internet also encompasses a wider spectrum of potential commercial activities and information exchanges and chances for an electronic marketplaces (EM) intermediary. Many of these EMs have been established on the Internet since the middle of 1999. The Economist estimates that there were already over 750 EMs in existence in the first quarter of 2000 (The Economist, 2000).

The EM concept, however, dates back to mid 1940s when the first documented EM system, known as *Selelevision*, was used to remote-market Florida citrus fruit (Henderson, 1984). As new entrants with new business models pour into the B2B space, it is increasingly difficult to make sense of the new EM landscape. Due to the new technology of Internet technology, EMs became more and more interesting for both researchers and practitioners because the limiting factors of time and space seem to have been overcome by the new medium.

Via the Internet, EMs are ubiquitous and available 24 hours a day (Weber, 1993). They seem to be more “just” and “self-ruled” as well as more competitive and decentralized (Malone et al., 1987). Following these arguments, EMs could be considered manifestations of the neoclassical market ideal, reducing transaction costs to a negligible minimum (Bako, 1991). New EM viewpoints have grown and research is popular in a range of disciplines, though definitions are varying, attributes and characteristics seem to be innumerable and used arbitrarily.

In fact, a marketplace as a historically evolved institution allows customers and supplies to meet at a certain place and at a certain time in order to communicate and to announce buying or selling intentions, which eventually match and may be settled. Today the institution market still does the same, but has occasionally been remodeled due to the evolution of media. However, owing to the evolution of modern information and tele-communication technology, time and space restrictions have been weakened and the cyberspace has become the new meeting point.

The unique feature of an EM is that it brings *multiple* buyers and sellers together (in a “virtual” sense in one central market space. If it also enables them to buy and sell from each other at a dynamic price which is determined in accordance with the rules of the exchange, called an electronic exchange; otherwise it is called a portal. The important point, which differentiates an exchange from other B2B e-commerce companies, is that an exchange involves multiple buyers and sellers and it centralizes and matches buy and sell orders and provides post-trade information.

One should compare this with the e-procurement process of one company, say General Motors, which sets up a web site with an auction process for suppliers to bid on contracts with General Motors. This is not an EM – because there is only one buyer. Similarly, a business that offers goods or services for sale to other businesses, over the Internet, is not an EM even if it provides a price-setting mechanism that is normally associated with an EM, such as an auction – because there is only one seller.

## **RELATIONSHIPS BETWEEN ELECTRONIC MARKETPLACE AND SUPPLY CHAIN MANAGEMENT**

The relationship between EMs and supply chain management (SCM) appears problematic. Collaborative supply chains aim to reduce the number of suppliers and

form long-term strategic alliances that ‘lock in’ suppliers and ‘lock out’ competition, while EMs promote competition and allow buyers to search for suitable suppliers and support “transport-based” partnering.

Economics has two basic mechanisms for coordinating the flow of materials or services through adjacent steps in the value chain – markets and hierarchies (Malone et al., 1987, 1989; Picot and Kirchner, 1987). Williamson categories transactions into those that support coordination between multiple buyers and sellers, i.e., market transactions, and those that support co-ordination within the firm, as well as the industry value chain, i.e., hierarchy transactions (Williamson, 1975, 1981). Williamson points out that the choice of transaction will depend on a number of factors, including asset specificity, the parties’ interest in the transaction, and ambiguity and uncertainty in precisely describing the transaction.

A product with high description complexity is more likely to be acquired through hierarchical co-ordination because of higher transaction costs associated with the exchange of complex descriptions. In a market these complex descriptions must be obtained from many possible suppliers to allow comparisons. Thus, buyers of products with complex descriptions are more likely to work with a single supplier in a close, hierarchical relationship. However, some empirical studies focusing on inter-organizational systems within the supply chain have shown that they have actually led to hierarchical co-ordination (Holland, 1995).

Also, Crowley (1998) says that today every business competes in two markets: the “marketplace”, in which resources and products exist physically and the “marketspace”, which is a virtual world of electronic commerce in which the main object of transaction is information. Managing these two interacting value-adding processes, in the two mutually dependent realms, is seen as posing new conceptual and tactical challenges for every firm.

