Chapter IV

Life Cycle Considerations for Supply Chain Strategy

Toru Higuchi, Sakushin Gakuin University, Japan

Marvin D. Troutt, Kent State University, USA

Brian A. Polin, Jerusalem College of Technology, Israel

Abstract

The goal of this chapter is to propose a framework for the dynamics of supply chains from a life cycles point of view. It is inevitable for supply chains to be affected by the life cycles of the product. There are three important interrelated life cycles that have effects on the dynamics of supply chains and are associated with the product. These are: (i) the innovation (Abernathy & Clark, 1983), (ii) the market (Kotler, 1999), and (iii) the location (Vernon, 1966). The first life cycle related to the innovation illustrates how the product and production process progress. It gives us a hint to consider the feasibility of the location dependent on the degree of innovativeness of the product. The second one related to the market clarifies the marketing objectives in each stage. It suggests the reasonable location strategy. The last one related to the location proposes...
the relation between the product and the reasonable location of the manufacturing facilities. It is operational because it considers the timing and the reason to shift the manufacturing facilities. In this chapter, we discuss the mission and structure of the supply chain in the different stages of these life cycles. We illustrate the proposed framework using the case of the VCR.

Innovation and Productivity Dilemma

From the viewpoint of innovation, Abernathy (1978) and Abernathy et al. (1983) introduced the concepts of maturity and de-maturity. They explained the development of a product in terms of radical and incremental innovations. A new category of products usually begins with a radical innovation. At the beginning, companies compete with each other based on their own unique approaches and take the very substantial risk that their technology and design might be out of use in the event that another company succeeds in establishing the dominant design, which then becomes the de facto standard. The dominant design sets the specifications for the product and causes competition to cool down. Once the dominant design has been established, the focus of innovation shifts from product category to the product itself. The manufacturers start automating factories to make products efficiently. At the same time, the opportunities for improvements and innovations of the product diminish gradually. Abernathy called this phenomenon the productivity dilemma. To be successful in this situation, the companies need a brand-new technology, usage, material, or design. After that, the status of competition becomes fluid again. This is called the de-maturity stage or phase. Once de-maturity starts, existing technologies and products rapidly become obsolete, and competition broadens to include alternate designs competing for dominance in an entire product category. Hence, de-maturity is destructive.

In Figure 1, the vertical axis requires additional explanation. Abernathy (1978) used the terms, Innovation and Stage of Development (Rate of Major Innovations). He counted technical changes related to the product and classified them as major (radical) or minor (incremental) changes. However, unambiguous criteria for deciding these classifications were not advanced. To reflect this caution, we have labeled the vertical axis as “Total Impact of the Innovation.” Innovations are divided into product innovations and process innovations.
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