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Strategic Pacing and the Progress Trap of Innovation

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Abstract

To what extent can the Strategic Pacing of Innovations (SPI) mitigate the Progress Trap of Innovations (PTI) that leads to diminishing returns to scope from timing innovation releases too fast or too slow? This research-in-progress paper incorporates economic and strategy concepts to conceptually surface (i) the need to balance existing product-line servicing with innovative new-releases, (ii) the strategic choice of timing a new release to maintain returns to scope, (iii) costs of overshooting or undershooting from SPI and its relationship to PTI, and (iv) internal and external contingencies that influence the impact of SPI on PTI. To the best of our knowledge, a similar framework has been hitherto missing in the literature on innovation.

Keywords: Strategic Pacing, Innovation Timing, Progress Trap of Innovations, Strategic Innovation.

Introduction

Why is it that, although Microsoft releases its OS innovations (Windows OS) once every seven months and Apple releases its OS innovations (Mac OS) once every fifteen months, Apple's Mac OS steadily attracts a larger market share (NetMarketShare.com, 2012)? Similarly, why is it that, RIM Blackberry, once a corporate mainstay mobile device, has steadily lost market share to Apple iPhone and Google Android devices? While it is commonplace for businesses in a competitive environment to overemphasize innovation releases or overemphasize servicing existing products, either strategy can leave companies overwhelmed. This article talks about how companies need to strategically release their innovations to the market, maintaining a delicate balance between offering services for their existing products and driving innovations to constantly whet the market's appetite for novelty.

The central theme of this research-in-progress is dispelling the myth that innovation releases at breakneck speed or maintaining a *status quo* with a profitable innovation always offers increasing returns to scope[1]. Instead, we combine economics and strategy to contend that companies who fail to strategically pace their innovation releases fall prey to a "*progress trap of innovation*" (PTI). We define PTI as a phenomenon where a marginal innovation within a product line offers diminishing returns to scope.

PTI, as a phenomenon, requires particular scrutiny in a competitive environment. Innovations establish benchmark standards for companies, competitors and consumers. A perceived gap between expectations and innovation offerings can erode a company's market advantage. For example, Apple's release of its iOS 6 as a marginal innovation to its iOS product line was negatively perceived by the market. The market expected greater iPhone hardware changes and fewer changes to the iOS (including replacing Google Maps with Apple Maps). Given that Apple's iOS releases had become a benchmark for its consumer's product/service line expectations, this negative perception precipitated into diminishing returns to scope.

It is well established in literature that too many innovations, too fast, can results in being "too much of good thing" (Barnett and Freeman 2001). Tony Scott, the CIO of Disney remarked that there are limits to how much innovations a customer can absorb over time. Much like adding the 37th button on a remote (Anthony 2008), companies that release innovations too fast without allowing for market maturity for existing releases can overshoot consumer and market expectations by overwhelming the market with frequency of releases. Similarly, an inability to innovate on time can erode a company's competitiveness. Therefore, in order to mitigate PTI, companies need to practice *strategic pacing of innovations* (SPI).