Graham and Hardaker (2000) argue that the “marketplace” is part of the web-based relationships in the supply chain, which could be divided into three company perspectives, namely business-to-business, business-to-consumer and marketplace. In this case, the marketplace involves the company, its partners, and its customers and provides the opportunities for developing communication interactions, including customer surveys and information exchange on such things as product warranty and service capabilities.

Beyond that, it is proposed that, with marketspace reconfiguring the traditional value proposition, SCM needs to manage the organizational complexity of adopting a dynamic mix and emphasis between content, context and infrastructure. Integration along the supply chain in the virtual market can be viewed as being a mix of both formal and loose integration mechanisms, similar to the Internet infrastructure.

However, literature shows that there have several shortcomings for electronic marketplaces in collaborative supply chains. Van Hoek (2001) claims that the supply chain dimension of e-business is largely neglected and poorly managed, while the “mal-performance” of logistics is currently hampering turnover and revenues of e-commerce applications in a severe way. If basic operational performance is not even assured, more advanced approaches of e-business will not take off, since the support

for concepts in the physical domain is inadequate.

Furthermore, Gural et al. (2001) emphasize that EMs can subcontract the functions of the physical logistics system from other specialized firms. It can be said that the implementation of the Internet is changing the structure of the classical distribution channel, encouraging an increased specialization of the physical delivery functions. In fact, the discussion of the relationship between electronic marketplaces and collaborative supply chains has been vague, limited and fragmented. We would try to share different perspectives of EMs and current development of EMs in SCM in order to fill the research gap.

### **DIFFERENT PERSPECTIVES OF ELECTRONIC MARKETPLACE IN SCM**

SCM and the e-marketplace have different point of view on B2B integration. SCM concentrates on developing an integrated supply chain from suppliers to customers while, e-marketplace concentrated on technology for developing a complicated marketplace. Accord to Premkumar (2003), Buyers, sellers, and IS managers have different perspective on e-marketplace in SCM.

#### **Buyer's View**

Several questions they will ask about e-marketplace:

- Where does e-marketplace fit in their SCM strategies?
- Is it compatible with our procurement philosophies and practices?
- How will our existing suppliers and relationships be affected after introducing e-marketplace?

SCM has tried to achieve cycle-time reduction and faster inventory turnover by establish a strategic relationship with suppliers, internal and external integration of business processes and function areas in supply chain. A mutual trust and good information flows among the parties in supply chain are a key success factors for implementation of these initiatives (Mariottie 1998). A study of current procurement culture is necessary to discuss so that e-marketplace can be fulfillment the business requirement from buyers (Premkumar. 2003).

Companies should evaluate the initiatives to see whether they are in alignment with current SCM strategies. Organization change management, both internal and external, is critical since many failure cases of introducing e-marketplace due to poor implementation strategies.

#### **Seller's View**

Several questions they will ask about e-marketplace:

- How do we choose which marketplaces to, or not to, participate in?
- Do we create our own or join an existing e-marketplace?
- What will happen to existing long-term relationships and contracts with key customers?
- Will the e-marketplace make their products commodities and create a price-driven market?

Several decisions are necessary for the sellers to consider: whether to participate in the e-marketplace, to develop long term relationships with key customers or do both. The decisions will affect by the business stability, profitability of niche markets and size of investments in the e-business transaction and unique value proposition in order fulfillment processes. (Premkumar 2003).

## IS Managers View

Some of the typical issues confronting IS managers are:

- How do we migrate from dyadic EDI platforms to these e-marketplaces?
- How do we integrate our internal ERP with these e-marketplaces?
- How does IT infrastructure cooperate with our buyers/suppliers for a success implementation in
- What are the system and data compatibility issues in interacting with non-standardized systems?

Many firms have internal legacy systems on the sales and procurement side that work with EDI middleware to communicate with their trading partners. EDI provides a standardized data format for two computers to automatically communicate transaction information without any manual intervention. EDI is difficult to communicate in unstructured information. Migration to e-marketplaces may require interacting with different Web interfaces and non-standardized data formats that may create problems with internal systems.

