This chapter explains the advancement and the price decline of products based on the VCR case. After the dominant design emerges, the product advances incrementally or cumulatively because the dominant design sets a standard design of the product and a framework for the competition. Many new generation products appeared in the market with innovative functions to spur sales. Some of them became popular and others did not. In the VCR case, most consumers bought a monaural VHS machine and, then later, a HiFi VHS machine. On the other hand, most consumers did not purchase S-VHS, D-VHS, and other advanced machines because those were too expensive in comparison with their performance. As a result, the alternation of generations of the VCR occurred only once, from the monaural to the HiFi machine.
Innovations and Productivity Dilemma

The industry-wide product development process can be explained from the viewpoint of innovation (Abernathy, 1978; Abernathy, Clark, & Kantrow, 1983). Innovations are mainly classified into two types, based on their characteristics, that is, product and process innovations. Usually, product innovations take place frequently in the early stages of the life cycle after the dominant design has emerged. They contribute to considerable enhancement of performance of a product. They are sometimes also destructive because they make obsolete old technologies and existing products by changing the basic design, components, production process, and usage of a product, such as cellular phones and portable games. In the middle stage, while product innovations gradually abate, process innovations frequently occur. Process innovations make the production system more efficient by sophisticating the product designs, components, and production processes. In the later half of the life cycle, a product innovation sometimes creates a brand-new category of products that makes an existing category of products obsolete. This phenomenon is called de-maturity.

Figure 1 shows the declining prices of three Product Series (PSs), 1 to 3. PS1 is the first series of the product which includes the dominant design. The dominant design is the first product to be widely adopted to satisfy latent customer needs. The Model T (developed in 1908) in the auto industry and the HR3300 (VHS format: developed in 1976) in the VCR industry, are good examples of a dominant design. The PS2 and PS3 series, which appear later, are more advanced versions of PS1. In time, the prices of the PS1 decline because of process innovations, the experience curve, and competition. At some point in time, a subsequent series is more expensive to produce than a previous one. However, the variation in price of subsequent series is less than that of preceding series. The impact of product innovations continues to further decrease; specifically, the process innovations, standardization, and modularization advance so much that it becomes possible to localize the impact of the change in the product design.

Figure 2 shows the progress of the product development. The vertical axis is an index, performance/cost ratio. At the beginning of each series, the cost (price) is very high. However, as the new functions are gradually incorporated, the production system becomes more efficient. As a result, performance/cost is enhanced as time elapses. However, after a certain point in time, the enhancement becomes regressive. Abernathy (1978) called the situation the
Green School Frameworks
Anisa Baldwin Metzger (2017). Agri-Food Supply Chain Management: Breakthroughs in Research and Practice (pp. 32-46).
www.igi-global.com/chapter/green-school-frameworks/167401?camid=4v1a