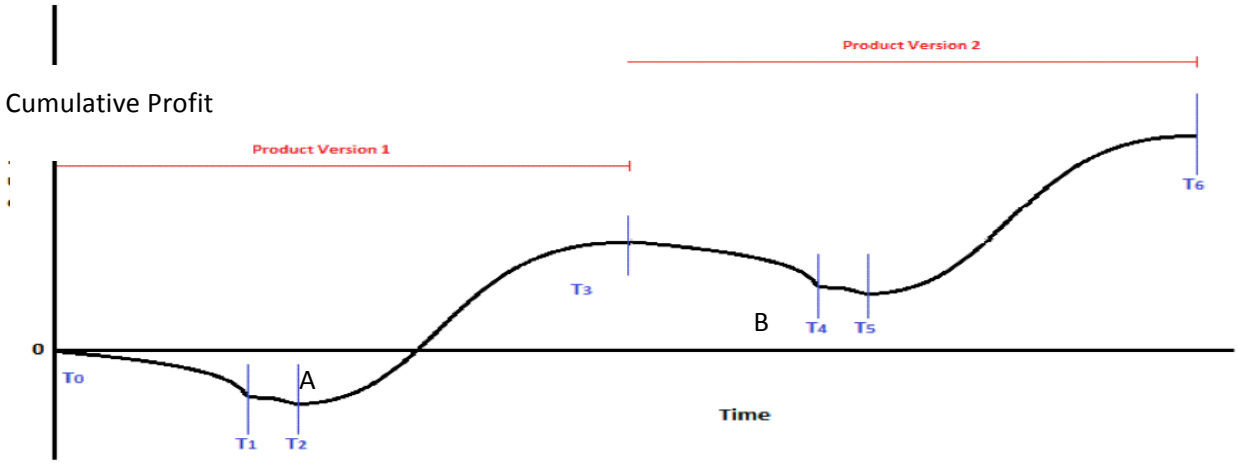
[1] While returns to scale focus on cost efficiencies from producing more of the same product/service (by distributing fixed costs over more units), innovations within a product line rely on returns to scope that focuses on cost efficiencies from reusing the same base of knowledge to offer innovative new-releases within the same product/service line.

We define SPI as a mechanism by which companies formally plan their innovation releases to the market with considerations of internalities and externalities. Internalities require balancing innovative R&D with service standards for existing product portfolios. Externalities require balancing competitive pressures with market expectations. Thus, strategic pacing is not a call for not innovating; rather, it highlights the need for strategically timing innovation releases for an existing product/service line.

This research-in-progress offers a conceptual framework for understanding relationship between SPI and PTI and the contingencies therein. In scoping our discussion to the strategic pacing of technological innovations, the framework surfaces the darker side of breakneck innovation, a phenomena of significance to industry and practice, but one that has escaped scrutiny.

Underpinnings and Framework Development

Innovations are significant investments for a firm, even when allowing for economics of scope to defray some costs of another innovation iteration on the same product line. The cumulative profit for an entire product line rises and falls over time as new innovations are developed and as revenues from sales of existing product lines slow down. When revenues are considered in conjunction with initial R&D costs as well as initial service stand up and ongoing service related costs we depict the cumulative curve over multiple product iterations in figure 1. The critical consideration for SPI thus becomes the appropriate timing for T_2, T_5… so as to maximize profitability from SPI calculated as areas under the curves B-A by trying to reduce the profitability drops in points such as T_4 and T_5.



T0 - Start of R&D for Product Version 1
T1 - End of R&D, Start of Service Stand Up for Product Version 1
T2 - Release to Public for Product Version 1
T3 - Start of R&D for Product Version 2
T4 - End of R&D, Start of Service Stand Up for Product Version 2
T5 - Release to Public for Product Version 2
T6 - Start of R&D for Product Version 3

Figure 1: Cumulative Profitability of Innovation new release iterations

Strategic Pacing of Innovations (SPI)

The proposed framework in this paper is underpinned by the macroeconomic concept of Production Possibility Frontier (PPF). PPF is a well-established economic model that shows the tradeoff between two competing resources, thus allowing for efficient resource allocation under conditions of opportunity costs and capital constraints. Given resource constraints, a company has to forego resource allocations in one area for another. This theory is particularly relevant to our research because of the following reasons. First, given an existing product line, investments in one more new technology innovation to an existing product line has an opportunity cost. This opportunity cost arises from foregoing investments from promoting and servicing the existing portfolio. Second, the PPF is central to our understanding of how sub-optimal allocation of resources (including investments) can degrade the value of a product line portfolio, leading to

diminishing returns to scope. For example, before Microsoft Windows XP had reached maturity in adoption, the release of Windows Vista required Microsoft to divest resources from better promoting and servicing existing Windows XP customers to promoting and servicing Windows Vista as a new release. This sub-optimal allocation degraded the Windows product line portfolio with customers perceiving Windows Vista as a hasty release in a market where Windows XP had yet to reach maturity.

