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DEVELOPMENT OF AN INTEGRATED SUPPLY CHAIN MODEL

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Abstract

With increased global competitive pressures, companies operating in these competitive environments are not only looking to their distribution division to save money, but also to generate competitive advantages. One technique is the integrated supply chain. However, this process has not met with success for all companies, leading some managers to consider the appropriateness of an integrated supply chain. This dearth of success could be attributed to the lack of scholarship to guide managers in their efforts to formulate and then implement their integrated supply chain strategies. In an effort to fill this gap, our paper draws on resource dependency theory and the realities of ever-increasing information technology sophistication as enablers of successful supply chain integration resulting in the creation of our model to guide managers throughout this process

Keywords: Supply chain management, resource dependency theory, information technology sophistication

Introduction

As companies attempt to deal with increasing global competitive pressures, they are looking to their logistics and distribution systems as potential areas for future competitive success. The rapid advancement of information technologies, such as the explosive growth of enterprise resource planning (ERP) and continuing development of e-commerce applications and the Internet, is forcing many companies to reevaluate their roles and positions within their competitive environments. This new business paradigm is forcing business processes to be reconsidered and redesigned (Hackney, Burn, and Dhillon, 2000). As such, many companies are modifying their logistics functions by forging strategic alliances with suppliers and buyers to create integrated supply chains.

An integrated supply chain involves greater coordination and collaboration among all members of company's supply chain. It is sharing information across organizational boundaries within a network of alliances, including suppliers, and end-users. Some of the potential benefits of employing an integrated supply system include overall cost and time reduction in design through product stages (Davenport and Short, 1990). However, with the hyperbole of advantages streaming from both academic and practitioner journals, there has been inconclusive evidence that an integrated supply chain is an essential strategic tool for companies to succeed (Bowman, 1997). Our primary purpose of this paper is to conceptualize and to empirically test a model to aid managers in formulating their strategies for implementation of an integrated supply chain, drawing from resource dependency theory and the realities of today's advanced information technologies as enablers of a successfully integrated supply chain.

Literature Review

Resource dependency theory suggests that a company will attempt to generate alliances with other organizations in order to maintain a consistent supply of critical resources (Pfeffer and Salancik, 1978). In essence, the initiating company will create an

alliance with another company who possess a needed resource, and in doing so; will attempt to create a mutual interdependence between the two alliance members through buyer-seller exchanges and through access to other members of the initiating company's strategic alliance network. Strategic alliances allow the company to create a web that is dedicated to the survival of both the company and to the other companies in the network (Arthur, 1996). "Organizations attempt to alter their dependence relationships by minimizing their own dependence or by increasing the dependence of other organizations on themselves" (Ulrich and Barney, 1984: 472). The company, which adds the greatest value to the supply chain, will be able to have greater control and power over other members and influence the future direction of the supply chain. Likewise, a mutual dependence is created among all of the members of the supply chain as uncertainty is reduced.

The most popular system used to integrate supply chains has been the electronic data interchange (EDI). The capability of interorganizational systems, like EDI, to connect supply chains has been predicted and demonstrated extensively (e.g., Cash and Konsynski, 1985; O'Callaghan, Kaufmann, and Konsynski, 1992). More recently, in a context of business process redesign (BPR) Clark and Stoddard (1996) describe technical innovations such as EDI are enabler of the process innovations such as BPR. Information technologies should be considered to be an enabler of an integrated supply chain. Additionally, supply chain electronic commerce coupled with the commercial availability of the Internet and development of sophisticated software including ERP tools make the integrated supply chain attainable for more organizations (e.g., Jenson and Johnson, 1999; Zheng, Yen, and Tarn, 2000).

Research Model

As stated previously, our purpose is to create and to test a model of supply chain integration empirically with a theoretical foundation grounded in resource dependency theory and augmented with the applied uses of information technologies. We have adapted Chwelos, Benbasat, and Dexter (2001) model and simplified it to more poignantly represent the studied components of our study. Our model is illustrated in the Figure 1.

