APPLYING THE O.E.S. PARADIGM TO THE SUPPLY CHAIN

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Abstract

This paper develops a conceptual model which explains the performance of supply chain members. Specifically, it applies the performance model called the organization-environment-strategy (OES) paradigm. The performance of supply chain members is influenced by supply chain uncertainty or the unpredictability of the actions of those sectors which supply inputs to or receive outputs from the organization. Supply chain uncertainty is the driver for firms to implement a collaborative strategy. Moreover, such unpredictability requires a more flexible structure to support collaboration within and across the organizations. Because of unpredictability, firms tend to work closely together with their partners and adapt their structure to be more flexible to fit their environment. Consequently, those firms that can align their strategy and structure with the environment will be able to increase their competitive advantage or outperform their competitors. Hence, their performance will have improved. It remains for other researchers to test this model.

Keywords: supply chain uncertainty, collaborative strategy, organizational structure, supply chain performance

INTRODUCTION

The conventional business model is based on transactional relationships between companies, a model which was able to create high-cost, low-quality products and services for the final customer in the chain. However, these relationships were formal and not particularly intimate. The consequences of this formality were that mutual distrust, short-term commitments, and information hoarding between trading partners became common. Evidence of these failings has been discussed by many authors, such as Kumar (1996), Dyer (2000), Wagner, Macbeth and Boddy (2002), and Bonet and Pache (2005).

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Increased competitiveness now entails a re-examination of the conventional model and its inadequate relationships. Competition is all-pervasive. Corporations now have to compete in the borderless global market as well as locally. Individual businesses can no longer compete as stand-alone entities with only formal relationships, but need to refashion their supply chains to include a closer network of relationships among suppliers and partners (Christopher, 1998; 2000). Businesses realize that they are now facing a new facet of competition, namely network competition. This makes networks the route to sustainable advantage, depending on management's ability to understand their new environment of a complex network of businesses and relationships, and to integrate this network into a cost-effective and value-added chain (Lambert, Cooper, & Pagh, 1998; Christopher, 1998; 2000).

Christopher (1998; 2000) defined a supply chain as the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hand of the ultimate consumer. Indeed, every organization has its own supply chain, but their effectiveness varies. Managing supply chains effectively is a complex and challenging task because an organization has to deal with many uncertainties caused by the interdependence between organizations. An organization typically depends on resources from its suppliers in the upstream as well as orders from its customers in the downstream. Thus, the interdependence of these sectors increases the degree of uncertainty faced by organizations. Such uncertainties have increased the need for collaboration among trading partners, from original suppliers to end users. It is a challenge for managers to develop a collaborative strategy and create an organizational structure that supports collaboration within the firm and across the supply chain members, to maximize performance in the light of uncertainty in the firm's environment.

The purpose of this research is to develop a conceptual model that explains the performance of supply chain members by applying the performance model called the organization-environment-strategy (OES) paradigm. This paper consists of three parts. First, the literature is reviewed to provide an overview of the major paradigms related to performance. Second, the conceptual model and relationships between variables are explained. Third, there is a conclusion, with recommendations for future research.

LITERATURE REVIEW

The following part discusses the different perspectives derived from the literature and related studies of industrial organization economics, strategic management, organization theory and supply chain management. In particular, it presents the major paradigms related to performance. Then, the major elements of the OES paradigm in the supply chain context are explained.

Major Paradigms Related to Performance

The question "Why do firms differ in their performance?" is central to the discipline of strategic management. The three major paradigms which address the performance issue are structure-conduct-performance (SCP), strategy-structure-performance (SSP), and organization-environment-strategy (OES).

1. Structure-Conduct-Performance (SCP) Paradigm

One of the long-standing perspectives of performance is the structure-conduct-performance (SCP) paradigm of industrial organization (IO) economics developed by Mason (1939) and Bain (1956; 1959). In particular, this SCP paradigm holds that 'industry' structure significantly affects the conduct of 'firms', and their conduct, in turn, affects 'industry' performance (Robinson & McDougall, 1998). It assumes that firms would replicate each other and that industry performance would depend on the structure of the market. In short, firms could ignore conduct (strategy) and look directly at industry structure in trying to explain performance. Conduct merely reflects the environment. This is a crucial aspect of the SCP paradigm. As the main focus of the SCP paradigm is the industry structure, it ignores the importance of strategy which is an essential element contributing to performance. This paradigm is extended by the strategy-structure-performance paradigm of strategic management.

