

## Chapter 13

# THE IMPACT OF DYNAMIC DEMAND AND DYNAMIC NET REVENUES ON FIRM CLOCKSPEED

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**Abstract** A firm's new product development clockspeed is determined by the frequency of new product introductions to the marketplace. Using a simple analytic model, we derive an optimal firm NPD clockspeed that is driven by several external market and internal organizational related factors. Specifically, we analyze the impact of dynamic sales/demand curves and dynamic net revenues on the optimal pace of new product introductions.

### 1. Introduction

Recent empirical literature defines an industry's clockspeed as a measure of the evolutionary life cycle capturing the dynamic nature of the industry. Among other factors, the rate of new product development is one of the primary drivers of clockspeed. For example, Fine (1998) suggests that one metric which can be used to measure an industry clockspeed is the rate of new product introduction or intervals between new product generations. In their study of the electronics industry, Mendelson and Pillai (1999) also show that higher industry clockspeed is associated with faster execution in product development activities. Furthermore, these authors find that firms operating in faster-moving business environments tend to accelerate their own internal operations such that their own individual clockspeed is synchronized with the corresponding industry clockspeed.

A variety of other mechanisms driving the speed of new product development for individual firms are also discussed in the literature. Eisen-

hardt and Brown (1998) recommend that in rapidly shifting industries, “time pacing” new product development efforts relative to the calendar can help managers to better manage transitions between new product development projects, and to build organizational momentum towards achieving ambitious new product development goals. Moreover, these authors advocate that firms should synchronize the pace of change with their own marketplace and internal capabilities. In contrast, they posit that “event pacing”, (i.e. timing your internal new product development efforts relative to competitors, shifts in technology, etc.) may be an erratic and ineffective strategy in fast paced industries. For example, Bayus (1998) also names key factors that are expected to significantly influence a firm’s decision regarding new product introductions, including competitive pressure, market opportunity, and internal pressure such as market share and time since last product introduction.

An issue related to new product introduction is the importance of “product rollovers,” or the simultaneous management of new product introduction and displacement of old products. Billington, Lee and Tang (1998) discuss problems associated with product rollovers. In particular, they analyze two primary strategies: the solo product roll (where one product completely replaces the previous generation) and the dual product roll (where both products remain in the market). These authors find that a firm’s choice of an appropriate rollover strategy depends on factors such as the inventory related rollover costs, customer service, and the firm’s market position.

We introduce a simple analytic model which identifies an optimal firm level clockspeed. First, we determine the optimal number of generations of new products that should be introduced for a given planning horizon. The optimal firm clockspeed is driven by the following forces: (i) average demand forecasts, (ii) dynamic profits earned over time, (iii) cannibalization of older products, and (iv) organizational constraints limiting the pace of new product development. Thus, this model offers managerial insights concerning the dynamics of new product development activities on the firm level.

A key factor influencing firm clockspeed is the anticipated shape of the demand/sales curve for each generation of a new product. For example, the product life cycle curve is often associated with the introduction, growth and decline of a product in the marketplace via some kind of diffusion process. Conversely, a common assumption in the literature addressing the optimal time-to-market for new product introductions is that sales are constant for both old and new generations of products. Finally, certain types of products experience the highest levels of sales