

## VALUE CREATION WITHIN THE SUPPLY CHAIN: AN EMPIRICAL ANALYSIS

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### ABSTRACT

In recent years, firms have recognized the importance of closely aligning their operations and supply chain strategies with the capabilities of suppliers and the needs of customers. However, while it is widely accepted that both customers and suppliers can impact a firm's success or failure, there is little empirical evidence to verify this. Moreover, there is little evidence of what firms must do to facilitate efforts to manage the supply chain or how this is affected by the firm's position within the supply chain. This study uses regression analysis to examine the impact of drivers and external sources of value creation efforts on firm performance, and to identify how this is impacted by a firm's position within the supply chain.

**Keywords: Supply Chain Management, Linear Regression**

### INTRODUCTION

Managing the supply chain has emerged as a key way for firms to respond to increasing competitive pressures. While many firms have benefited from managing individual elements of the supply chain such as production, materials management, or distribution, for a variety of reasons, few have excelled in managing the chain as a whole. Managing intra-firm linkages is not without significant difficulty, in part due to the conflicting agendas of different departments and organizational units within firms [45][47]. For similar reasons, managing inter firm linkages is harder still and has resulted in few firms successfully involving suppliers in their own decision making processes [20][29][33][54]. Poor communication between functions closest to the customer such as customer service and the rest of the organization [34], differences in attitudes to customer involvement [21], and the inability to incorporate and communicate customer feedback into product design processes have also hindered efforts to involve customers in decision making processes [25][36]. An additional yet overlooked reason is that firms often fail to understand what drives their ability to leverage their supply chains. What differentiates firms considered leaders in managing their supply chains from many others is their attention to such issues [18]. According to the literature, there are structural and behavioral drivers of firms' ability to leverage their supply chains. Structural drivers reflect compatibility between supply chain partners in terms of capability and geography and the existence of physical structures that bind them such as information systems [10][46]. For example the location of key suppliers such

as Procter and Gamble and distributors such as J.B. Hunt close to Wal-mart's corporate headquarters serves to physically facilitate supply chain coordination. Behavioral drivers reflect trust, information sharing, and mutual commitment within the supply chain [19][28]. Evidence suggests that relationships founded on trust and fairness lead to less conflict, more responsive behavior, and are considered to be more rewarding [8][28].

Successful supply chains depend on both identifying how to leverage partners to create value and on understanding what drives one's ability to do so. To date however, the role of these drivers, and in particular, structural and behavior drivers, has been largely overlooked. The objective of this study is to examine the impact of these drivers on efforts to create value within the supply chain and to identify how such efforts are affected by a firm's position within the supply chain.

## **BACKGROUND**

### **Supply Chain Drivers**

Several theoretical frameworks provide support for the idea that structural drivers can impact supply chain performance. Transaction Cost Economics theory [13][55][56] explains not only how resource allocation decisions are driven by the relative cost of using internally versus externally controlled resources, but that cost efficiencies are realized when governance structures are congruent with the underlying transactions [56-58]. Resource based theory suggests that competitive advantage results from the acquisition and exploitation of inimitable resources, and that assumption of responsibilities should depend on the locus of control of resources representing competitive advantage [6][37][43][53]. The organizational structure and strategy [9], reengineering [27], and just in time/lean manufacturing [50][59] literature also address the need to critically assess structural characteristics of systems, the latter emphasizing the need to evaluate sources of value-added with an emphasis on identifying and eliminating waste. These theoretical arguments are also supported by evidence from industry. The RosettaNet consortium for example used common information systems platforms to integrate supply chain spanning business processes within the computer industry [7]. Similarly, Cisco Systems invested in an information system to provide real time status of upstream and downstream inventory levels in response to a \$2.5 billion write-off of inventory caused by overly optimistic demand forecasts and inability to rapidly reconfigure their pipeline inventory by [42]. Early order commitments by suppliers have also resulted in enhanced supply chain coordination and reduced system wide inefficiency [24][60].

A number of social science theories provide support for the notion of behavioral drivers of supply chain performance. For example, the boundary spanning view of attachment [16][26], social network theory [15], and organized behavior system [1] suggest that inter-organizational linkages in which entities have common interests and mutual commitment to each other's well being, are more likely to succeed than those that do not. Recent empirical evidence in the supply chain literature supports this. For example the length of relationships with suppliers was found to positively influence strategic integration with distributor firms [31], firms focused on behavioral issues such as perceptions of fairness and use of informal contracts were observed to enjoy tighter linkages and flexibility within their supply chains [8], and the quality of buyer-seller

relationships measured in terms of trust and satisfaction, was shown to be significantly related to buyer perceptions of access to their own distribution channels and gains in market share [41].