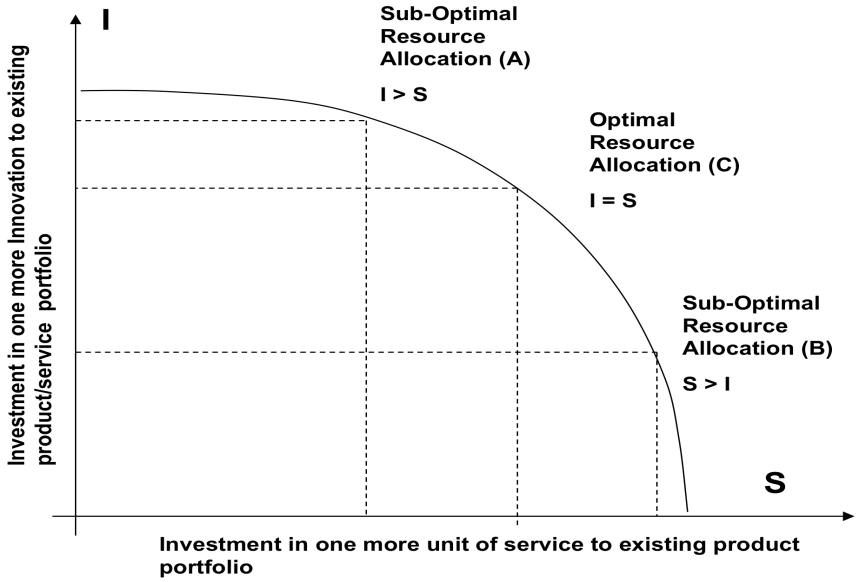


Figure 2: Innovation Adoption Possibility Frontier

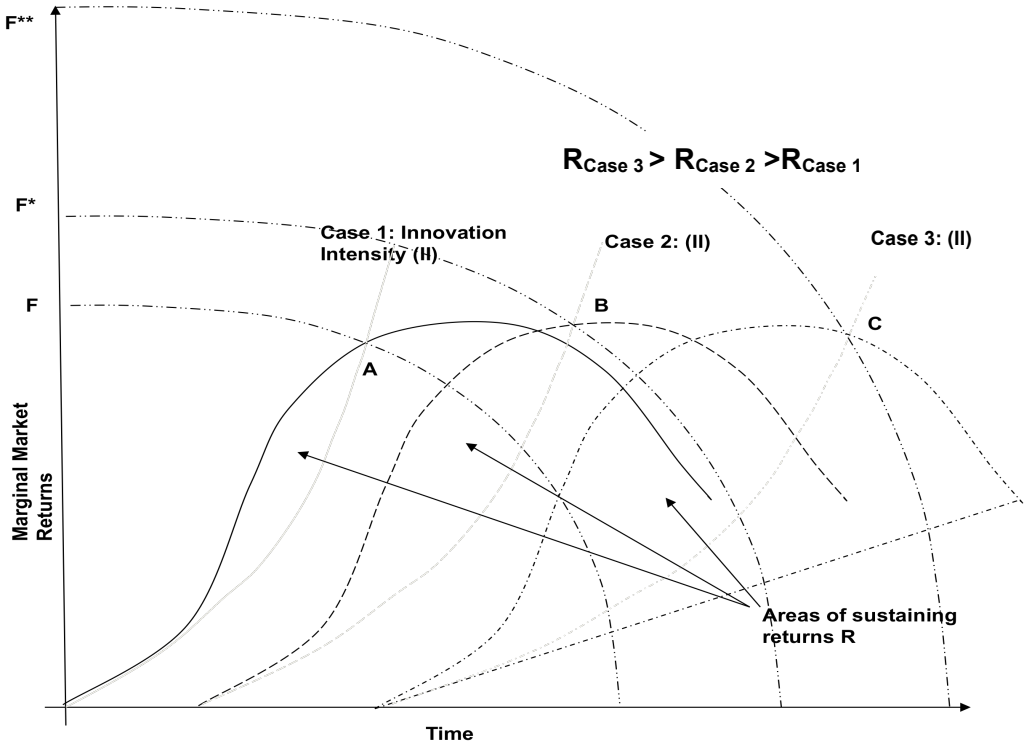


Figure 3: PPF & Returns (R) from SPI Scenarios

As noted earlier, SPI requires a deliberate yet delicate balancing of innovation-centric R&D (I) and servicing the existing product line (S). Contemporary research has often accustomed itself to an exclusionary conflict from considering scale economics (less new releases and more efficient servicing; S>I) or scope economics (diverse new releases where innovation I>S) (figure 2). In a study regarding proper product line diversity a business should

follow, Bergh (2008) notes that the apparent exclusionary conflict between scale (efficiency) and scope (diversity) economics is incomplete and is best understood when considered together. Thus, adapting the PPF for this discussion, the Innovation Adoption Possibility Frontier (Figure 2) shows that the optimal resource combination is when I=S. For I>S, returns will be sub-optimal because resource investments and allocations for a new innovation release will result in foregoing investments and allocations for service obligations for existing products/services. For S>I, returns are also sub-optimal from the opportunity costs of foregoing innovations to competitors.

Proposition 1: For a company with an existing product/service line, optimal investments in resource allocation is achieved when I=S and is sub-optimal when I>S or S>I.

Figure 3 shows Returns (R) from various Innovation Release timings. The S-shaped curve for each case denotes the marginal market returns from an existing innovation over time- from increasing marginal returns after inception to decreasing marginal returns after maturity. $R_{case\ 1}$ shows the area under the curve as returns from releasing the next innovation in the product line. In Case 1, releasing an innovation before the adoption matures reduces R. In Case 3, a late innovation release increases R but makes the product line vulnerable to competitive erosion. Case 2 shows an approximately appropriate timing for a new innovation release at the point of market adoption maturity and the beginning of diminishing marginal returns.