2. Strategy-Structure-Performance (SSP) Paradigm

The strategy-structure-performance paradigm states that organizational performance hinges on the fit between strategy and structure. It highlights the importance of organizational structure as the complementary factor to strategy, on firm performance. In essence, it argues that the environments only partially dictate the behavior of organizations and that 'firm' strategy is the key determinant of 'firm' structures and processes (Chandler, 1962; Child, 1972; Galbraith & Nathanson, 1978; Miles & Snow, 1978; Pfeffer & Salancik, 1978; Randolph & Dess, 1984; Thompson, 1967). Importantly, this paradigm focuses on the link between a firm's strategy and organizational structure; environment is not its main focus.

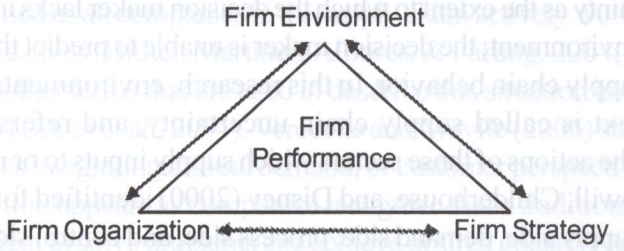
3. Organization-Environment-Strategy (OES) Paradigm

The above SCP and SSP paradigms propose a one-way linear flow of relationship. The SCP paradigm states that industry structure determines conduct (or strategy) and performance, whereas the SSP paradigm identifies strategy as determining organizational structure and performance. It is argued that the SCP model tends to ignore the importance of strategy, while the SSP model tends to ignore the importance of environment, and that organizational structure needs to follow strategy. Additionally, the link between environment and organizational structure is missing. Such a link is explained by organization theory or contingency theory. The

contingency theory states that environment generally influences organizational structure and that firms need to adapt to the environment they are in.

Later, an OES paradigm has been proposed. It integrates both the SCP and SSP paradigms by stating the importance of all three elements (i.e., environment, strategy, and organization) on organizational performance (Farjoun, 2002). Moreover, the scope of organization in this paradigm is broader including not only structure but also other elements in the organization such as people, routines, and culture (Roberts, 2004). Additionally, the OES paradigm argues that there is not only a one-way linear relationship between the variables, but there is also a two-way relationship and interactions between environment, strategy and organization (as shown in Figure 1). The OES paradigm extends dyadic relationships (e.g. strategy influences on performance) to describe a network of potential relationships and the multiple causal influences which environment, strategy, and structure have on firm performance (Farjoun, 2002).

Figure 1: Organization-Environment-Strategy Paradigm



Source: Adapted from Farjoun (2002, p.573)

Even though the OES paradigm suggests a two-way relationship between the variables, it is expected that the environment would determine its strategy and structure because a number of research reports have supported such direction (e.g. Chandler, 1962; Duncan, 1979; Lawrence & Lorsch, 1969; Miles & Snow, 1978). The environment is treated as an independent variable.

For strategy, supply chain strategy is the focus. This is different from the previous research into industrial organizations, strategic management, or organization theory which focused on corporate or business level strategy. Even when compared with other studies in the supply chain management field, the scope and the way that this research integrates the dimensions of supply chain strategy is not the same as in previous studies.

For the organization, the organizational structure that supports supply chain strategy is the focus, because the main objectives of structure are to facilitate the information flows and to achieve coordination within the firm and across chain members in the supply chain context. Additionally, behind the structure are people who have to work together, communicate, and

coordinate to achieve common goals. Moreover, there is a culture – shared values or beliefs – which creates common understanding among members as to how members should behave. In the following section, environment in the supply chain context is clarified.

ENVIRONMENT IN THE SUPPLY CHAIN CONTEXT

Environment typically refers to "everything outside the organization's boundaries" (Robbins, 1990, p.206). In this study, the supply chain environment refers to those sectors which have a direct impact on the flow of products/services delivered to the end users, and which have a direct impact on the value creation activities of the organization. As such, the uncertainty related to these sectors becomes a problem for the firm in fulfilling the demand of its consumers.

Miles and Snow (1978) defined environmental uncertainty as the predictability of conditions in the organization's environment. Similarly, van der Vorst and Beulens (2002) defined the term supply chain uncertainty as the extent to which the decision maker lacks information about the supply chain or its environment; the decision maker is unable to predict the impact of possible control action on supply chain behavior. In this research, environmental uncertainty in the supply chain context is called supply chain uncertainty, and refers to the degree and unpredictability of the actions of those sectors which supply inputs to or receive outputs from the organization. Towill, Childerhouse, and Disney (2000) identified four sources of supply chain uncertainty: supply side, demand side, process side, and control side. As the OES paradigm suggests focusing on the external environment, hence, only supply uncertainty and demand uncertainty are the focus in this study.

