

Unveiling the structure of supply networks: case studies in Honda, Acura, and DaimlerChrysler

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Received 8 August 2001; received in revised form 26 October 2001; accepted 11 March 2002

Abstract

Three complete supply networks have been mapped in this study. These supply networks pertain to the center console assembly and come from three different product lines—Honda Accord, Acura CL/TL, and DaimlerChrysler (DCX) Grand Cherokee. Based on these three cases of supply networks, propositions are built concerning how the structure of supply networks operates. Based on the extant literature, we frame structure in three dimensions—formalization, centralization, and complexity. As an underlying methodology, we first conduct the within-case analysis and then expand the analysis to cross-case context. The three structural dimensions affect one another progressively, and the cost consideration appears to be the overarching force that shapes the supply-network structure.

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Keywords: Supplier management; Operation strategy; Case study research; Supply networks; Supply chain

1. Introduction

A supply network refers to a network of firms engaged in manufacturing and assembly of parts to create a finished product. The membership in a network and its organization vary for a given product and over time. For instance, a product with a large bill of materials (BOM) tends to show a large membership in the network, and the efforts to consolidate suppliers affect the pattern of the network. The operation of a supply network can vary tremendously depending on policies, practices, and shared history.

In spite of growing interest in the management of supply chains or, more appropriately, supply networks (Choi et al., 2001; Lamming et al., 2000; Stuart et al., 1998), researchers are still in an early stage of investigating what a supply network looks like or how it behaves. This study will investigate the structure of supply networks and the principles involved in the operation of supply networks. Since it entails doing research in an emerging field, a case study approach has been adopted. Three case studies of supply networks are offered here. They focus on the center console assembly for the Honda Accord, Acura CL/TL, and DaimlerChrysler (DCX) Grand Cherokee.

The study maps the complete supply networks of the three cases. We will first introduce a literature review of organizational structure and show how it applies to our study of supply-network structure. We will then discuss how we collected the case data, made our analysis, and ultimately extracted key propositions from

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the data. The analysis will entail two steps—we will first conduct a within-case analysis and capture the essence of each network case, and then we will undertake a cross-case analysis comparing and contrasting the essence of supply-network structures captured in each case to compile overarching behavioral patterns. We will conclude with a discussion and implications for future research.

2. Literature review

As a first step toward characterizing the structure of supply networks, we turn to the literature of organization design. Many authors in this area (Daft, 1989; Gerwin, 1984; Gibson et al., 1997; Price and Mueller, 1986; Walsh and Dewar, 1987) have pointed out that organization or system structure can be captured in three dimensions—formalization, centralization, and complexity. Since a supply network is essentially an organizational form in larger context or a system of firms, we extend this literature to examine the qualitative traits of supply networks in these three dimensions.

To start, we espouse the view that a structure emerges. Over a period of time, the structure of a supply network emerges (Choi et al., 2001) with no one firm deliberately orchestrating the exact shaping, just as the structure of an organization ultimately emerges regardless of the intended design (Mintzberg, 1979). Since structure of an organization is viewed as “the pattern of relationships among people” (Gerwin, 1984, p. 9), structure of a supply network can be viewed as the pattern of relationships among firms engaged in creating a sellable product. Further, regardless of the structure that will eventually emerge over time, the underlying purpose of structure is to “control” activities (Gibson et al., 1997; Miles, 1980), whether the controlling occurs globally throughout the system or locally within a system.

2.1. Formalization

Formalization is closely associated with standardization (Mintzberg, 1979; Pugh et al., 1968; Walsh and Dewar, 1987) through rules and procedures as well as norms and values (Beyer, 1984). Organizations formalize activities to ensure consistency of output over

time, and such an effort may take place either in written form or unwritten form (Price and Mueller, 1986).

A key variable that has proven to show positive correlation with formalization in empirical studies over the years is explicitness (Gerwin, 1984). Therefore, whether in written (documents) or unwritten form (work norms), formalization requires rules and other behavioral guidelines to be explicit. Eventually, by keeping the rules and norms explicit and open, formalization will bring about precision and fairness. However, too much formalization may also lead to inflexibility and rigidity (Mintzberg, 1979).

Therefore, formalization in the supply network context refers to the degree to which the supply network is controlled by explicit rules, procedures, and norms that prescribe the rights and obligations of the individual companies that populate it. However, it is important to recognize that in supply networks these rules, procedures, and norms exist at the *firm-to-firm* (*dyadic*) level and not at the systems level. It would not be possible for any one firm to impose formalization simultaneously onto the whole of a supply network.

The next level up from a simple dyadic relationship is a set of multiple dyadic relationships revolving around one firm. In particular, when this one firm is the buying firm, the entire set of supplier firms that it forms multiple dyadic relationships with is commonly referred to as the *supply base*. Much as a large organization would tend to be more formalized (Gibson et al., 1997), a large supply base (high number of suppliers) per given product might also be more formalized than a smaller supply base. Larger bases would rely on rules, procedures, and norms to achieve standardization and control their suppliers.

2.2. Centralization

Centralization addresses the degree to which authority or power of decision making is concentrated or dispersed across the organization (Price and Mueller, 1986). If the decision-making authority in an organization rests on a single individual, the structure is said to be centralized. Conversely, if the decision-making authority is distributed among many individuals, then the structure is regarded as decentralized (Mintzberg, 1979).

The key advantages of centralization are orderliness and economies of scale, whereas the key advantages

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