Proposition 2: For a company with an existing product/service line, optimal returns from SPI can be achieved when a new innovation is released at the point of market maturity. An early or late release will reduce R such that an early release will forego increasing marginal returns to scope and a late release will forego marginal returns from competitive erosion.

Combining the Innovation Adoption Possibility Frontier investments (F, F*, F**) in resource allocation to SPI scenarios in Figure 2, point B shows the closest allocation of I=S while I>S for point A and S>I for point C. Therefore, we argue:

Proposition 3: Optimal returns to scope can be achieved at point B when the Adoption Possibility Frontier (F) balances resource investments and when SPI is at the point of maturity.*

Impact of Strategic Pacing of Innovations (SPI) on the Progress Trap of Innovations (PTI)

Perceived value of an innovation release is central to customer adoption and plays a major role in avoiding PTI costs. In practicing SPI, companies must fully understand the pace of customer adoption and market diffusion. It is important for the firm to allow adequate time between releases to allow the market to fully accept the previous product. While too long a window will erode competitiveness, a small window of time between innovations may lead to a customer's reluctance to purchase the new innovation. Moreover, too frequent innovation releases create a deflationary pressure. If customers believe that another innovation release is expected too soon, it may defray adoption of lessen the value of the existing innovation yet to mature. Even more so, it can lead to cannibalization with the new product line innovation stealing sales revenues from a previous innovation that is yet to mature.