Many firms have implemented ERP systems to integrate the information flow within the organization. They have proprietary interface requirements for data input and output. There are many new initiatives to address these problems. ERP vendors trying to create integrated software that will link their ERP systems with their e-marketplace software since ERP has less concentrated on the linkage with customers systems.

Data and system incompatibilities are the barriers of IS managers to reluctant integration of e-marketplace with EDI and ERP systems.

## **CURRENT TRENDS OF ELECTRONIC MARKETPLACE: STRATEGIC ALLIANCES**

The electronic marketplaces folded or were failing in the internet due to keen competition. So how can e-marketplace survive? The electronic marketplace domain has recently witnessed join together of a number of previously independent marketplace and formulation of collaborative alliances between each other. The first alliance is where a marketplace has merged with another. The benefits of the merger is try to eliminate the redundant costs associated with developing and deploying separate exchanges while making it easier and less costly for current and future users to conduct ecommerce to each other. The second alliance is acquisition of one marketplace to another marketplace which help broadens the markets to an additional audience. The third alliance is interoperability agreements, that buyer connected to one e-marketplace, can asses to an interoperable marketplace, vice versa. (White and Daniel, 2003)

The rationales of alliance formation are increasing the numbers of buyers and sellers that an organization has assess to via the marketplace, increasing the range of services offered to users, is facilitation of trading between tires in a supply chain. The first rationale is increasing the numbers of buyers and sellers that an organization has assess to via the marketplace. This rationale formulation is consistent with theory of network externalities (Katz and Shapiro 1986), that is the value of network based service will increase with the number of parties that can be assessed via the network.

The second rationale for alliance formation is to increase the range or depth service to the offer. This aims to allow buyers and seller of one marketplace assess to the services of another marketplace, that offers products and services that complimentary to those offered on the first marketplace. The findings that strategic alliances are being formed

in order to broaden the range of services offered to their users is agreement with a recent study of e-marketplace failures by Laster and Capers (2002). Laster and capers' study found that e-marketplace were most likely fail because of limited service offerings. The third rationale for alliance is facilitation of trading between multiple tiers in a supply chain. Many industries such as automotive and electronics consist of multiple tiers. Downstream in supply chain is original equipment manufacturing (OEM) in automatic supply chain. Supplying to these OEM's are tire one suppliers and supply tier one's suppliers are tire two suppliers. This can enables the multi-tired supply chain integration, according to observation of Choi et al (2002) in their study of supplier-to-supplier relationships. Choi observed that improvements in such relationships could have benefits to organization downstream in supply chain, a cooperative relationship has benefits to buyers and sellers because it can take advantages of synergy between suppliers.

### **FUTURE OF ELECTRONIC MARKETPLACES**

E-marketplace has to evolve to be consistent with paradigms of collaborative commerce provide a greater value to its customers by enhance value and cost reduction in the value chain. The long-term relationship and mutual trust should not be ignored. Collaborative commerce is based on the premise that trading partners will collaborate and freely exchange information to reduce the bullwhip effect of supply chain. The information sharing and good information flows is a significant factors for operating collaborative commerce. Information asymmetry is critical for participants in value chain to survive.

Future e-marketplace should provide support to e-supply chain management activities. The success of implementation e-marketplace based on following factors: (Turban et. al 2004)

- The abilities of all supply chain partners to view partner collaborations as strategic asset. A tight integration and mutual trust among trading partners that generates speed, agility and lower costs.
- Information visibility along the supply chain. Information flow should be visible to all members of supply chain at any time and anywhere.
- Benchmarking supply chain management performance. Performance metrics, such as speed, cost, quality and customer services should be measured through the supply chain. Companies should clearly define the measurements of the performance metrics. The target levels should be attractive to business partners.
- Integrating supply chain more tightly. A e-supply chain will benefits from tight integration both internally in the business process and functions and externally with suppliers, logistics providers and distribution channels.

