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Viet Dao
University of Oklahoma

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Viet T. Dao
Price College of Business
University of Oklahoma
vdao@ou.edu

ABSTRACT

Technological innovations, e.g. new hardware or software products, evolve through lifecycles comprised of multiple phases. At each of these phases, different types of uncertainty exist that confound the decision making processes of potential technology adopters. In order to diffuse this uncertainty, technology-producing firms emit different types of market signals. This paper develops a model to explain firms' signaling efforts as they correspond to the uncertainties experienced at the various phases of the innovation life cycle.

The paper identifies three types of uncertainty associated with different phases of the innovation lifecycle: i) Technology uncertainty, ii) Marketplace uncertainty, and iii) Standards uncertainty. Different categories of corporate strategic market signals corresponding to these three types of uncertainty are identified. The relationship between the nature of the uncertainty experienced and firms' signaling efforts is proposed to be moderated by whether the firm is a technology leader or not.

Keywords

Strategic signaling, technological innovation, technological standard, innovation development uncertainty.

INTRODUCTION

Getting a technological innovation adopted is often very difficult (Rogers, 1995). The development of an innovation is associated with different types of uncertainty. For innovative companies to have their innovations adopted by the marketplace, it is essential for them to address these uncertainties properly. An innovative company can encourage and speed up the development and adoption process of its innovation by signaling its stakeholders about different aspects of its innovation. Strategic corporate market signaling is used quite commonly nowadays. The signals are a potentially beneficial tool for companies to communicate their intentions, threats, plus seek cooperation in the market (Heil and Robertson, 1991).

The lifecycle of a given technological innovation can be divided into different phases, with different characteristics associated with each phase (Utterback, 1994). Given different levels of different uncertainties associated with an innovation in these phases, innovative companies can use different combinations of corporate market signals to signal their stakeholders about the uncertainties.

This paper attempts to propose a theoretical framework for a study aimed at answering the question "Why do firms emphasize different types of corporate market signals about technological innovation uncertainty in different phases of the innovation lifecycle?" We first identify the dimensions of the uncertainty associated with the development of a technological innovation. Based on these uncertainty dimensions, we identify the different categories of corporate market signals that companies use. Finally, we propose several hypotheses with regard to the relationships between different phases of innovation and the types of signals that companies focus on in their signaling activities.

THEORETICAL MODEL

Technological Innovation Evolution Phases

A technological innovation evolves through three phases - the fluid phase, the transitional phase and the specific phase - with each phase having distinctive features (Utterback, 1994). Since this paper talks about technological innovation, the terms "technological innovation", "innovation" and "technology" are used interchangeably.

