

Factors that foster information sharing in the supply chain integration

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ABSTRACT

Information sharing among supply chain members is a basic requirement for effective supply chain management. It has been proven that timely information shared throughout a supply chain can produce significant supply chain performance improvements to all members of the supply chain. This paper identifies and gives detailed explanations into the factors that affect information sharing among parties in the supply chain and how it can improve integration. This paper adopted extensive literature studies to identify the factors and explain how they influence information sharing among supply chain parties. The study revealed that trust, incentive contract, cost, facilities and business focus have significant factors that influence information sharing among the parties in the supply chain.

Keywords: Information sharing, supply chain management, supply chain integration.

1. INTRODUCTION

Supply chain management (SCM) monitors the flow of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer [1]. According to Zhou and Bentong [2], efficient coordination of information allows the other kinds of flow like materials and finance to be more efficient and effective. Therefore, information sharing among supply chain members is a basic requirement for effective supply chain management.

In recent times, there has been a paradigm shift in relation to competition among individual firms to supply chains [3]. The status quo encourages competition among supply chains through supply chain integrations. Hence business activities require a change from managing individual functions to integrating activities into key supply chain processes through quality information sharing [4]. Dell Computer and Fujitsu America and Walmart and P&G cases are proofs of how information sharing improves performance and profitability among parties of the supply chain through supply chain integration [5], [6].

However, extensive investigation or study into factors that encourage free and effective information sharing among supply chain partners are limited. Hence the paper identifies and clearly explains the significant factors that influence information sharing among parties of the supply chain. These factors are presented in the conceptual framework in Figure 1 below.

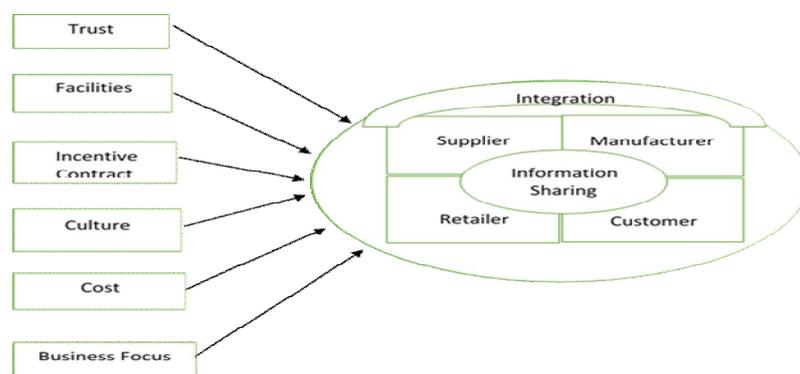


Figure 1 Conceptual Framework

The main contribution of this paper includes systematic and detailed identification of the factors that influence open information sharing, explanation of the factors that influences information sharing among parties and how they

influence integration in the supply chain.

The subsequent sections of the paper are organized as follows; the second section includes the role of information sharing in supply chain management. The third section includes the factors that influence information sharing. The fourth section includes the conclusion and future research proposal.

2. ROLE OF INFORMATION SHARING IN SUPPLY CHAIN

Extensive theoretical work in supply chain literature has been done with regards to the impact of information sharing between firms [7] – [10]. According to Lambert [13], operating an integrated supply chain requires continuous information flows, which in turn assist to achieve the best product flows. Sharing information among various members in the supply chain has been recognized as an effective approach to reducing demand distortion and improving supply chain performance [14]. Also researchers have studied the effect of information sharing initiatives such as sharing point of sale data between manufacturer and retailers [11], Electronic data interchange (EDI) on operational performance including reduced cycle time and improved quality [12].

In addition, efficient information sharing has a positive effect on operational performance measures. For example, rapid information integration of customer preferences improves the business value of electronic integration with suppliers [16] and increases the gains from information sharing. Faster order processing and turnaround times are advantages of sharing information. Information sharing gives suppliers insight into the current situation to make better forecast, accounting for promotions and market changes. It also enables the co-ordination of manufacturing and distribution systems and strategies. Efficient and effective information sharing among supply chain partner facilitates lead time reduction. Information-gathering techniques such as efficient customer response provide visibility into consumer demand lessening the bullwhip effect [14].

