Chapter 22

Modeling Adoption of a Successive Generational Product in Multiple Markets

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ABSTRACT

Companies that have been following the innovation mantra have also understood the importance of coming up with successive generations for their offerings. Continuous enhancement of existing technologies or emergence of new technologies has made this improvement possible. In today’s neck to neck competitive environment firms introduce their products in more than one market so as to widen their spectrum of visibility and availability. This has allowed customers to avail the facility from more than one place (segment) simultaneously. In the present proposal, we have come up with a mathematical framework to capture the impact of multi-generations on multiple markets and vice-versa. Further, consideration of cross-generation shifting makes our analysis more comprehensive.

INTRODUCTION

In order to sustain in today’s cutting edge competitive environment, companies always enhance their products with new and additional features to make customers attracted towards their offering. This new and updated version of existing product is called new or successive “generation” of the product. Moreover, it is very well accepted fact that newer generations give clients a better product that they value more (Jiang & Jain (2012), Anand et al. (2014), Aggarwal et al. (2014), Aggarwal et al. (2015)). When these new technologies or latest offerings become available, they provide an opportunity for potential adopters of
earlier technologies to substitute the more recent technologies for earlier ones. Examples from various fields can be quoted to supplement this substitution. Be it software, be it a durable product, or be it a non-durable product, this phenomenon has proven itself everywhere. The Microsoft Windows and Office lines of products are two well known examples, with new versions typically introduced every few years (Jiang & Jain (2012)). The replacement of black & white TV with those of color TV and then in today’s time the coming of high definition (HD) TV have further transformed the meaning of technological advancements. In another case, a recent survey by Aseem Gaurav (2014) showed how the newer version of Hyundai’s i10 car i.e. the all new Hyundai Grand i10 is a much more attractive version of the car. It has been seen since the launch of this newer version of i10; the sales have been continually growing.

The bulk of the literature on new product sales model is based on innovation-diffusion theory (Kapur et al (2012), Singh et al (2012), Aggrawal et. al, (2014), Anand et al. (2016), Bansal et. al (2016)). Diffusion is the process by which a new idea or new product is accepted by the market. The difference among individuals in their response to new ideas is called their innovativeness; it represents the degree to which an individual is relatively early or late in adopting a new product or services. Hence the diffusion process is the aggregate of all individual adoptions over time. Tarde (1903) first claimed that sociology was based on small psychological interactions among individuals, especially imitation and innovation. Rogers’ (1962) in his classic book “The diffusion of Innovation” has studied the diffusion process extensively from a variety of view points and concludes that consumers go through number of stages before accepting and adopting a new product. The diffusion process has been studied by many researchers in the literature. The pioneering work in this context has been provided by Bass (1969). The beauty of this mixed influence model has been that though it is confined to single generation modeling only, this methodical approach has been widely used by researchers to give their propositions. One of the ground-breaking works in the field of marketing literature was given by Norton – Bass (1987). Their model was also inspired by the seminal Bass model and they have been credited as pioneers in the field of multi-generational modeling of diffusion process. The diffusion curves of two successive generations when they are present in the market simultaneously and the effect of their cannibalization can be pictorially shown in Figure 1.

Following Norton and Bass, other researchers developed extensions and variations to the Norton and Bass model. Empirical verifications in these studies show that multi-generation diffusion models are applicable not only to technological products such as IBM mainframe computers and mobile phones, but also to non-technological products such as milk containers (Speece and MacLachlan 1995). Mahajan and Muller (1996) extended the Norton–Bass model to allow adopters of early generations to skip generations, for example, an adopter of the first generation could replace it with third generation technology and second by fourth, etc. They validated their model using dataset belonging to adoption of

Figure 1. Diffusion curves for two successive generations
Source: Jiang and Jain (2012); Aggarwal et al. (2015).