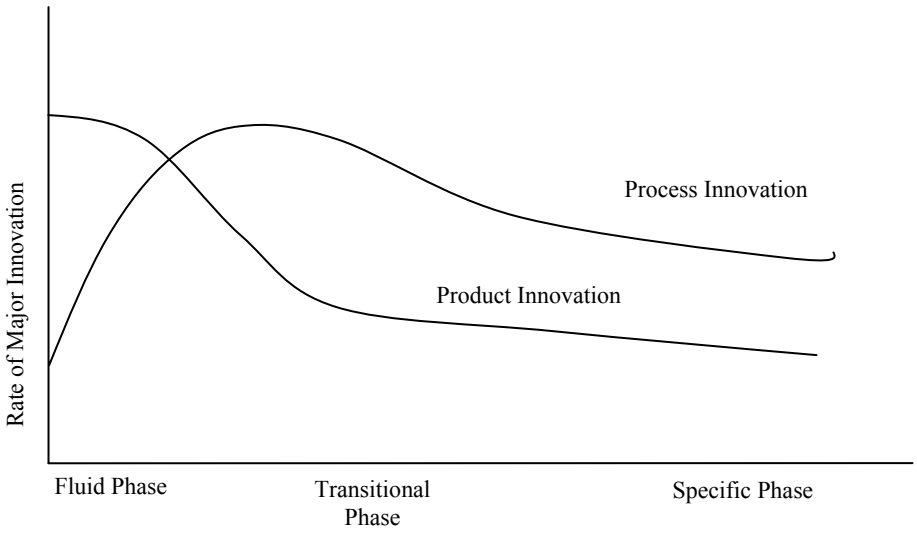

Figure 1. Phases of Innovation

Fluid phase: The fluid phase refers to the initial stages of product development. In this phase, the potential market for the product has not been well defined, and there is a lack of consensus on the utility of the emergent product. The most notable feature of this phase is the lack of a dominant design, the product design that wins the allegiance of the marketplace and which competitors and innovators must adhere to if they are to gain a presence in the market. Product standards in this phase are rudimentary, when they exist at all. The technology is often crude, expensive and unreliable, but is able to provide a function in a way that is highly desirable in some niche markets (Utterback, 1994). The basis for competition in this phase is functional product performance, and innovative companies have to capitalize on the fit between their technologies and the market in order to succeed.

Transitional phase: In this phase, the innovation is accepted widely by the market and the dominant design that sets the standard for the innovation. Firms' primary concern switches from inventing new product standards to increasing efficiency of production and producing products for more specific users as the needs of these users become more clearly understood (Utterback, 1994).

Specific phase: In this phase, both manufacturing methods and product designs are standardized, and the differences between products of competitors are often fewer than the similarities. In this phase resistance to product and process change will emerge (Abernathy and Utterback, 1978).

Scope of Study

In this study we investigate corporate market signaling behavior of innovative companies. Generally, the signals are targeted at a broad range of stakeholders. A company's stakeholders include shareholders, suppliers, employees, customers, competitors, etc. (Wood, 1994). For this study, we focus on signals targeted at customers.

A notable feature that helps distinguish different innovation phases is the emergence of the dominant design. There are different contexts for the emergence of the dominant design. In the first context, the innovation is a part of a body of technologies of which a body of standards has been defined or is in the process of being defined. In this context the new dominant design must fit in the body of standards.

In the second context, a dominant design, or a standard, can emerge through the activities of an organization known as a standardizer. There can be a situation that variations of the innovation are produced without any consensus on specifications for the final product. Therefore there exists a need for a standard, and a standardizer develops and propagates the standard by influencing companies in the industry to conform to the standard (Brunsson et al., 2000).

In the third context, where the innovation does not fit into any body of standards and there exists a need for the standard of the innovation, an influential company in the market can exert its influence and forces its design to be adopted as the

dominant design (Utterback, 1994; Van de Ven et al., 1999). We focus our investigation on signaling behavior of innovative companies in the third context.

Uncertainties of Technological Innovation

To construct the model for the study, we first need to identify the uncertainties of an innovation. An innovation in the fluid phase faces two types of uncertainty: technical uncertainty, and target uncertainty (Utterback, 1994). Technical uncertainty arises because a firm is not sure whether the technology that it develops will be adopted by the market or will be ignored in favor of other competing technologies. Technical uncertainty arises from the fact that there is uncertainty about the viability of the innovation's functionality and the compatibility of the innovation with other technologies that it co-operates with during its operation. Target uncertainty refers to the fact that most early innovations do not have established markets. Therefore, innovative companies are not certain whether these innovations are good enough to create their own markets.

In addition, the development of an innovation entails uncertainty from the innovation itself (internal uncertainty) and uncertainty from the impact of the outer environment (external uncertainty). Internal uncertainty, which is somewhat similar to technological uncertainty, refers to whether the new technology will work. Milliken (1987) identifies three types of environmental (external) uncertainty that affect an organization: i) "State uncertainty", referring to the lack of information about the nature of the environment; ii) "Effect uncertainty", referring to the lack of knowledge of how environmental events affect the organization, or the technology the organization develops; and iii) "response uncertainty", referring to the lack of "knowledge of response options and/or an inability to predict the likely consequences of a response choice" (Milliken, 1987). State uncertainty refers to whether the market will accept the innovation. Effect uncertainty refers to how the development of other related technologies or competing technologies will affect the innovation. Response uncertainty refers to whether the innovation development strategy will bring about benefits to the innovative company, or there would be unanticipated consequences that the company will have to face.

From the above categorization of uncertainty two main dimensions of innovation uncertainty are proposed: technology uncertainty, and marketplace uncertainty.