Research shows that timing of innovations is linked to product success (Kessler and Bierly 2002), without which companies have to incur PTI costs. For example, strategic timing research by Sharma (1999) and Savetpanuvong et. al (2011) link innovation timing to "long-term cost reduction via appropriate use of resources, risk management to ensure immunity against a negative future, and timely entry into different market cycles" (Savetpanuvong et. al., 2011). This research offers a relevant corollary on overshooting and undershooting as central to PTI. In overshooting, too-early or too-short a release cycle can lead to a company driving away their customers who tire of an ever-shortening product upgrade cycle. For example, while IBM was one of the first to enter the PC market during the early 1990's, the innovation was too early and overshot the market adoption and diffusion. IBM was unable to capitalize on its innovative entry

and a multitude of competitors capitalized on strategically pacing their market entry (e.g. Packard Bell, Dell, Gateway) in line with adoption trends. Conversely, in undershooting, releasing innovations to the market too slowly can drive away customers who switch to competitive products which satisfy their adoption demands at a more expected pace. For example, Nintendo's inability to release innovative new releases for its Wii product line for over 7 years led to undershooting and cost Nintendo its competitiveness to gaming consoles such as Sony PS3 and Microsoft Xbox.

Overshooting or undershooting a new innovation release to an existing product line can have detrimental PTI effects. Innovations require diffusion and adoption to be successful and provide returns to scope. Jensen's (1982) "decision-theoretic model of individual firm adoption behavior which can be used to derive an expected diffusion curve…" highlight the need for aligning the trajectories of innovation and adoption. Notwithstanding early or late adopters as tails in a probability distribution, markets and customers have a specific pace of adoption and diffusion. For example, Smartphone adopters may expect specific Smartphone innovations new releases to be strategically paced with their 2-year carrier contracts. Overshooting can happen when too many significant new releases to the product line occur before contract expiry. There is value for a firm that can practice a distinguished waiting period before further releases (Choi et al. 1998). Similarly, undershooting can happen when no significant new releases are introduced after the contract expiry, opening the field for competitors (Figure 4). Therefore we argue:

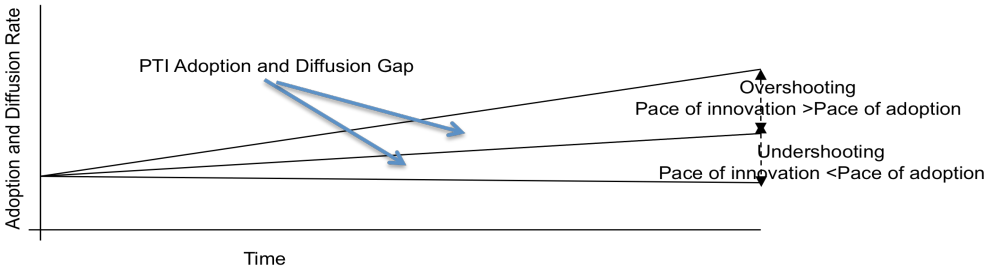


Figure 4: Adoption and Diffusion Gaps

Proposition 4: SPI overshooting or undershooting the pace of consumer adoption and diffusion increases PTI costs.

SPI Contingencies

Internal Contingencies

An empirical study of post-acquisition innovation performance of Google and Yahoo by Datta et al (2013) found that the (i) Type and (ii) Emphasis of an innovation has significant impact on innovation timing. Following Datta et al (2013), we dimension Innovation Type into radical and incremental innovation. Dewar and Dutton (1986) forwarded the notion of "radicalness" as the distribution of fundamentally-different, revolutionary shifts in innovations within the same product/service line. Incremental innovations, on the other hand, are minor improvements and adjustments in innovations within the same product/service line. Using the Apple iPod line as an example, iPod Touch was a radical innovation while iPod Video was an incremental innovation. Companies' product lines that practice incremental innovation can add a few enhanced features to innovative new releases with relatively lower PTI costs owing to a lower probability of overshooting or undershooting the SPI. On the other hand, companies that practice radical innovation can "punctuate" the adoption and diffusion equilibrium and overshoot or undershoot its SPI, leading to higher PTI costs. By releasing radical innovations a company can cause angst within the consumers by increasing learning curve costs. Apple Maps introduced in iOS 6.0 offers ample evidence when a radical new release to the iOS platform on the iPhone 5 undershot the adoption and diffusion pace. The Maps release highlighted PTI costs that eroded Apple's market capitalization even when the iPhone 5 release had an optimal SPI. While Apple Maps provided added features (e.g. Fly-by) and usability, Apple Maps

increased adoption and diffusion costs for a product with minor glitches undershooting its SPI. Thus we, contend:

Proposition 5: The relationship between SPI and PTI is moderated by innovation type such that SPI overshooting or undershooting for radical innovations is more likely to incur higher PTI costs than for incremental innovations

Innovation Emphasis is dimensioned in product or process innovations (Datta et al 2013). Product innovation relates to building artifacts or prototypes, both radical and incremental.