Supply uncertainty is defined as the upstream or supply uncertainties which can be manifested through late deliveries, or poor quality of incoming materials or parts (Davis, 1993). In this research, supply uncertainty refers to the degree and unpredictability of the actions of the suppliers, who supply inputs to the organization. It is expected that the higher the unpredictability of the actions of suppliers, the higher the supply uncertainty. In other words, an unstable or dynamic environment increases the uncertainty. And the more the firm is dependent on suppliers, the higher the uncertainty.

Demand uncertainty is defined as the downstream, or demand uncertainties which take the form of unforeseen demand variability, in turn creating problems in planning and controlling, which jeopardize delivery performance (Fisher, Hammond, Obermeyer, & Raman, 1994). In this research, demand uncertainty refers to the degree and unpredictability of the actions of the customers, who receive outputs from the organization. It is believed that the higher the unpredictability of the actions of customers, the higher the demand uncertainty. In other words, an unstable or highly volatile environment increases the uncertainty. And the more the firm is dependent on customers, the higher the uncertainty. Because of demand uncertainty, some

industries suffer from an excess of some products and a shortage of others.

COLLABORATIVE STRATEGY

Scholars have proposed a number of strategies to manage supply chains. Some applied marketing strategy (Rodrigues, Stank, & Lynch, 2004), while others proposed different strategies (Fisher, 1997; Ho et al., 2005; Lee, 2002). All this implies that there is no one best strategy that fits all supply chains, as is also suggested by contingency theory. In particular, Rodrigues et al. (2004) applied the concept of strategic business network alliances to explain the inter-organizational relationship phenomenon in the supply chain. They used the term relational strategy to characterize the relationship formed between multiple firms linked together in support of a common goal. The relationship-based or collaborative strategy is the heart of a supply chain (Ballou, 2007).

Collaboration is defined as all companies in the supply chain actively working together as one, toward common objectives (Bititci, Martinez, Albores, & Parung, 2004; Mentzer, Foggin, & Golicic, 2000). The other terms that are used to describe this situation are relationships, partnerships or alliances (Bititci et al., 2004). Vereecke and Muylle (2006) state that supply chain collaboration involves integrating the real demand, or customer perspective, into supply chain thinking. Collaboration appears as companies recognize that a traditional arm's length relationship is not sufficient to solve problems and achieve desired goals (Dyer, 2000; Fites, 2000; Wagner et al., 2002). For instance, Chrysler survived a financial crisis because it transformed the organization relationships with suppliers from adversarial to collaborative (Dyer, 2000). Similarly, the close relationships with dealers and customers helped the turnaround of Caterpillar (Fites, 2000).

In particular, researchers agree that collaboration involves information sharing, and joint efforts which include joint planning, joint decision making, and joint problem solving (e.g. Ballou, 2007; Bowersox et al., 2010; McLaren, Head, & Yuan, 2002; Mentzer et al., 2000; Sheu, Yen, & Chae, 2006; Simatupang & Sridharan, 2004; Stank, Crum, & Arango, 1999).

ORGANIZATIONAL STRUCTURE IN THE SUPPLY CHAIN CONTEXT

In the OES paradigm, the letter 'O' represents 'organization', consisting of people, structure, routines and culture (Roberts, 2004). In the supply chain context, the organization refers to organizational structure that supports collaboration within the firm and across the supply chain members. Behind the structure are people who have to work together, communicate, and coordinate to achieve common goals. Moreover, there is a culture – shared values or beliefs – which creates common understanding among members as to how its members should behave

(Robbins, 1990). In order to collaborate with other supply chain members, each company is required to create alignment within its own organization. Indeed, each organization still has to keep its own identity and coordination within its firm. Before the company can make the information flow from its organization to the supply chain members, it has to ensure that the information flow within the organization is smooth enough to support such collaboration across the organizations.

In general, structure refers to the deliberate pattern of the relationships among various activities or subsystems within an organization, designed to attain organizational objectives effectively (Holdaway, Newberry, Hickson, & Heron, 1975; Kim & Utterback, 1983). The objectives of organizational structure are to facilitate the flow of information in order to reduce uncertainty in decision making and to achieve coordination within and across organizations. Hence, in the supply chain context, organizational structure is defined as the structure that supports collaboration within the firm and across the supply chain members. In fact, there are different forms of organizational structure, as discussed in the following section.