Technology Uncertainty Dimension

Technology uncertainty refers to the uncertainties arising from the development of an innovation, this type of uncertainty can be considered internal uncertainty. There are several issues concerning this dimension of uncertainty. The first issue is whether the new technology will work. There have been many failures in the development of innovations where the final products do not function. Therefore, workability is the foremost requirement when a new technology is developed.

The second issue is whether the new technology is compatible with technologies that it works with. A technology usually does not function as a stand-alone technology but cooperates with other technologies. It is critical that the technology is compatible with these technologies. These technologies evolve over time, thus the technology needs to be compatible with these technologies not only at present but also in the foreseeable future.

The third issue is whether the technology provides functions that meet the technical demands from the customer side for this type of innovation. This is also a major concern for the innovator because the technology has low chance of being adopted if it is does not meet the technical demands of the customers.

The last issue is whether the implementation of the technology is feasible. A technology is unlikely to be adopted if it is difficult to be implemented. Thus the technology should be developed in a way that facilitates easy implementation. From the above mentioned issues, it is obvious that technology uncertainty dimension is a fundamental dimension of consideration when initial auditing of an innovation is carried out.

Marketplace Uncertainty Dimension

The second uncertainty dimension proposed is "marketplace uncertainty". Whether the market adopts an innovation involves uncertainties that an innovative firm needs to consider. The first issue of this dimension is whether the innovation is in line with the development of the market demand, or will it be able to create a market for itself. In order to be adopted, the innovation must provide functionalities that are needed by the market or it must be innovative enough that it can persuade for a market of its own. The second issue is whether the innovation brings about financial benefits to its adopter(s). Even if the technological innovation is technically well developed, it is unlikely to be adopted if it does not bring about financial benefits. The third issue is whether the innovation has advantages over its competing technologies in the market. It is obvious that between the two technologies that provide similar functionalities, customers will choose the cheaper alternative.

The two proposed uncertainty dimensions of the fluid phase are arguably applicable for innovations in the transitional phase. Technology uncertainty dimension is applicable for innovations in the transitional phase. The development of an innovation is always accompanied by the issues of its workability, its ability to fulfill technological requirements from adopters, and its compatibility with co-operating technologies. In every innovation phase, there is a certain degree of uncertainty that the innovation fails to function. Since co-operating technologies are ever evolving, the compatibility of an innovation with its related technologies is not stable. In addition, since adopters develop their collections of adopted technologies over time, the requirements for innovations as well as the technological conditions for their adoption are not stable but ever changing.

Marketplace uncertainty dimension is also applicable for innovations in the transitional phase. The market is not stable but ever changing, the demands of the market are thus also ever changing. Therefore, the alignment with the development of different and ever changing demands of different market sectors is an issue of concern for an innovation in the transitional phase. Innovations in the transitional phase can be developed to aim at new niches with different requirements (Utterback, 1994). In order for the variations of the innovation for different niches to be adopted, they have to bring about better benefits for the niches, compared to the benefits of the technologies that the adopters currently use as well as of other competing technologies.

A notable feature that differentiates the transitional phase from the fluid phase, as discussed above, is the emergence of the dominant design, which is the result of the introduction of the technological standards. Technological standards pertain to component specifications, processes, and performance criteria that new technology designs are expected to achieve (Garud and Rappa, 1994). These technical standards are the institutional mechanisms for selecting dominant designs from among competing technological possibilities (Van de Ven et al., 1999). Standards reduce uncertainty about the risk of buying new technologies and thereby facilitate technology adoption decisions for innovation adopters (Link and Tassey, 1987). Therefore, if an innovation conforms to the standards, it is more likely to be adopted. In addition, standard may be used as tools of competitive strategy as firms promote a standard to gain advantage over rivals (Besen and Saloner, 1989).

Standards Uncertainty Dimension

From the above arguments, it is obvious that uncertainties related to standards are important for innovations in the transitional phase. Hence we propose another uncertainty dimension named “standards uncertainty”. The major issues concerning this dimension of uncertainty are whether the new technology is aligned with the dominant design, or whether it fits with the body of standards that includes this type of innovation therefore the innovation will not be ignored when the standard emerges. Normally, customers are not willing to adopt a technology if the technology is not compatible with the “standards” (the dominant design or the body of standards that includes the innovation). Therefore, the alignment between an innovation and the dominant design and/or the fit between the innovation and the body of standards that includes the innovation play an important role in the perception of the uncertainties associated with the innovation.