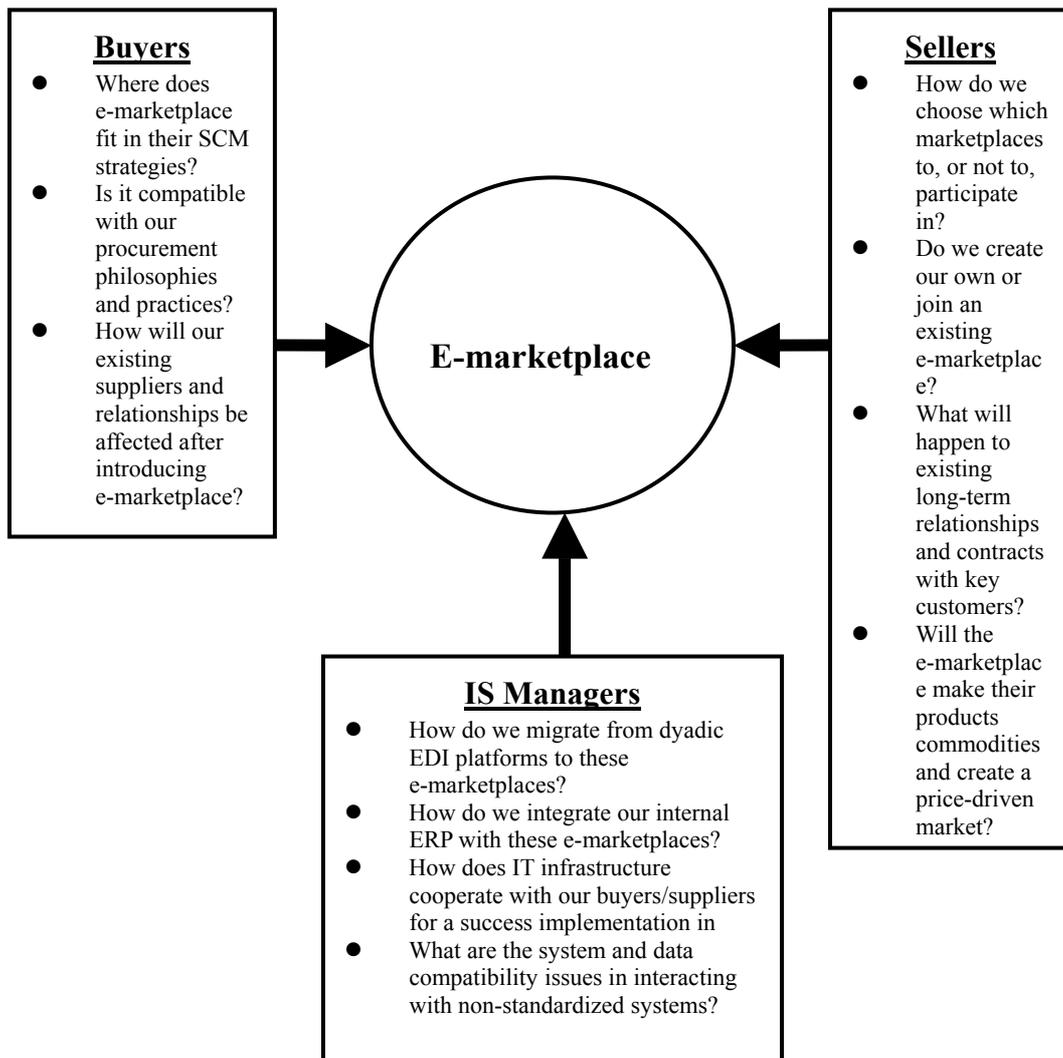
Several questions should consider in order making an e-marketplace become successful.

- Do e-marketplaces achieve the necessary liquidity level in order to survive?
- Do e-marketplaces bring the right owners in order to increase liquidity?
- Do e-marketplaces have right governance?
- Are e-marketplaces open to all both from organizational and technological points of view?
- Do e-marketplaces have a full range of services for buyers and sellers?
- Do e-marketplaces target in the right industries?
- Do e-marketplaces invest in gaining brand awareness?