Sharing of information has differential effects on different members of the supply chain. For instance, experimental studies have found that sharing information reduces order variability among upstream members of the supply chain (i.e., manufacturers and distributors) rather than at downstream levels (i.e., between retailers and their wholesalers). [19] Thus if a manufacturer is able to share concrete information with the retailer and vice versa, providing greater value to customers becomes a reality. Moreover, the manufacturer would be able to provide a greater product variety. Hence, competitive advantage would be achieved [17]. If the demand information is integrated, each stage of the supply chain can use the actual customer demand data to create more accurate forecasts, rather than relying on the orders received from the previous stage, which can vary significantly more than the actual customer demand. Hence the bullwhip is reduced [18].

3. FACTORS INFLUENCING INFORMATION SHARING AMONG SUPPLY CHAIN PARTNERS

Globalization and competition requires adequate and timely information sharing among members in the supply chain. Effective information sharing is affected by several factors including information technology and its supporting facilities, incentive contracts, trust, sociocultural factors, cost and business focus.

3.1 Information technology and supporting facilities

Supply chain integration initiatives are unlikely to succeed without the appropriate information systems and the technology required to support them. In an environment where the IT system is not well implemented with full integration of internal processes and information, embarking on supply chain integration may actually create upstream and downstream problems [20]. Also, organizations' have realized that it is not possible to achieve effective and efficient supply chains without a sound, robust and well integrated enterprise wide information system [21] – [22].

Information technology has had a substantial impact on information sharing in supply chains. Recent advances in information technology have facilitated information sharing in diverse ways. For example, Mukhopadhyay and Kekre provide evidence that electronic data interchange provides substantial operational and strategic benefits to both customer and suppliers [23]. Also, information technologies have contributed to the process improvements at the supply chain level and its performance through information sharing by using Electronic Data Interchange (EDI), Collaborative Planning Forecasting and Replenishment (CPFR) and inter-organizational information systems in supply chain management activities.

Firms that coordinate information exchange with supply chain participants and rely on IT mediated supply chain

arrangements such as Just in Time Production (JIT) and Vendor Managed Inventory (VMI) experience increased profits, lower costs and efficient operations [11].

While the internet has facilitated a shift towards dynamic communication with supply chain partners, supporting facilities like scanners collect sales data at the point-of-sale, and EDI allows these data to be shared immediately with all stages of the supply chain [6]. The application of these technologies, especially in the grocery industry, has substantially lowered the time and cost to process an order, leading to impressive improvements in supply chain performance [24]. To take advantage of the SCM systems and thereby manage technology and processes well through efficient information sharing, organizations must ensure that their own IT systems are correctly implemented. Companies can gather vital information along the entire supply chain and react quickly to any predictable market changes, thereby gaining competitive advantage by effectively utilizing SCM [25]. Many companies are taking advantage of advanced information and manufacturing technologies for better managing their supply chains [26].

3.2 Incentive Contracts

Information sharing in supply chain management provides a reduction in cycle time, a reduction of inventories, a minimization of the bullwhip effect, and improvement in the effectiveness of distribution channels [27]. However, one major factor that influences information sharing is the incentive contract among parties in the supply chain. Aligning incentives for partners in the supply chain has been a challenge. For example, supply chain partners are reluctant to share information like production yield data or purchase price of component or parts. Even when each partner is assured a positive gain in return for information sharing, they could play a non-cooperative game and remain critical about how much. This may potentially lead to a failure to share information.

In addition, the principal-agent model suggests traditional fixed payment incentives are not adequate for ensuring timely and accurate sharing of information [28]. Instead, a mix of nonmonetary incentives, profit sharing and payments for sharing forecasts is crucial [29]. Thus, managers can study and examine the feasibility of information sharing in their supply chain and devise appropriate schemes to manage and redistribute the risks, costs, and benefits among their supply chain partners [30].

3.3 Trust

Trust has been defined by Mayer et. al. "as the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" [30]. All relations in both private and business relationships are based on trust. Trust is one of the social issues that attract attention in relation to information sharing among supply chain partners. Therefore, trust is a very important element in information sharing [30].

Zaheer et al. [31] found that firms that create enhanced inter-organizational trust with their customers gain advantages in reducing the cost of managing the relationship. Also, both parties gain advantages in growing the relationship into a higher profitable position. In supply chain partners' relationship, contractual trust, competence trust and goodwill trust are crucial. Contractual trust is where parties involved believe that contractual commitments would be met [31]. Competence trust is displayed when parties believe that their partners will not only meet contractual commitments but also have the right skills, technologies, and other required resources [32]. And lastly, Goodwill trust is where parties know others will represent them fairly and make the same decisions as they would when representing them. Lack of contractual, competence and goodwill trust among supply chain partners may result to reluctance in sharing information.