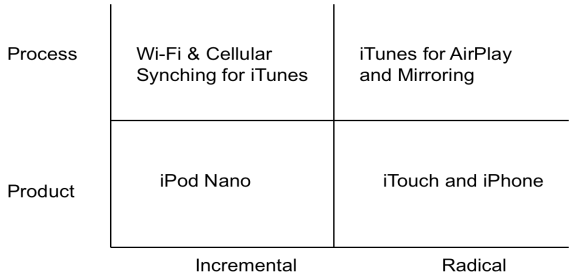


Figure 5: Innovation Type and Scope Matrix

Process innovation knowledge relates to creating novel ways of performing an activity or service (Datta et al 2013). A process innovation, such as a change in Google's search algorithm, whether radical or incremental, remains for the most part, server-side, transparent and behind the scenes with negligible adoption and diffusion costs. The search page looks the same even though the search algorithm may have been changed. In contrast, product innovations require more "buy in" from consumers with marked adoption and diffusion. Therefore, a product/service line that emphasizes more on product innovations is more exposed to SPI overshooting or undershooting, leading to higher PTI costs.

Proposition 6: The relationship between SPI and PTI is moderated by the innovation emphasis such that SPI overshooting or undershooting for product innovations is more likely to incur higher PTI costs than for process innovations

External Contingency

In his famous treatise, Schumpeter (1934) remarked on the role of innovations in technology firms where "waves of creative destruction" can originate from within the firm or from its competitors aiming to capitalize on abnormal rents. In considering technology innovations, lower barriers to entry have led to heightened competitive pressures. Given that every firm enters the market with its innovations at different times, SPI has to consider competitive pressures from substitute product/service innovations from rivals. For example, Apple's iPad mini release was timed to counter market shares from holiday sales of Samsung Galaxy III and Amazon's Kindle Fire HD. Because competitive pressures often force company's to respond faster in a way that can deviate from its original planned innovation release, it increases the likelihood of SPI overshooting or undershooting, thus exposing itself to higher PTI costs. For example, the iPad competitive boom forced companies such as Dell and RIM Blackberry to release their own tablets, Dell Streak and Blackberry Playbook. However, both tablets undershot the SPI and significantly added to their PTI costs. Thus, we contend:

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Proposition 7: The relationship between SPI and PTI is moderated by innovation competitiveness such that SPI overshooting or undershooting for product lines with more competitors will incur higher PTI costs than for product lines with fewer competitors.

Conclusion and Future Research Agenda

This research-in-progress combines economic and strategic considerations in planning and practicing innovation new-releases to an existing product line. The research tries to answer

specific questions that have escaped scrutiny but offers tremendous research and practical relevance. First, is there and what is an optimal innovation new release timing for a specific type of technology portfolio? What is the optimal balance between allocating resources to maintain service quality (servqual) for existing product and practicing innovation new releases? To what extent does overshooting or undershooting vary in assessing PTI costs? And, how can firms strategically plan for internal and external contingencies in choosing resource allocations for its innovation/service portfolio? The research is currently collecting data on tablets (Apple and Amazon) and Smartphone hardware and software (Apple, Samsung (uses Google Android), and Nokia) to (i) mathematically model and analyze optimal SPI based on historical post-release profitability and (ii) a positivist comparative case study to build a grounded theory to surface further insights on the relationship and contingencies between Strategic Pacing and the Progress Trap of Innovations.

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