



2007 DIS Workshop:
A Mini-Conference on Product Strategy

A Co-Production of
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January 26-27, 2007

Mini-Conference on Product Strategy 2007 DIS Workshop Program

Friday, January 26, 2007

Time	Event	Location
7:30am – 8:30am	Breakfast & welcome	UF Hilton
8:30am – 9:15am	Michael Smith (CMU): Piracy or Promotion? The Impact of the Broadband Internet Penetration on DVD Sales	
9:15am – 10am	Ali Kemal Parlakturk (UNC): Product-Line Competition: Customization vs. Proliferation	
10am – 10:30am	Break	
10:30 – 11:15am	Ozalp Ozer (Stanford): Competing on Time: An Optimization Framework for New Product Introduction Decision in the High Technology Industry	
11:15am – 12:00pm	Bing Jing (NYU): Product Line Competition in a Sales Model	
12:00pm – 1:30pm	Lunch	
1:30 – 2:15pm	Steve Shugan (Florida): People-Metrics for Pre-Concept Forecasting	
2:15 – 3pm	Olivia Sheng (Utah): Data Product Strategies – Reexamine Management, Investment and Design Issues of Information Systems	
3 – 3:30	Break	
3:30 – 4:15	Charles Corbett (UCLA): Leadtime – Variety Tradeoff in Product Differentiation	
4:15pm – 5pm	Anindya Ghose (NYU): Geography and Electronic Commerce: Measuring Convenience, Selection, and Price	

Saturday, January 27, 2007

Time	Event	Location
7:30am – 8:30am	Breakfast	UF Hilton
8:30am – 9:15am	Rajiv Dewan (Rochester): Firms as Incubators Of Open Source Software	
9:15am – 10am	Yi Xu (Miami): Economic Models for Open Innovation Systems and Multi-Agent Problem Solving	
10am – 10:30am	Break	
10:30 – 11:15am	Sezer Ulku (Georgetown): Explaining the Lack of Modularly Upgradeable Products	
11:15am – 12:00pm	Ravi Mantena (Rochester): Software Launch through Beta Versions	

Mini-Conference on Product Strategy
2007 DIS Workshop Abstracts
(In the order of talks)

Michael Smith (CMU)

[Piracy or Promotion? The Impact of the Broadband Internet Penetration on DVD Sales](#)

The movie industry represents one area where digital networks have had a particularly strong impact on economic activity. These digital networks provide copyright holders with new sales and promotional channels for their content, while also providing consumers with new opportunities to obtain high quality free copies of this content. Broadband access is a necessary condition for movie piracy and the movie industry has argued that the dominant impact of increased broadband Internet penetration will be increased piracy, and reduced media sales.

We analyze this hypothesis by applying fixed effects and first difference models to a new dataset quantifying changes in broadband Internet penetration and DVD sales at a local level from 2000 to 2003. Contrary to industry concerns, we find that increased broadband Internet penetration leads to a significant *increase* in DVD sales. Our results are robust across a variety of specifications. Using the most conservative results, we find that 9.3% of the \$14.1 billion increase in DVD sales during our study period can be directly attributed to increased broadband Internet penetration. This corresponds to a \$1.3 billion increase in DVD revenue and a \$630 million increase in profits to movie studios.

[Joint work with Rahul Telang]

Ali Kemal Parlakturk (UNC)

[Product-Line Competition: Customization vs. Proliferation](#)

We study a market with customers that have heterogeneous preferences for product attributes. We consider two types of firms that compete on price and product variety: A traditional firm, which chooses a limited set of product configurations, and a customizing firm, which can produce any configuration to order. Unlike the traditional firm, the customizing firm does not carry inventory, but its customers incur waiting costs until they receive their orders. We derive the equilibrium for a duopoly competition between the customizing and traditional firms, study its characteristics, and compare it to a single- and dual-channel monopoly. We identify conditions that favor customization under competition. We find that the customizing firm's profit is not monotone in the market size and its ease of customization. Similarly, the traditional firm's profit need not increase by an improvement in its unit holding cost. We show that the effects of these changes critically depend on the unit cost differential between the firms.

[Joint work with Heim Mendelson]

Ozalp Ozer (Stanford)

Competing on Time: An Optimization Framework for New Product Introduction Decision in the High Technology Industry

In this presentation, we will outline the challenges and uncertainties associated with bringing a new product to market. To do so, we will focus on a major global high-technology company located in the Bay Area and discuss their challenges related to new product introductions (NPI). The high technology industry is characterized by lightning speed in technology innovation, intense competition and relentless price erosion. We will present our OR based modeling framework that is used to help this global high-technology company make effective time-to-market decisions. Our model solves the problem in two nested phases: a design phase and a mass production phase. The design phase is modeled as an optimal stopping problem where decision to "enter or not" is made. The solution of the design stage affects the mass production phase. This second phase is modeled as a stochastic production control problem where production decisions are made. We will characterize an optimal policy for market timing, an optimal policy for production decisions and how and why they are amenable for implementation. If time permits, we will discuss how this project and the resulting software enabled various functional areas, such as Finance, Manufacturing, Marketing and R&D within the firm to communicate and jointly address this strategic question.