The three uncertainty dimensions proposed - technology uncertainty, marketplace uncertainty, and standards uncertainty - are also applicable for innovations in the specific phase. Following the arguments of technology uncertainty for innovations in the transitional phase, it is reasonable that the technology uncertainty dimension is applicable for innovations in the specific phase. Similarly, as the development of a technology is always associated with issues related to the relationship between the technology and its market, thus the marketplace uncertainty dimension is applicable for innovations in the specific phase. As discussed above, a notable feature of the specific phase is the highly standardized products and processes and the domination of the similarities over the differences among products of competitors. As such, a technology in the specific phase faces a high level of standards uncertainty if it does not conform to the standards. Thus the standards uncertainty dimension is applicable for innovations in the specific phase.

From the above discussion we have figure 2.

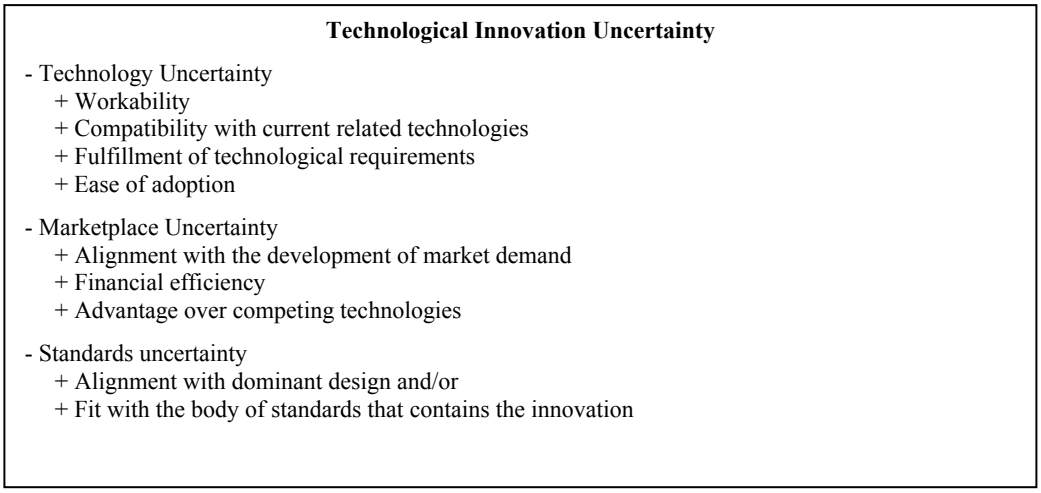

Figure 2. Dimensions of Technological Innovation Uncertainty

Signaling Behavior with Regard to Technological Innovation Uncertainty

In this section we categorise different types of signaling behavior based on the uncertainty dimensions identified above, and look at different conditions to investigate the issue of why firms choose to focus on different types of signal regarding different phases that the technological innovation is in.

As Heil and Robertson (1991) define, "competitive market signals are conceptualized as announcements or previews of potential actions intended to convey information or to gain information from competitors". Corporate market signaling is "concerned with all of an organization's stakeholders and the multi-faceted way in which an organization communicates" (Balmer, 1998). The most effective signals used by companies are press releases, annual reports, press briefings, mass media advertisements, trade journal ads, newsletters, industry write-ups, and catalogues (Herbig and Milewicz, 1996). Many studies have looked at the impact of information technology (IT) investment announcements on firms' market value (e.g. Dos Santos et al., 1993; Im et al., 2001; Chatterjee, 2001). Dos Santos et al. (1993) found that innovative IT investments increase firm value. Subramani and Walden (2001) studied the impact of E-commerce announcements on firms' market value, and found that e-commerce announcements are associated with significant increases in market valuation of firms. However, few researches have investigated firms' signaling behavior with regards to different types of technologies or to different contexts of the adopted technologies. Based on the three dimensions of uncertainty proposed above, we propose three dimensions of signaling behavior: technology oriented signals, marketplace oriented signals, and standards oriented signals.