COMPETITIVE ADVANTAGE

Though the terms competitive advantage and performance are often used interchangeably (Porter, 1985), the two constructs are conceptually distinct (Newbert, 2008). In particular, Barney (1991) has differentiated the term competitive advantage from sustained competitive advantage. A *competitive advantage* is conceptualized as the implementation of a value creating strategy not simultaneously being implemented by any current or potential competitors (Barney, 1991). Whereas a firm is said to have a *sustained competitive advantage* when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors and when these competitors are unable to duplicate the benefits of this strategy (Barney, 1991); *performance* can be viewed as the rents a firm accrues as a result of the implementation of its strategies (Newbert, 2008). It is noted that earnings in excess of breakeven are called rents, rather than profits, if their existence does not induce new competition (Peteraf, 1993).

SUPPLY CHAIN PERFORMANCE

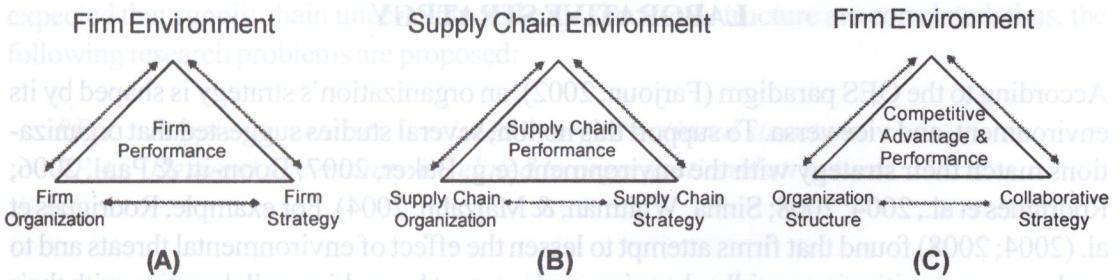
An extensive review of the literature showed that the supply chain members' performance may be influenced by collaborative joint efforts. Researchers found that the chain members who are involved in collaborative efforts outperform those with less involvement in collaboration (Corsten & Felde, 2005; Simatupang & Sridharan, 2002; 2005). Corsten and Felde (2005) empirically investigated buyer-supplier relationships and found that supplier collaboration has a positive effect on buyer performance both in terms of innovative capability and financial

results. However, there is no consensus among researchers on the definition of supply chain performance. In the context of organization, performance is a measure of how efficiently and effectively managers use resources to satisfy customers and achieve organizational goals. It increases in direct proportion to increases in efficiency and effectiveness (George & Jones, 2008). Hence, this research defines supply chain performance as a measure of how efficiently and effectively the supply chain members utilize resources to satisfy customers and improve their costs and flexibility.

MODEL DEVELOPMENT

The conceptual model in this paper is developed from the organization-environment-strategy (OES) paradigm presented in the previous part. The OES paradigm elaborates the importance of environment, which when aligned with strategy and organizational structure, would create value or be a source of competitive advantage to the firm. However, the OES paradigm has left a theoretical gap in the explanation of how firms gain competitive advantage in an environment where they maintain frequent and multiple collaborative relationships with supply chain partners. In addition, its level of analysis is the individual firm, not the supply chain. The application of the OES paradigm in the supply chain context and in this research is shown in Figure 2. In this Figure, (A) represents the original OES paradigm, (B) represents its application in the supply chain context, and (C) represents its application in this research. The extension of the OES paradigm to a supply chain context centers on the definition of the supply chain as a network of relationships. As shown in Figure 2 (C), in order to make the model parsimonious, even though the OES paradigm suggests a two-way relationship between the variables, it is expected that the environment would determine its strategy and structure because a number of research studies have supported such direction (e.g. Chandler, 1962; Duncan, 1979; Lawrence & Lorsch, 1969; Miles & Snow, 1978). Hence, the supply chain environment is treated as an independent variable consisting of two dimensions: supply uncertainty and demand uncertainty.