[Joint work with Onur Uncu]

Bing Jing (NYU)

[Product Line Competition in a Sales Model](#)

When running sales, firms offering multiple quality varieties of a product face the conflicting objectives of boosting the demand for its sale items and protecting the profits from the non-sale items. We extend the Varian (1980) model to characterize product line (PL) competition in a duopoly. Our model has two types of consumers with different valuations for quality, and the firms may choose from a common set of two quality levels. A subgame perfect equilibrium exists only when a firm offering both qualities always price discriminates. In the PL equilibrium, both firms will offer only the high-end product and make equal profits when its unit variable cost falls below a certain threshold. When the unit cost of the high-end product exceeds this threshold, however, one firm offers only the high-end product but the other offers both products, with the latter making greater profits. We also fully investigate how firms adjust their pricing strategies according to their PL choices.

[Joint work with John Zhang]

Steve Shugan (Florida)

People-Metrics for Pre-Concept Forecasting

Despite simplifying assumptions to the contrary, most project managers understand that people are both important and different. Sometimes, at the nascence of the project (i.e., before the final concept or pre-concept) the people can be more important than the project aspects because the right people might change the entire direction of a project and vastly improve project outcomes. Moreover, people are different – they can possess different skills, different experiences, different levels of creativity and different analytical abilities.

Our objective is to consider the impact of the people that implement a project on future project outcomes. To be specific, we seek to determine which people-metrics (if any) based on past performance will be better at forecasting future project outcomes and under what conditions. Our findings could be potentially applicable to many decisions involving people and summarizing their past performance. In particular, our findings could improve early or pre-concept forecasting when the people on the project might be the most important determinants of the project's future outcome. For example, when finding a new cure for a disease or inventing a new distribution channel, the creativity and insights of the people might be far more important than the initial product concept.

We study (both theoretically and empirically) six people-metrics based on past performance - the mean of the past project outcomes for a person, the number of past project outcomes, the maximum past project outcome, the minimum past project outcome, the range (i.e., maximum minus minimum) of the past project outcomes and the last observed past project outcome.

We find, for example, that when people with a higher number of past project outcomes have a higher potential (i.e., the probability of more favorable outcomes), the maximum-metric is always more highly correlated with future project outcomes (i.e., forecasts better) than the mean-metric. The minimum-metric is always better than the mean-metric when people with a higher number of past project outcomes have lower potentials. The range-metric and number-metric both are better than the mean-metric when people of different potentials are sufficiently heterogeneous in terms of the number of past project outcomes. Finally, the mean-metric is always more correlated with future project outcomes than the last-metric is.

Apart from pre-concept forecasting, this analysis should be valuable for many activities including providing information for decisions related to selecting people for specific projects and demonstrating that individual people do matter.

[Joint work with Deb Mitra]



Olivia Sheng (Utah)

[Data Product Strategies – Reexamine Management, Investment and Design Issues of Information Systems](#)

Physical and software products provide value to consumers or users. The design and management of these products have shared common issues and strategies regarding platforms, reuse and lifecycle management. This talk positions information systems of which value provided to users primarily stems from large-scale, diverse data. Business intelligence and web optimization applications are examples of data products. The design and management of these information systems including software, hardware and people involved primarily anchor around various data types throughout the data-to-value transformation process. By identifying the similarities and dissimilarities of web optimization or business intelligence data products in comparison to physical and software products, the talk intends to explore management, investment and design issues associated with such data products that could stir research collaboration.

Charles Corbett (UCLA)

[Leadtime – Variety Tradeoff in Product Differentiation](#)

The literature on mass customization generally focuses on the trade-off between the increased fit between product specifications and customer preferences, and the increased fixed and/or variable cost of production associated with offering a broader, possibly fully customized, product line. Implicitly acknowledged, but less well-understood, is the trade-off between the increased ability to precisely meet customer preferences and the increased leadtime from order placement to delivery often associated with customized products. In this paper we formulate an integrated model for a firm's optimal product line design that involves product positioning, pricing and inventory policy decisions, and propose a dynamic-programming-based solution procedure. We show that, although inventory control decisions are usually taken later and at a lower level than product line design decisions, ignoring inventory implications leads to suboptimal product line designs.