Another major concern associated with trust in information sharing is the confidentiality of information shared. For example, assuming that a supplier supplies a critical part to two competing manufacturers, neither of the two competing manufacturers would be willing to share information like sales data with the supplier unless it is guaranteed that the information is not leaked to the other manufacturer [33]. Thus, trust and confidentiality of information become critical ingredients in information sharing in supply chain integration. Surveys of supply chain parties have suggested that building trust improves supply chain responsiveness and induces cooperation among supply chain members [34].

3.4 Sociocultural factors

Comprehensive supply chain integration among parties in the supply chain in today's market requires a command of social, cultural and environmental topics. Sociocultural factors such as ethics, culture, environment and sustainability

are emerging issues in information sharing among parties. For example, a research on the influence of cultural factors on information sharing in China postulated that social network structures such as guanxi, Confucian dynamism, and collectivism had a significant influence on information sharing [35]. Considering how information behavior evolves, information behavior of people evolves over time with socioeconomic conditions of culture.

Aside traditional culture, organizational culture is an essential link in understanding the resistance to information sharing. Understanding organizational culture will aid parties in identifying the underlying causes for resistance to information sharing. According to Schein, organizational learning, development, and planned change cannot be understood without considering culture as a primary source [36]. When information sharing takes place, information behavior of the receivers may determine to what extent the messages will be accepted. An extended analysis of cultural influences on information sharing and organization was first reported by Vatrappu [37, 38].

3.5 Financial factors

Implementation of a cross-organizational information system is costly, time-consuming and risky. Partners in the supply chain may not agree on the specifications of the technical system, e.g., EDI standards, or how to split the cost of investing in the system. Sharing information results in better performance when the supply chain design does not allow other mechanisms such as risk pooling [39]. For example, a powerful monopolistic partner can extract all economic profit from his or her partner but one way of defending a positive profit for the weaker party is to keep the cost hidden and maintain informational superiority. The profit associated with superior information is often called the informational rent.

In addition, significant investments are information to be shared across entities so that the activities and decisions throughout the supply chain can be well coordinated. Recent advances in cost effective IT has however, made the cost-benefit tradeoff favorable toward well-coordinated supply chain management. This enables Supply Chain management to perform broader business processes like Customer Relationship, Supplier Relationship, Customer Service, Demand Management, Order Fulfillment, Manufacturing Flow, Product Development and Commercialization Process and so on.

3.6 Business focus

A study revealed that business focus of companies is moving towards cooperative relationships in an effort to make the supply chain as a whole more competitive [40]. Business focus is not just outsourcing the procurement of materials and components, but also outsourcing of services that traditionally have been provided in-house. The logic of this trend is that the company will increasingly focus on those activities in the value chain where it has a distinctive competitive advantage and everything else it will outsource. Also, reengineering efforts have led to more cooperation between parties in the supply chain in the form of alliances and partnership with much emphasis placed on logistical issues in product design. This movement has been particularly evident in logistics where the provision of transport, warehousing and inventory control is increasingly subcontracted to specialists or logistics partners.

Engaging in strategic cooperation and partnership can reduce or eliminate bullwhip effect. Thus, the way information is shared and inventory is managed in the supply chain, possibly eliminate the impact of the bullwhip effect. For example, Vendor Managed Inventory (VMI) enables the manufacturer to manage the inventory of its products at the retailer outlet, and therefore determine for itself how much inventory to keep on hand and how much to ship to the retailer in every period. However, an empirical study of manufacturing firms concluded that organizations need to clearly understand their company's competitive priorities and evaluate information technology adoptions for their ability to support these priorities, rather than follow current competitors [41].

4. CONCLUSION

In conclusion, timely and accurate information sharing among partners in supply chain management has a greater impact on performances; leading to the reduction is the lead time, short turnaround times, short lead times and hence high profit. After reviewing literature, the basic requirements for successful information sharing in supply chain management identified include adequate information technology and supporting facilities, trustworthy partners, positive sociocultural factors, financial factors, strategic cooperation, cost effective information system investment and good incentives plan.

However parties must be careful which kinds of information they share. They should develop effective strategies based on an appropriate balance between supply chain performance and risk; assess the likelihood and effects of potential threats to their supply chains to keep the potential threats at manageable levels when sharing information with their partners.

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