- Do e-marketplaces exploit economies of scope?

## CONCLUSION

In the paper, we present to identify the importance of collaborative supply chain and the relationship between electronic marketplaces and SCM. Different perspectives of electronic marketplace have been shared by the stakeholders. A current trend of developing electronic marketplace, strategic alliance has been discussed.



**Figure 1: Relationships of stakeholders and e-marketplace in supply chain management**

## REFERENCES

1. Bakos J.Y. (1991), *A strategic analysis of EM*, MIS Quarterly, 15(4), pp.295-310.
2. Choi, TY, Wu Z, Ellram, L. and Koka, B R (2002), “ Supplier-Supplier Relationships and their Implications for Buyer-Supplier Relationships”, *IEEE Transactions on Engineering Management*, Vol.49, No.2, p119-130.
3. Crowley J.A. (1998), *Virtual logistics: Transport in the marketspace*, International Journal of Physical Distribution and Logistics Management, 28(7), pp.547-574.
4. Graham G. and Hardaker G. (2000), *Supply Chain Management across the Internet*, International Journal of Physical Distribution and Logistics Management, 30(3/4), pp.286-295.
5. Gural C., Ranchhod A. and Hackney R. (2001), *Internet transactions and physical logistics: Conflict or complementarity*, Logistics Information Management, 14(1/2), pp.33-43.
6. Henderson D.R. (1984), *Electronic marketing in principle and practice*, American Journal of Agriculture Economics 66 (5), pp.848-853.
7. Holland C.P. (1995), *Co-operative supply chain management: The impact of inter-organizational information systems*, Journal of Strategic Information Systems, 4(2), pp.117-133.
8. Katz, M. and Shaprio, C. (1986). “Product Introduction with Network Externalities”, *Journal of Political Economy*, Vol.94, p.822-841.
9. Laster. T, Long B, and Capers. C. (2002), “E-Marketplace Survival Strategies”, *Strategy + Business*, Booz Allen, Hamilton, US.
10. Malone T., Yates J. and Benjamin R. (1987), *Electronic markets and electronic hierarchies*, Communications of the ACM, 30, pp.484-497.
11. Malone T., Yates J and Benjamin R. (1989), *The Logic of Electronic Markets*, Harvard Business Review, pp.166-172.
12. Mariottie, J. L. (1999) “The Trust Factor in Supply Chain Management.” *Supply Chain Management Review (Spring 1999)*, p.70–78.
13. Picot A. and Kirchner C. (1987), *Transaction cost analysis of structural changes in the distribution system: Reflections on institutional developments in the federal Republic of Germany*, Journal of Institutional and Theoretical Economics, 143, pp.62-81.
14. Picot A. and Kirchner C. (1987), *Transaction cost analysis of structural changes in the distribution system: Reflections on institutional developments in the federal Republic of Germany*, Journal of Institutional and Theoretical Economics, 143, pp.62-81.
15. Premekumar G. Prem (2003), “Perspectives of the E-Marketplace by multiple Stakeholders”, *Communications of ACM*, Vo. 46 No. 12, p.279-288
16. The Economist (2000), *Shopping Around the Web: A Survey of e-Commerce*, 26 February 2000.
17. Turban, King, Lee, Viehland (2004), *Electronic Commerce: A Managerial Perspective 2004*, Prentice Hall, NJ
18. Van Hoek R. (2001), *E-supply chains - Virtually non-existing*, Supply Chain Management: An International Journal, 6 (1), pp.21-28.
19. Weber B.W. (1993), *How Financial markets are going online EM*, International Journal of Electronic Markets 3(3), pp.6-8.
20. White A & E M Daniel (2003), “Electronic Marketplace to Marketplace Alliances: Emerging Trends and Strategic Rationales”, *Proceedings of the 5th international*

*conference on Electronic commerce, September 2003.*

21. Williamson O.E. (1975), *Markets and Hierarchies: Analysis and Antitrust Implications*, Free Press, New York.
22. Williamson O.E. (1981), *The economics of organization: The transaction cost approach*, *American Journal of Sociology*, 87, pp.548-577.