Figure 2: Application of the OES Paradigm in the Supply Chain Context and in this research



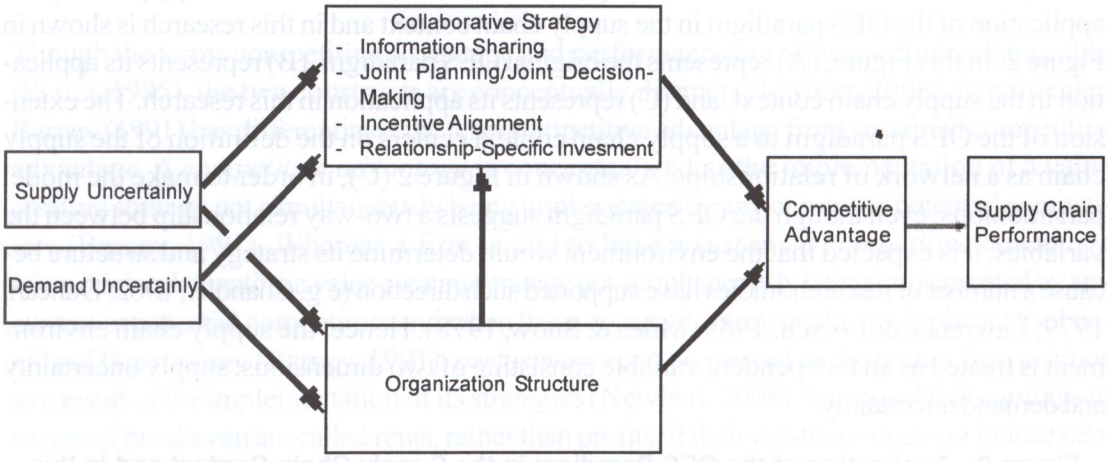
Source: Adapted from Farjoun (2002)

For 'strategy', collaborative strategy is the focus. It consists of four dimensions: information sharing, joint planning/joint decision-making, incentive alignment, and relationship-specific investment. For the organization, the organizational structure that supports the collaboration within the firm and across the supply chain members is the focus of the study.

Moreover, it is argued that the relationship between supply chain environment, collaborative strategy, and organizational structure in the supply chain context will help supply chain members gain a competitive advantage and that this competitive advantage will enhance the supply chain members' performance. In this regard, a conceptual model is proposed in Figure 3. The main variables proposed in the research model are classified into three groups: 1) the dependent variable which is supply chain performance; 2) the independent variable which is supply and demand uncertainties; and 3) the mediating variables which are collaborative strategy, organizational structure, and competitive advantage.

Figure 3: Conceptual Model

Relationship between Supply Chain Uncertainty, Collaborative Strategy, Structure, Competitive Advantage and Supply Chain Performance



RELATIONSHIP BETWEEN SUPPLY CHAIN UNCERTAINTY AND COLLABORATIVE STRATEGY

According to the OES paradigm (Farjoun, 2002), an organization's strategy is shaped by its environment, and vice versa. To support this notion, several studies suggested that organizations match their strategy with the environment (e.g. Baker, 2007; Boon-itt & Paul, 2006; Rodrigues et al., 2004; 2008; Sinha, Whitman, & Malzahn, 2004). For example, Rodrigues et al. (2004; 2008) found that firms attempt to lessen the effect of environmental threats and to explore opportunities in a rapidly changing environment by seeking collaboration with their supply chain members.

Several researchers suggested the use of collaboration as a strategy to mitigate supply chain uncertainty and risk (Baker, 2007; Boon-itt & Paul, 2006; Faisal et al., 2006a, b; Helms, Ettkin, & Chapman, 2000; Koudal & Coleman, 2005; Mason-Jones & Towill, 1997; Norman & Jansson, 2004; Sinha et al., 2004). For example, Norman and Jansson (2004) found that supply and manufacturing uncertainties are the major force for Ericsson to collaborate with partners in a supply chain in order to deal with risks and uncertainties caused by, or impacting on, logistics related activities or resources.

Specifically, supply chain uncertainty is comprised of two dimensions, i.e., supply uncertainty and demand uncertainty, which have their own independent characteristics. As such, the impact of each dimension on collaborative strategy may be unequal. Thus, two separate research problems are proposed.

RP1: Supply uncertainty is positively related to the degree of collaboration.
RP2: Demand uncertainty is positively related to the degree of collaboration.

RELATIONSHIP BETWEEN SUPPLY CHAIN UNCERTAINTY AND ORGANIZATIONAL STRUCTURE

Drawing on the work of Burns and Stalker (1961), Lawrence and Lorsch (1967) studied firms in three different industries and found that high-performance firms adopt organizational structures that are more fitted to competitive conditions in their environments than low-performance firms. In a similar vein, Child (1973) studied a British corporation and found evidence of a contingent relationship between environment, organizational structure, and performance.