Technology oriented signals: As discussed above, the major issues concerning technological innovation uncertainty are the technology's workability; the technology's compatibility with other technologies; the technology's capability in meeting the technical demands of the customers; and the technology's implementation feasibility. Using technology oriented signals, a company can signal its stakeholders about the functionality and implementation feasibility of its innovation, its compatibility with related technologies that the potential adopters are using, and will be using in the near future.

Marketplace oriented signals: As discussed above, the major issues concerning marketplace uncertainty are the innovation's alignment with the development of the market demand, or it's capability to create a market for itself; and the innovation's financial competitiveness, compared to other technologies. Using marketplace oriented signals, a company can signal its stakeholders about the advantages of its technology, the benefits the technology will bring about to adopters in terms of more efficient firm performance and financial benefits.

Standards oriented signals: As discussed above, the major issues concerning standards uncertainty are the innovation's alignment with the dominant design, or with the body of standards that includes this type of innovation. Using standards oriented signals, a company can signal its stakeholders about its innovation's position in the development of the standard(s) for the innovation.

Based on the categorization of technological innovation phases and signaling behavior, and the identification of the moderating factors which will be discussed later, the theoretical model for the study is proposed in figure 3.

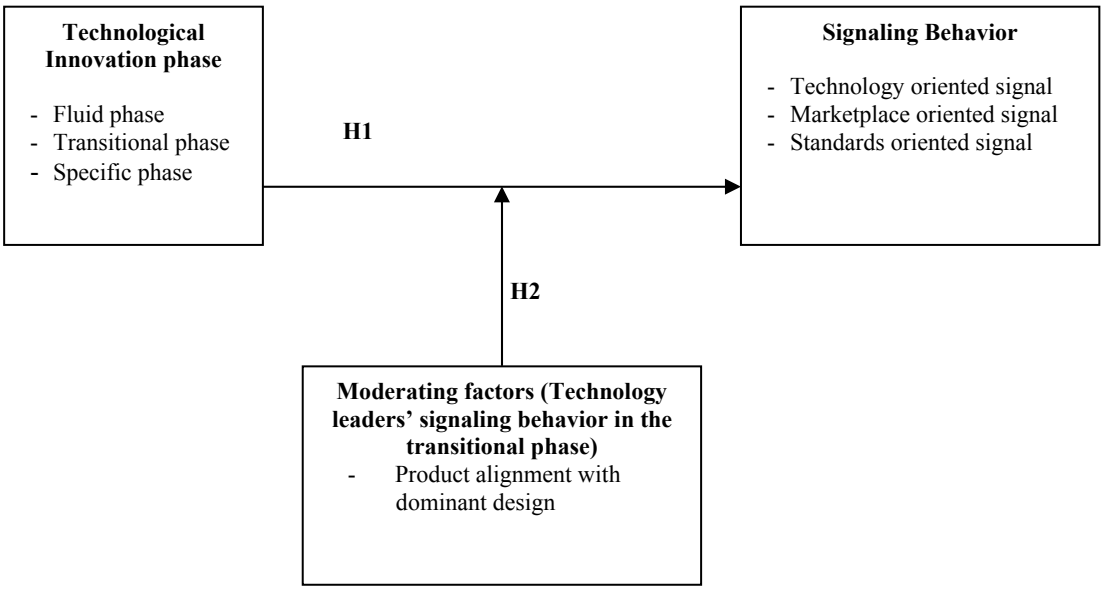

Figure 3. Theoretical Model

Hypotheses

Companies can be categorized into two categories, depending on whether their dominant technology-based competition strategy is innovative (taking the technology leader role) or imitative (following the leader) (Link and Tassey, 1987). The number of technology leaders is very small compared to the number of imitators. For the development of the first hypothesis, we look at the majority of imitators. Further investigation into the technology leaders will be carried out in the formation of the second hypothesis.

As discussed above, different innovation evolution phases have different distinctive features. Therefore, the level of a certain type of uncertainty is perceived to be different in different phases. Because of this, a company generally focuses on signaling about different types of uncertainty according to the phase of its innovation. For example, there are different product standards in the fluid phase, while in the transitional phase the dominant design emerges and accounts for a significant production volume, and in the specific phase there are few differences among products because the production process is highly standardized (Utterback, 1994). Therefore, the level of standards uncertainty should be perceived differently in different phases. As a result, companies can have different approaches to signaling with regard to standards uncertainty. The condition of the market in different phases is different too. In the fluid phase, the market is not well defined, while in the transitional phase a large market for the innovation is defined. Thus marketplace uncertainty in different phases can be at different levels (Link and Tassey, 1987). Because of these differences, the focus of companies' signals is different in different phases.

