

Chapter 6

Multi-Objective Decision Analysis in Strategic Supply Chain Design

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ABSTRACT

This chapter introduces the impact of competitive strategy on strategic supply chain network design decisions. The aim of increasing competitive advantage forces firms to deal with multiple conflicting objectives. Since supply chains are affiliate networks including multiple parties, accomplishing a solitary objective corresponds to an inadequate effort to maintain the sustainability of supply chain. The overall integrity and sustainability of the supply chain can be provided by satisfying the expectations of each parties. The loyalty in the supply chain is achieved by offering distinguished service among suppliers and customers rather than delivering almost same services. This can only be achieved through network design models by taking into account multiple conflicting objectives. The firm's competitive strategy defines a particular set of objectives to achieve specific goals on these performance attributes. This chapter examines the main problem domains in SC design, strategic performance measures, and recent literature on single/multiple objective models.

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1. INTRODUCTION

The essence of formulating competitive strategy is to define the position in the industry to preserve market share and challenge the other competitors in the market to increase firm's favor. The competitive strategy determines the building blocks of the supply chain network design. A successful supply chain design can only be provided by the resolution of infrastructure through well-defined competitive strategy. It requires strategic decision making that outlines the main characteristics and the main capabilities of the supply chain. Supply chain design consists of decisions that influence the investment patterns made by the firm across its various supply chains (Melachrinoudis & Min, 2000).

Managing supply chains (SCs) effectively is a complex and challenging task due to current business trends of expanding product variety, short product life cycle, increased outsourcing, globalization of businesses, and continuous advances in information technology (Lee, 2002). Currently, the traditional performance indicators are lack of creating distinguished competitive advantage among many suppliers since they create approximately equivalent services in terms of conventional criteria (ie. cost). Therefore, a tailored approach should be taken up seriously while defining the competitive strategy rather than generic definition.

The main goal of a SC is to maximize the value created by fulfilling stakeholders' prospects. Stakeholders are generally classified into two groups: internal and external. Internal stakeholders are the staff and shareholders that aim to make higher revenue. Simply, they create value for use of customers through the operations, as such designing, producing, packaging and shipping the products. External stakeholders are generally customers, suppliers, communities, contractors and government. Suppliers are critical stakeholders owing to their role in the supply chain. The positive and innovative contribution of supplier to the supply chain yields superior results in terms of increasing customer satisfaction and delivered quality. Additionally, efficient collaboration with suppliers in terms of shared strategy and goals builds inter-business loyalty and conclusively contributes increasing the loyalty of customers. Since the ultimate goal of supply chain is to meet customers' expectations, they are said to be the most critical stakeholder.

Supply chains aim to maximize the delivered value among stakeholders by managing upstream and downstream flow of information, service and products. Considering the comprehensive scale of supply chain, formulation of a unique model, including every supply chain processes and real-world aspects, is almost impossible. The levels in supply chain, interrelationships, uncertainty on problem parameters and variety of objectives makes the problem more challenging. Supply chain modelling problem focuses on multiple conflicting objectives, since the ultimate goal is to find a compromise solution to satisfy the requests of various stakeholders.

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