Some evidence showed the influence of supply chain uncertainty on the organization. For example, Helms, Ettkin, and Chapman (2000) discovered that the uncertainty in customer demand drives the cultural and process changes in an organization. The organization is forced to manage its supply chain since an efficient supply chain would lead to the firm saving on cost and working efficiently. Additionally, in the supply chain context, the organizational structure should support collaboration within the firm and across supply chain members. Hence, it is expected that supply chain uncertainty and organizational structure are correlated; thus, the following research problems are proposed:

RP 3: Supply uncertainty is related to organizational structure.
RP 4: Demand uncertainty is related to organizational structure.

RELATIONSHIP BETWEEN ORGANIZATIONAL STRUCTURE AND COLLABORATIVE STRATEGY

The success of a collaborative relationship lies in the support of a well-designed structure. Several studies identified that organizational structure, people and culture are significant facilitators and barriers in implementing collaborative strategy (Catalan & Kotzab, 2003; Fawcett, Magnan, & McCarter, 2008; Halldórsson, Larson, & Poist, 2008; Larson, Poist, & Halldórsson, 2007; McCarter, Fawcett, & Magnan, 2005; Mentzer et al., 2000). For example, Fawcett et al. (2008) found that the lack of alliance guidelines, non-aligned measures, organizational boundaries and processes poorly appraised in terms of costs, are among the top ten barriers to supply chain collaboration. Moreover, the study shows that organizational structure should be designed to facilitate the flow of information so that the managers would have enough information to make decisions (Duncan, 1979). In addition, the organizational structure should be designed to support coordination, both within a firm and across supply chain entities (Defee & Stank, 2005). Therefore, the fifth research problem is proposed:

RP 5: Organizational structure is positively related to the degree of collaboration.

RELATIONSHIP BETWEEN COLLABORATIVE STRATEGY AND COMPETITIVE ADVANTAGE

Generally, the motive behind supply chain collaboration is to improve supply chain members' performance. Researchers contend that the chain members who are involved in collaborative efforts outperform those with less involvement in collaboration (Corsten & Felde, 2005; Mentzer et al., 2000; Wagner et al., 2002). For example, Mentzer et al. (2000) suggested that supply chain collaboration can deliver some powerful competitive advantages if the right enablers are in place and the barriers can be overcome. Similarly, Simatupang and Siharan (2004) discovered that companies with a higher degree of collaboration practice are able to attain better performance. Thus, it is predicted that:

RP 6: Degree of collaboration is positively related to competitive advantage.

RELATIONSHIP BETWEEN ORGANIZATIONAL STRUCTURE AND COMPETITIVE ADVANTAGE

Extending the resource-based view with relational and network perspectives, evidence has accumulated suggesting that the resources of collaborative partners transferred via direct interfirm interactions have a considerable impact on the competitive advantage of the interconnected firms (Lavie, 2006). Gulati (1999) has referred to these resources as network re-

sources that can provide strategic opportunities and affect firm behavior and value. Thus, research problem 7 can be proposed as:

RP 7: Organizational structure is positively related to competitive advantage.

RELATIONSHIP BETWEEN COMPETITIVE ADVANTAGE AND SUPPLY CHAIN PERFORMANCE

Newbert (2007; 2008) found from his empirical study that a competitive advantage via the implementation of a strategy is an important means by which a firm can improve its performance. However, it is argued that the implementation of collaborative-based strategy is one of many means by which a firm might earn rents. In fact, there is much empirical evidence indicating that performance is influenced by a host of exogenous factors (e.g. McGahan & Porter, 1997; Rumelt, 1991). Hence, performance may increase even in the absence of a well-executed strategy (Newbert, 2008). Nevertheless, it is expected that firms in the supply chain which are able to attain competitive advantages will have a greater performance than those rivals which do not (e.g. Barney, 1991; Barua, Konana, Whinston, & Yin, 2004; Newbert, 2007; 2008; Porter & Millar, 1985; Powell, 2001; Zou, Fang, & Zhao, 2003). As such, the following research problem is examined:

RP 8: Competitive advantage is positively related to supply chain performance.

CONCLUSION

This study proposes a conceptual model and the propositions of research problems are drawn from the OES paradigm. Specifically, eight major research problems are developed. Further quantitative research is needed to test the proposed model across multiple industries. In addition, this study focuses on uncertainty in the supply chain context, not the environmental uncertainty in macro views such as political, economical, social, and technological environments. Therefore, future research could be conducted to include other external environments which influence the supply chain members' operation.

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