# INTEGRATED SUPPLY CHAIN: A THEORETICAL TYPOLOGY

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**ABSTRACT**

With increased global competitive pressures and higher customer demands, more firms are attempting to gain a competitive advantage through their logistics and distribution systems. This system is not in the traditional form of logistics but through alliances with both suppliers and buyers as an integrated supply chain. An integrated supply chain, in the words of Andersen consultant Edward D. Root, is "taking those functions that originate at point of origin and ultimately end up at a point of consumption" and integrating them together through alliances (Bowman 1997, p. 30). An integrated supply chain is the extension of supply chain to all members, but some firms may not be suited or equipped to enter into an integrated supply chain.

As evidenced by the literature, there are several potential theoretical attributes which can be argued to be necessary for the successful implementation of an integrated supply chain such as social exchange theory, transaction costs, and other perspectives (Song 1995; Walton and Miller 1995). It is the contention of this paper not to argue the strengths and weaknesses of these theories, but to focus on the theoretical dimensions of resource dependency and the enabling influences of information technology. The purpose of this paper is to propose a typology for an integrated supply chain based upon resource dependency and information technology acting as an enabler of an integrated supply chain. Resource dependency suggests that the firm should initiate alliances to have control over its future survival. Hence, a firm will only attempt to enter into an alliance when the firm can benefit from such an alliance such as reducing supply or demand uncertainty. Moreover, the only way that a firm is able to create and manage an alliance is through information technology. The intensity of information technology acts an enabler of alliances and integrated supply chains (Andel 1997; Narus and Anderson 1995; Upton and McAfee 1996; Walton and Miller 1995). Intensity of information technology may be defined as the pervasiveness and usage of information technology in the processes which make up the firm.

The level of resource dependency and the level of information technology intensity of a firm will assist in predicting the firm's potential benefit from a strategic alliance with suppliers and buyers. If a firm resides in a highly placid environment where supply and demand are stable, then the firm does not need to enter into an alliance (Song 1995). However, a firm that is in a highly volatile environment such as the computer software industry must rely on external suppliers to satisfy demands for resources.

Only firms that are high on both resource dependency and information technology intensity will be able to fully integrate their systems and realize the full potential of an integrated supply chain. Stand-alone firms or firms which can be characterized as having low resource dependencies and low intensity of information technology should not enter into an integrated supply chain, as little could be gained from entering into alliances.

For firms who have a high resource dependency but low information technology intensity, only partial integration can be achieved. For example, a manufacturing firm is operating in a third world nation with a highly limited information technology infrastructure, but most of their orders are from developed nations. The manufacturing firm is highly dependent upon firms operating in developed nations but is unable to achieve full supply chain integration due to limited information technology intensity. The same can be said for firms who have high levels of information technology intensity, but relatively low resource dependencies.

To this point, we have discussed the internal conditions and needs as exhibited by a firm that should determine to what extent they might integrate their supply chain. However, the internal needs of resource control and the internal structure of information technology is only half of the equation. Investment in information technology is traditionally expensive. While costs may be reducing, the reasonable time horizon for recouping the investment is also becoming shorter. It is therefore critical to not only be able to ascertain the level of potential supply chain integration that is beneficial, but the optimal level necessary given the operating environment. Allocate too many resources to unnecessary information technology and those resources are wasted, fail to allocate enough resources and a crucial competitive advantage may be lost. To this end we briefly examine the external competitive environment along the mirroring axes of level of competition and communication infrastructure. Simply put, the greater the competition surrounding the firm, greater will be the need for alliances with other firms. While the threat of opportunistic behavior is always present, the potential benefits of integration will usually outweigh the pos-

sible penalties. This is especially true when one expands the definition of resource to include the installed customer base. As the competitive level of the industry increases so does the need to protect the installed resource base, including customers.

Just as the level of information technology determines the potential for supply chain integration so does the level of technological infrastructure exhibited by the competitive environment. This is most obviously manifested by the level of telecommunications infrastructure developed. For high tech firms that rely on phone lines and other sophisticated transmission devices this infrastructure is critical for connecting the firm to alliance partners. For less advanced countries, other forms of communication must be used, including traditional post or courier service. Additionally, the ability to track shipped products and supplies becomes more difficult in arenas where sophisticated telecommunications are not available.

The conclusion of this treatise is that a tight co-alignment should exist between firm resource needs and structures with environmental pressures and structures. The internal structure and needs of the firm will determine the degree of possible supply chain integration where as external structures and pressures will indicate the level of optimal supply chain integration. In this manner, the firm can attempt to co-align needs and pressures with appropriate structures.

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