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Winning strategies for innovation and high-technology products management

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ABSTRACT

Though numerous studies examine the issues on innovation, diffusion, and adoption of high-tech products, the industry practitioners still have many questions unanswered. Twenty papers in this special issue of the *Journal of Business Research* explore six major venues in this area. The contributors presented the studies in the track of innovation, diffusion, and adoption of high-tech products at the Global Marketing Conference held in Tokyo, Japan in September 9–12, 2010. All these papers have gone through double-blind reviews and revisions. The scholars share the successful experiences in innovation, analyze the diffusion of information and communication technology, investigate the adoption of high-tech products, discuss the technology management issues, and evaluate the marketing strategies for high-tech products.

1. Introduction

Innovation has become a key concept in the business world as the global economy seeks to escape from a period of major recession. Despite developments of so many breakthrough technologies and products, high-tech firms, big or small, are still struggling in creating and extending the new market opportunities. With technology being a necessary condition, marketing should play a critical role in fulfilling the dream of successful diffusion of high-tech products and services.

It is an honor and pleasure of co-guest editors to present high quality papers that are to provide rigorous and relevant insights into the critical issues of this area in the special issue of the *Journal of Business Research*. This special issue is a direct outcome of the Global Marketing Conference held in Tokyo, Japan during September 9 to 12 in the year 2010, which Korean Academy of Marketing Science and Society for Marketing Advances co-organized. The conference was very successful in the sense that it gathered scholars from several countries all over the world and that it received more than 1000 submissions. The track of "Innovation, Diffusion, and Adoption of High-Tech Products" was one of the most popular tracks among 48 of them at the conference. The conference papers submitted to this track went through three stages of blind review processes, and the guest editors are proud to include 20 most excellent papers in this issue.

The following sections discuss major issues in the research area of innovation, diffusion, and adoption, and then summarize the papers included in this special issue. In the last section, the guest-editors acknowledge the contributors to this special issue.

2. Emerging issues in innovation and diffusion research

When the first edition of Everett M. Rogers' book of *Diffusion of Innovation* came out in 1962, there were 405 papers on the topic (Rogers, 1995). The total number of publications in innovation diffusion grew ten-fold by 1995, over 4000. It is almost certain that the number would be more than 40,000 by now. Considering that the key word of "innovation" is popular across all academic subcategories of business research, it might be far beyond our guesstimate.

With such a long history and great interest, innovation literature has sought to answer the questions such as:

- How can firms successfully develop innovative new products or services?
- Which innovation characteristics affect consumers' adoption of innovative new products and how?
- How can we forecast the speed and pattern of innovation diffusion?
- How can we forecast the demand of innovative new products?
- How do consumers behave in adopting (i.e., making decisions and purchasing) innovative products?
- What are the roles and traits of innovators and other adopter categories?
- What roles do marketing actions play in innovation adoption and diffusion?

A myriad of behavioral studies investigated the phenomenon of innovation adoption and diffusion, thereby yielding numerous managerial

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insights valuable for managers of high-tech firms. Meanwhile, modeling and forecasting of innovation diffusion constitutes another big stream of research. As Sultan, Farley, and Lehmann (1990) report in a meta-analysis study, innovation diffusion models, including the famous Bass model and its variants, have become very effective as well as efficient. Another substantive venue of innovation research is so-called technology acceptance models (TAM), first introduced by Fred Davis in 1989. Though the key elements of Davis (1989) model are ease of use and usefulness, there are various versions of TAM incorporating variables such as compatibility, complexity, and relative advantage based on earlier studies (e.g., Tornatzky & Klein, 1982). To reflect diverse context and product uniqueness, scholars have replicated and extended the TAM models in all possible directions (e.g., Venkatesh & Davis, 2000).

Although huge literature of innovation research answered many of the above questions, both the scholars and practitioners still face challenges to address the issues such as the following.

- How can firms make their innovation processes successful?
- How can firms successfully commercialize technologies?
- What factors affect the global diffusion of high-tech products?
- What roles do online buzz and social networks play in innovation adoption and diffusion?
- What kinds of strategic behavior do consumers make and how should marketers respond to them?
- What marketing strategies are effective in creating new markets?

We briefly discuss the above six issues one by one.

First, despite the fact that there is plenty of research tackling innovation process, firms are still struggling in making it successful. One possibility is that current research fails to notice that there are different factors working at different stages of innovation development. Further, firms need to consider innovation process not only in the realm of business but also in the broad context of social change.

Second, technology commercialization gets more and more important as companies seek for growing opportunities in the midst of recession. However, studies in this area haven't made big strides for decades. Active research on many critical issues such as industry-university collaboration, technology transfer, and the evaluation of early-stage high-tech firms, is necessary.