Hypothesis 1a: During the fluid phase, companies use more technology oriented signals than marketplace oriented signals or standards oriented signals.

As discussed above, there is no dominant design, or standard, in the fluid phase. Therefore, it is difficult for companies to decide which standard to follow. Furthermore, the market for the technology is not well defined yet, but normally customers in this phase are well aware of their need for this type of innovation and thus decide to start adopting the technology even though there are uncertainties associated with it. Therefore, it is not important to signal customers about the standards that the innovative company follows as well as the need for the technology. The basis for competition in the fluid phase is functional product performance (Utterback, 1994). Additionally, rational customers are willing to pay a high price for the certainty that a given product or service of a certain minimum quality will be available when it is needed (Hannan and Freeman, 1984). Also, the higher the level of the innovation's compatibility, the more likely it is adopted (Rogers, 1995). These issues are the

major issues of technology uncertainty addressed above. Hence it is more important for companies to focus their signaling activities in the fluid phase on technology oriented signals than on marketplace oriented signals or standards oriented signals.

Hypothesis 1b: During the transitional phase, companies use more standards oriented signals than technology oriented signals or marketplace oriented signals.

Since the dominant design for the innovation is widely accepted in the transitional phase (Link and Tassey, 1987; Utterback, 1994), technology uncertainty reduces if companies follow the standard in the development of their technologies. Also in this phase, the number of competitors is large but declining. One of the reasons for the decline is that companies that develop technologies that are not aligned with the dominant design have to withdraw, or change their technologies to adapt to the emergence of the dominant design. Therefore, it is important for companies to signal that their technologies are aligned with the dominant design and thus can be adopted without the hassles of incompatibility. That means standards oriented signals are the focus of companies' signaling activities in the transitional phase.

Hypothesis 1c: During the specific phase, companies use more marketplace oriented signals than technology oriented signals or standards oriented signals.

In the specific phase, when production process is standardized, products of different companies have more similarities than differences (Link and Tassey, 1987). In this phase, technology and standards uncertainties are relatively low provided that companies comply with the standardized production process. Thus technology and standards oriented signals do not play important roles in the signaling activity. The basis for competition in this phase is price (Utterback, 1994; Goodman and Lawless, 1994). That means it is important for companies to signal the market about the financial benefits of adopting their technologies. According to Rogers (1994), the higher the observability of a technology (the degree to which the results of a technology are visible), the more likely it is adopted. Since the product standard(s) and process standard(s) are stable in the specific phase, the observability of a technology is very much its financial benefits. Therefore, marketplace oriented signals are the focus of companies' signaling activities in the specific phase.

Hypothesis 2 revolves around signaling behavior of technology leaders in the transitional phase, when the dominant design emerges. Imitators who are not the leaders in the formation of the dominant design would choose to follow the leaders of the innovation process (Deephouse, 1996). The small number of technology leaders who choose to lead the innovation process and the development of the dominant design can have signaling strategies different from that of the majority of imitators. Companies choose to lead the innovation process because by shaping common standards, they can build attributes of their technologies directly into emerging institutional structures (Constant, 1980), and once the dominant design is defined based on a particular product, that product can enjoy a large market share for an extended period (Utterback, 1994). So we argue that in the fluid phase, the technology leaders focus on technology oriented signals to demonstrate the functionalities of their products to persuade the industry to favor their products as the chosen dominant design. However, when the dominant design emerges in the transitional phase, the emergence's impact on the technology leader(s) whose design is chosen as the dominant one and those leaders whose designs are not chosen could be different. Therefore, these technology leaders should have different signaling strategies with regard to the alignment of their products to the standard.

Hypothesis 2a: A producer of the dominant design in the transitional phase uses more marketplace oriented signals than technology oriented signals or standards oriented signals.

The company whose product is chosen as the dominant design has a significant competitive advantage. The technology and standards uncertainties reduce dramatically as the company's product is chosen as the default standard for the innovation. For this reason, the company can focus more on commercializing its products in the marketplace by utilizing marketplace oriented signals.

