Integrating supply chain and network analyses: The study of netchains

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Abstract

This paper introduces the concept of netchain analysis. A netchain is a set of networks comprised of horizontal ties between firms within a particular industry or group, which are sequentially arranged based on vertical ties between firms in different layers. Netchain analysis interprets supply chain and network perspectives on inter-organisational collaboration with particular emphasis on the value creating and coordination mechanism sources. We posit that sources of value and coordination mechanisms correspond to particular and distinct types of interdependencies: pooled, sequential, and reciprocal. It is further argued that the recognition and accounting of these simultaneous interdependencies is crucial for a more advanced understanding of complex inter-organisational relations. The paper concludes with an analysis of a set of netchain configuration examples, including buyer-supplier relationships, information technology induced inter-organization collaborations, and the introduction of the "macrohierarchy" organization structure.

Key words: network, supply chain, value chain, interdependence, cooperative strategy

1. Introduction

Supply chain and network analyses have been treated as two distinct strands in the literature on inter-organisational collaboration. Supply chains are defined as a set of sequential, vertically organized transactions representing successive stages of value creation. The literature on supply chain analysis (SCA) suggests vertical interdependencies require a systemic understanding of resource allocation and information flow between firms engaged in sequential stages of production (Christopher, 1998; Simchi-Levi *et al.*, 2000). Value chain analysis (Porter, 1985), an approach describing a set of sequential activities creating value within firms, has been more recently extended to activities between firms (Barney, 1997).

Network analysis (NA), in turn, provides numerous tools to map the structure of inter-organisational relationships or "ties" based on the recognition that network structure constrains and at the same time is shaped by firms' actions (Granovetter, 1973; Burt, 1992; Nohria, 1992; Wasserman and Faust, 1994). Unlike SCA, NA is not particularly concerned with vertically organized ties, but rather with horizontal relationships between firms belonging to a particular industry or group (Powell, 1990).

Even though both SCA and NA stress the importance of interdependencies between multiple firms and how inter-organisational relationships can be a source of competitive advantage (Dyer and Singh, 1998), the integration of their core concepts and analytical tools is still to be done[2]. Yet, it has been recognized that NA could benefit from a careful assessment of distinct types of ties (Nohria, 1992), whereas SCA could benefit from a network-based perspective of interfirm relations (Aitken, 1998; Stuart *et al.*, 1998).

This paper attempts to fill this void in the literature by introducing the concept of *netchain* - a set of networks comprised of horizontal ties between firms within a particular industry or group, such that these networks (or *layers*) are sequentially arranged based on the vertical ties between firms in different layers (Figure 1). Netchain analysis explicitly differentiates between horizontal (transactions in the same layer) and vertical ties (transactions between layers), mapping how agents in each layer are related to each other and to agents in other layers.

For example, it is becoming increasingly important to evaluate not only how suppliers transact with a given buyer, but also how they interact between themselves to promote knowledge exchange (Stuart *et al.*, 1998; Dyer and Nobeoka, 2000). SCA is not well equipped to discuss relations among

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[2] Some authors apply NA in contexts involving supply chains (Uzzi, 1997; Burt, 1992; Dyer and Nobeoka, 2000; Swaminathan et al., 2000), but the comparative and simultaneous assessment of vertical and horizontal relationships is not their main goal.