[Joint work with Aydin Alptekinoglu]



Anindya Ghose (NYU)

[Geography and Electronic Commerce: Measuring Convenience, Selection, and Price](#)

We examine how the local availability of offline retail stores drives use of the online channel and consequently how the convenience, product selection, and price advantages of the online channel may vary by geographic location. In particular, we examine the effect of offline product assortments through local store openings on online book purchases in that location. We explore this problem using data from Amazon on the top selling books for 1501 unique locations in the US for 10 months ending in January 2006. In addition to this data, we use information on changes in offline retail competition as measured by openings of large bookstores such as Borders or Barnes & Noble and discount stores such as Wal-Mart or Target. We show that even controlling for product-specific preferences by location, changes in local retail options have substantial effects on online purchases. We demonstrate how the convenience, product selection, and price benefits of the Internet are different for consumers in different types of locations. More generally, we show that geography significantly impacts the benefits that consumers derive from electronic markets.

[Joint work with Chris Forman and Avi Goldfarb]

Rajiv Dewan (Rochester)

[Firms as Incubators of Open Source Software](#)

Many employed programmers work on open source projects that neither pay them nor are directly related to their job. Previous research has ascribed several economic incentives for the programmers to engage in such projects. We examine the hiring firm's response to these extraneous incentives created through open source. We find that when abilities of programmers are uncertain, the firm may offer then one of three types of contracts: one that pays a premium over the labor market and provides a bonus for performing only in the firm's project; one that compensates at the labor market rates and provides a bonus for performing only in the firm's project; and one that compensates at the labor market rates and provides bonuses for performing in both the firm's and the open source projects. We then analyze when each of these three contracts are optimal. We further characterize the magnitude of bonus payments in each contract in terms of potentially quantifiable parameters such as value of the firm's project, wage rate in the labor market and openness of company policies that determine how much information about an individual programmer's contribution in the firm's project becomes public knowledge. Methodologically, we extend the principal-agent model to include multiple projects. Our results are illustrated through some compelling anecdotal evidence.

[Joint work with Marshall Freimer and Amit Mehra]

Yi Xu (Miami)

[Economic Models for Open Innovation Systems and Multi-agent Problem Solving](#)

In an innovation contest, a firm (the seeker) facing an innovation related problem (e.g. a technical R&D problem) posts this problem to a population of independent agents (the solvers) and then provides an award to the agent that generated the best solution. In this paper, we analyze the interaction between a seeker and a set of solvers. Prior research in Economics suggests that having many solvers work on an innovation problem will lead to a lower equilibrium effort for each solver, which is undesirable from the perspective of the seeker. In contrast, we establish that the seeker can benefit from a larger solver population as he obtains a more diverse set of solutions, which mitigates and sometimes outweighs the effect of the solvers' under-investment in effort. We demonstrate that the inefficiency of the innovation contest resulting from the solvers' under-investment can further be reduced by changing the award structure from a fixed price award to alternative mechanisms, such as a cost contingent award or a performance contingent award. Finally, we compare the quality of the solutions and seeker profits with the case of an internal innovation process. This allows us to predict which types of products and which cost structures will be the most likely to benefit from the contest approach to innovation.

[Joint work with Christian Terwiesch]

Sezer Ulku (Georgetown)

[Explaining the Lack of Modularly Upgradeable Products](#)

In markets with high uncertainty and fast technological change, often, the prescription is to use modular architectures. However, the evolution of products in the consumer electronics industry tells us a different story. For instance, *Handspring*, a personal digital assistant, was initially conceived as a modular platform that allowed new applications through an expansion port (Springboard). In the more recent versions, this desirable feature has been discarded in favor of a more integral architecture that does not allow expansion. In this paper we aim to explain this observation. We build an analytical model to examine the demand for and supply of modularly upgradeable products. More precisely, we investigate when modular upgrades are desirable for users and manufacturing firms. We show that under a monopoly, regardless of the trajectories followed by the component technologies, integrated upgrades are preferable for both the firm and users unless the manufacturing firm has very high costs of redesign. This result holds under leasing as well as purchasing.

[Joint work with Glen M. Schmidt]

Ravi Mantena (Rochester)

[Software Launch through Beta Versions](#)

Traditionally, the term beta referred to feature-complete versions of software code that a developing firm shared with a small set of power-users to identify and fix glitches before it was released to the regular users. Recently, it has been observed that a number of software firms and web-based applications/services have started releasing incomplete versions of their software as betas, sometimes making them available even to the regular users. Further, in some of these cases, firms seem to leave the software in the beta version for unusually long periods of time, giving rise to the so-called perpetual betas. In this paper, we develop a simple model with two-types of users to explain this phenomenon. The release of a beta version typically trades off short term revenue for opportunities in the form of consumer aided quality improvements and future market size. We find that while firms generally benefit from releasing incomplete versions of their software as betas, this is not always the case. For example, firms may find it optimal to introduce full-featured versions of their software and use a price-skimming strategy to capture additional value through exclusivity. Further, when firms do launch beta versions, the quality of their betas depends on the business model employed by the firm. We find that firms that choose an indirect revenue model (e.g. ad supported websites) are more likely to launch beta versions and generally choose a higher quality level for their betas.

[Joint work with Amit Mehra]