Third, as the world becomes smaller, the issue of global diffusion garners more attention. Therefore, more research on technology adoption needs to focus on the country level adoption rather than individual or company level ones. To better understand and forecast the country level diffusion, one needs to figure out the differences among various economies in terms of information and communication infrastructure. Measurements and classification schemes are essential in order to build and test the theories on this matter.

The fourth challenging issue in innovation and diffusion research is regarding the role of social networks. A unified TAM developed by Venkatesh, Davis, Morris, Davis, and Davis (2003) identify social influence as a key construct that determines both usage intention and usage behavior. Though theoretical research in this venue is very active these days (e.g. Goldenberg et al., 2009; Goldenberg, Libai, & Muller, 2001), the number of empirical studies is negligible. Also, theoretical and empirical work on the effectiveness of online word-of-mouth activities will enhance the understanding of consumers' innovation adoption behavior.

Fifth, consumer behavior research in the context of high-tech marketing needs to further address the strategic behavior of consumers. Techno-savvy consumers armed with vast information behave in an opportunistic way. They balk at the new product introduction and frequently leapfrog (i.e., skip a version of a product for the next one). They try to minimize economic and physical risks in many ways. Sometimes they even produce and disseminate false information or lead negative campaigns to protect their own benefit. Further theoretical developments on post-adoption behavior also appear to be promising.

Finally, empirical work on the linkage of various marketing strategies and their effects would be desirable. As companies design and manufacture their products in many different countries, the concept of country-of-origin (COO) has evolved into a multi-national one. Scholars need to reexamine the effects of country of manufacture and country of brand in a more realistic and complicated setting. As social network service (SNS) plays important roles in the adoption of innovation, efficiency and effectiveness of marketing strategies based on online or mobile SNS ask for verification.

The guest editors believe that the current special issue of *Journal of Business Research* is a first step to reply to the questions discussed above. This special issue covers a wide spectrum of innovation research, but it focuses mainly on the critical themes above, thereby contributing to both academia and industry. Some comments on each paper follow.

3. Successful innovation

Innovation not only has a direct impact on the viability of a firm but also influences the social and economic change (Sorensen & Stuart, 2000). Jie Wu investigates the asymmetric roles of business ties and political ties in the innovation processes. A survey examines Chinese firms across multiple sectors and draws interesting results on different impacts by the two types of ties.

Product development and innovation are vital to firm's success (Yalcinkaya, Calantone, & Griffith, 2007). Innovation is more critical in the high-tech industries (Kobrin, 1991; Madhok & Osegowitsch, 2000). Ana Lisboa, Dionysis Skarmeas, and Carmen Lages investigate the role of firm's customers and competitor orientation, in driving innovative capabilities and the impact of these capabilities on firm's current and future performance. Findings suggest different relationships to exploitative and/or explorative capabilities.

Various factors may affect innovation at different stages of adoption. Nicole Vowles, Peter Thirkell, and Ashish Sinha study which factors best explain business to business adoption of a radical, high-tech innovation early in the diffusion process. Early lifecycle data provide insights about the differences in determinants of adoption at different times in the product diffusion process. The results indicate that differences do exist among the determinants of early adoption, intent to adopt later, and unawareness of the innovation.

4. Technology diffusion

Information and communications technology (ICT) impacts the countries all over the world (Huarng, 2010; Huarng & Yu, 2011). Some studies examine the ICT adoption at country level (Lee, Shin, & Kim, 2010; Pohjola, 2003) while some at firm level (Corrocher & Fontana, 2008; Martins & Oliveira, 2008; Nasco, Toledo, & Mykytyn, 2008). However, the least squares method only shows the impact of the estimated coefficients on the mean. Tiffany Hui-Kuang Yu applies quantile regression to examine the heterogeneous effects of various factors on global ICT adoption. This study shows that the effects at different quantile levels are very different from those at their counterpart conditional means. And the effects at different quantile levels help to explain many situations that are hard to interpret by the least squares method.

ICT covers a wide range of technologies (World Bank, Global ICT Department, 2003). How to find effective variables to measure ICT is always a hot issue (Grigorovici, Constantin, Jayakar, Taylor, & Schement, 2004; Hilbert, López, & Vásquez, 2010). Instead of using many variables as in relevant studies, Kun-Huang Huarng classifies ICT developments by economies with a clustering technique and with only two essential variables: the number of internet subscribers and gross domestic product. A comparative analysis for 121 economies covering the period from 1999 to 2007 provides results similar to those in United Nations Conference on Trade and Development and International Telecommunication Union, and helps to explain different ICT developments in various economies.

As an innovative technology, Internet Protocol television (IPTV) provides advanced, customized, and personalized television services with