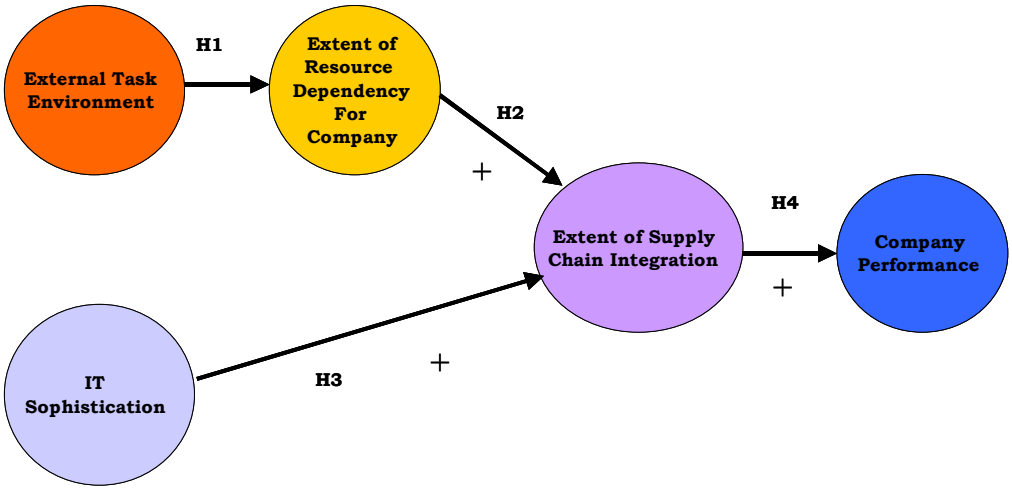

Figure 1. Proposed Research Model

Hypotheses

The level of resource dependency will aid in predicting the company's potential benefit gained through either joining or forming an integrated supply chain. Several of the articles touched upon the belief that industry effects may play a role in the level of exhibited resource dependency (e.g., Pfeffer and Salancik, 1978). If a company resides in a benevolent task environment, then external resources will be non-critical. For example, a concrete manufacturer needs a constant supply of rocks, sand, and water to make concrete. However, a company that is in a highly volatile environment such as in the semiconductor industry sector must rely on external suppliers to satisfy demands for resources (Lukas, Tan, and Hult, 2001).

H1: A company in a highly volatile environment has a higher Resource Dependency than a company in a benevolent task environment.

Companies who are considering whether or not to initiate or to join an integrated supply chain should consider their level of resource dependency and level of information technology. Opportunistic behaviors could be more self-evident for alliances based on non-critical resources. Only companies that are high on both resource dependency and information technology will be able to fully integrate their systems and realize the full potential of an integrated supply chain while simultaneously reducing opportunistic behavior of its members.

H2: A company with a higher Resource Dependency is likely to integrate the supply chains than a company with a lower Resource Dependency.

H3: A company with a higher Information Systems Sophistication is likely to integrate the supply chains than a company with a lower Information Systems Sophistication.

Companies who integrated their supply chains to manage the logistics and development cost and to succeed in strategic planning will be likely to show some evidence of their success in financial performance. The purpose of this study is not merely showing the link between the level of integration and the performance, but also the match between resource dependency and information systems sophistication and the level of affects the company's performance.

H4: A company with a higher integration in the supply chains management will perform better than a company with a lower integration. The companies whose level of integrated supply chain management matches their resource dependency and information systems sophistication will perform better than a company with a mismatch between them.

Methodology

Developing the Instrument

The first phase of the study will consist of interviews with industry experts of supply chain management and the adoption of relevant scales in the development of an instrument to measure the constructs listed in the model. A list of possible measures to be used has been identified (the scales are summarized in Table 1).

Table 1. Scales

Construct	Source	# of items
External Task Environment (EX)	- Lukas, Tan, and Hult, 2001	12
Resource Dependency (RD)	- Chwelos, Benbasat, and Dexter, 2001	3
IT Sophistication (IT)	- Paré and Raymond, 1991 - IT investment (proxy)	8 1
Extent of Supply Chain Integration (SCI)	- Developed for this study (adopted from Chwelos, Benbasat, and Dexter (2001) - Proxy using investment data.	3 1
Company Performance (CP)	- Dess and Robinson, 1984	4

Once the instrument is completed, a pilot testing using 4 - 5 organizations including their suppliers will be conducted. For the next phase of this research study, data will be collected, and the instruments and model will be tested using structural equation modeling techniques drawn from a larger sample utilizing a mail survey.

Conclusion

We argue that full benefits of an integrated supply chain cannot be achieved by all firms as the literature has consistently postulated. Levels of resource dependency and information based technology intensity play integral parts in the potential rewards of an integrated supply chain. Without the ability to share information throughout the alliance, the integrated supply chain would be unthinkable. This paper has attempted to exhibit why some firms will do better in an integrated supply chain than others. The hope of the authors was not to dampen the enthusiasm regarding integrated supply chains, but to point out potential fallacies that are illuminated through theory but have largely been ignored by both practitioner and academic writers. Thus, this paper provides a point of reference for managers who are contemplating entering into an integrated supply chain.

References

Available upon request to the first author.