### **Customers and Suppliers as Sources of Value**

The quality management literature contains several studies that demonstrate the relationship between customer focus and organizational performance (e.g., [2][17][22][44][49]). Similarly, positive relationships have been demonstrated between close cooperation with suppliers and performance (e.g., [17][22][30][44][51]). A similar theme to emerge in the supply chain management literature is that of integration or the alignment of activities of supply chain partners in terms of material and/or information flows. Evidence increasingly points to a positive relationship between integration and performance (e.g., [3][4][23][31][38][39][46]). Of particular interest is that while firms appear to be further along in their efforts to integrate with customers than with suppliers [21], and that few are integrated beyond first tier suppliers and/or customers, firms with high levels of both supplier *and* customer integration report higher levels of performance compared to firms with low levels of either [23].

### **Supply Chain Position**

While there has been considerable interest in *supply chains*, much of the literature on supply chain management focuses on a single entity within the chain, typically a finished goods producer or assembler, with few studies either examining firms at other positions within the supply chain or using position as a contingent variable. While studies have shown that quality management [12][48] and supplier selection practices are largely consistent across the supply chain [11], there is little other evidence of the impact of supply chain position on how firms manage their supply chain management activities.

## **RESEARCH ISSUES AND METHODOLOGY**

Prior research suggests that structural drivers such as the proximity of supply chain partners, a common shared information system, and visibility of inventory levels, and behavioral drivers such as the development of trust, facilitation of information sharing, and promotion of open communication, are enablers or starting points to efforts to create value within the supply chain. It is therefore reasonable to assume that a positive relationship exists between the extent to which firms consider these issues and performance. Creating value itself however means responding to the needs and capabilities of customers and suppliers in a manner consistent with firm objectives. This in turn suggests that leveraging knowledge of supplier capabilities and customer needs will positively impact performance. Finally, supply chain management efforts tend to be driven by firms responding directly to the marketplace, and relationships between firms and their suppliers and customers are a reflection of the competitive forces they are subject to. One can therefore surmise that the impact of drivers and sources of value creation within the supply chain will vary by position within the chain.

The above propositions, while having a sound theoretical basis, have yet to be empirically tested. In order to do so, a survey instrument was developed. Based on a review of the literature, company documentation, and discussions with industry professionals, nine drivers (four

structural and five behavioral), and fourteen sources (eight customer and six supplier) of value creation were identified. For each structural driver, a five point Likert scale was developed that addressed the extent to which the item had limited the realization of supply chain management objectives (Appendix I). For each behavioral driver, a similar scale was established that examined the importance of the item in managing the supply chain. Customer value variables addressed efforts by the firm to better respond to customer needs while supplier value focused on key issues in selecting strategic suppliers. Three commonly used measures of market performance, product quality, competitive position, and customer service level, were also identified [52]. For each, a five point Likert scale was developed seeking information on the performance of the firm relative to that of major competitors (Appendix I). The survey also contained questions regarding firm characteristics including position in its supply chain. Five locations within the supply chain, raw material producer, component manufacturer, finished good manufacturer, wholesaler, and retailer were included. The instrument was pre-tested by senior purchasing and materials managers and where necessary modified to improve question clarity and validity.

The revised survey was sent to senior purchasing and materials managers of firms identified from Institute for Supply Management (ISM) and American Production and Inventory Control Society (APICS) membership lists. Two mailings and a reminder yielded five hundred and twenty seven usable surveys, a response rate of 12%. To test for non-response bias, surveys were separated into two groups based on return date, late arriving surveys considered representative of non-respondents [5][31]. T-tests on responses to a number of randomly selected survey items as well as the number of employees, and annual sales indicated no statistically significant differences in mean responses indicating the absence of non-response bias. Similar tests comparing responses from the two survey populations (APICS and ISM) also indicated no statistically significant differences, allowing the two samples to be merged.

Reliability analysis using Cronbach's  $\alpha$  [14] indicated that four of the five scales yielded values of  $\alpha$  in excess of the generally accepted value of 0.70 [40], while for the fifth scale, structural drivers, the value exceeded the value of 0.50 considered acceptable for exploratory analysis [40]. The Principal Components Method with varimax rotation was used to extract underlying factors from each of the five scales with eigen values greater than 1.0 and item factor loadings greater than 0.50 [40]. For each scale, a single factor was derived. Using the resulting factor scores, regression models were run for each position in the supply chain of the form

$$\text{Performance} = \beta_0 + \beta_1\text{SD} + \beta_2\text{BD} + \beta_3\text{CV} + \beta_4\text{SV} \quad (1)$$

where, SD = structural drivers, BD = behavioral drivers, CV = customer value, and SV = supplier value.

**N.B.** A complete version of this paper can be obtained from Vijay R. Kannan.