

# Chapter 19

## Structuring and Managing Supply Network: A Review of Current Literature and Conceptual Framework

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### ABSTRACT

*The concept of supply network has extended supply chain across national borders towards globalization. The aim of this chapter is to provide researchers, business practitioners and university students a picture of the architecture of supply networks. By analyzing two main trends of studies in the field of supply network management, components of supply network are classified into structural and infrastructural factors. Also a comparison is made to identify the difference between supply network and traditionally factory-based manufacturing system. Based on the literature review, a conceptual framework is further proposed which describes the supply network from four essential perspectives: Role/function, Relationship/alliance, Configuration/reconfiguration, and Risk and crisis management. After presenting detailed models and decision making areas of each perspective, suggestions are given on some emerging topics.*

### INTRODUCTION

Supply Chain Management (SCM) has boosted the development for both industrial management and academic research. The concept of supply network (SN) extended the concept of supply chain (SC) across national borders towards globalization. Current studies have provided frameworks (Soni & Kodali, 2011) on specific areas of supply chain such as purchasing, control, risk and performance; however, a more systematic review on the components and architecture can help to better understand the increasingly more complexity and dynamics of SN. The review should combine influential classical theories and recent novel research findings with a highlight on the most critical decision making areas and elements.

In early studies, Harland et al. (1996) divided the SN into two dimensions – structural and infrastructural factors, while Christopher (2005) suggested that a mature SN should achieve the 4R prin-

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ciples – ‘responsiveness, relationships, reliability, and resilience’. Govil and Proth (2002) proposed a process-oriented SN structure, containing ‘make, buy, move, store, and sell’. From then on, increasingly more research was conducted on a specific area of SN such as process, logistics and relationship. This chapter aims to generate a picture of SN architecture and identify the most important decision making areas, based on reviews of influential SN theories. It presented current research in terms of structural and infrastructural factors with different theories and practical perspectives. A conceptual framework is proposed with role/function, relationship/alliance, configuration/reconfiguration, and risk/crisis, along with recommendations for the future work.

## **LITERATURE REVIEW**

SN is defined as ‘a network of connected and interdependent organisations mutually and co-operatively working together to control, manage, and improve the flow of materials and information from suppliers to end users’ (Christopher, 2005). There are two trends of analysis methods of how to describe the architecture of SN. The first trend is to identify the structural and infrastructural components of SN, whereas the second is a dynamic approach to map the growth path of manufacturing system from the factory level to the network level.

### **The First Trend: Structure and Infrastructure**

SN architecture can be defined in two dimensions: structural and infrastructural. Structural elements refer to the static levers controlling the architectural configurations of SN (Shi and Gregory, 1998). Infrastructural elements, on the other hand, mean dynamic levers controlling the operational mechanism of SN (Shi & Gregory, 1998; Harland et al., 1999).

#### **Structural**

The concept of structural factors refers to the physical activities of SN. Hayes and Wheelwrights (1984) defined that structural elements have a long-term impact, difficult to be reversed or undone in place, and require a substantial capital investment to be altered or extended. In 1994, Saunders (1994) described SN structure as the aspects of make, transform, move, and store. Govil and Proth (2002) added two other important aspects “buy and sell” into Saunders’ (1994) model, and summarized the structure of SN as ‘buy, make, move, store, sell’. In addition, Govil and Proth (2002) highlighted two types of sharing process and a high-level decision making system, which are linked with the above five aspects by financial flows and strategic information flows.

To expand previous research framework, Harland et al. (1999) defined ‘capacity, SN actors’ configuration, SN facilities configuration and do-or-buy’ as SN structural elements. In this new model, the concept of facilities configuration includes fleet, buildings and materials handling systems, which combined the meaning of ‘move’ and ‘store’. As for the capacity, besides the elements of size, volume, and timing (Harland et al., 1999), Lawrence et al. (2000) highlighted the short-term and long-term capability of SN and suggested that the system capacity is determined by the bottleneck.

Most recently, Christopher (2005) emphasized the five factors to enhance the risk of SN: a focus on efficiency rather than effectiveness, the globalisation of supply chains, focused factories and centralised

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