Hypothesis 2b: A proprietary producer of the technological innovation which is not the dominant design in the transitional phase uses more technology oriented signals than marketplace oriented signals or standards oriented signals.

As the dominant design emerges in the transitional phase, many "failure" technology leaders do not switch their products to conform to the dominant design. Since they have invested a huge amount of resources in the development of their own product stream, switching to another standard could cause them a huge loss. Besides, the bases for competition in the transitional phase are fitness for use and product variation (Utterback, 1994), and one of the focuses for companies in the transitional phase is unique performance of their products (Goodman and Lawless, 1994). Therefore, those "failure" technology leaders could develop niche markets for their products, and focus on technology oriented signals to persuade about the superiority of their designs over the dominant design in serving these niches. For example, when IBM's PC format became the dominant design of the personal computer market, Apple did not switch their design to PC format but still kept their Macintosh design. Apple developed niche markets for its Macintosh machines because for some certain niche markets

Apple Macintosh computers are better than IBM PC. For example, Apple Macintosh computers are better than IBM PC computers for graphic designing work.

CONCLUSION

Drawing together literatures on strategic technology management, contingency theory, institutional theory, and corporate market signaling, this study provides a framework for the understanding of a part of the relationships between technological innovations' uncertainties and strategic corporate market signaling behavior. The framework also contributes to the understanding of uncertainties associated with the development of a technological innovation. This framework can be a basis for further empirical studies, the results of which will contribute to the theory of strategic corporate market signaling with regard to the development of technological innovations. As strategic corporate market signaling is a part of corporate business strategy, the use of market signals with regards to the development of technological innovations helps integrate technological innovation development strategies into firms' business strategies. As a result, strategic market signals help innovative firms reduce the uncertainties associated with the development strategies of innovative technologies, thus speeding up the innovation development and adoption process.

Since corporate market signaling is a complex concept, the study does not claim that it has captured every aspect of corporate signaling behavior with regard to innovation development. Also, the study focuses on signals aimed at customers, who are only a portion of the stakeholders, the ultimate targets of the signals. Therefore future studies can investigate other ways of operationalizing corporate market signals with regard to innovation development as well as investigate signals aimed at a broader range of stakeholders.

Finally, the emergence of the dominant design and the standard(s) is a complex process that this study has not covered thoroughly. As discussed in the "scope of study" section, this study focuses on one context among the three contexts identified for the emergence of the dominant design. Further studies can extend this study and investigate signaling behavior in other contexts, which will bring about other findings of and contributions to the understanding of the relationships between corporate market signaling and innovation development.

REFERENCES

1. Balmer, J. M. T. (1998) Corporate Identity and the Advent of Corporate Marketing, *Journal of Marketing Management*, 14, 963-996.
2. Besen, S.M., and Saloner, G. (1989) The Economics of Telecommunications Standards, In R.W. Crandall and K.Flamm, *Changing the Rules: Technological Change, International Competition, and Regulation in Communication,* Washington, DC: The Brookings Institution.
3. Brunsson, N., Jacobsson, B., et al. (2000) A World of Standards, Oxford University Press.
4. Chatterjee, D., Pacini, C., and Sambamurthy, V. (2001) Stock Market Reactions to IT Infrastructure Investments: An Event Study Analysis, *Proceedings of the American Accounting Association Annual Meetings*, Atlanta, GA.
5. Deephouse, D.L. (1996) Does Isomorphism Legitimate?, *Academy of Management Journal*, 39, 4, 1024-1039.
6. Dos Santos, B.L., K.Peffers, D.C. Mauer (1993) The Impact of Information Technology Investment Announcements on the Market Value of the Firm, *Information System Research*, 4, 1, 1-23.
7. Garud, R., Jain, S., and Kumaraswamy, A. (2002) Institutional Entrepreneurship in the Sponsorship of Common Technological Standards: The Case of Sun Microsystems and Java, *Academy of Management Journal*, 5, 1, 196-214.
8. Garud, R., and Rappa, M. (1994) A Socio-cognitive Model of Technology Evolution, *Organization Science,* 5, 3, 344-362.
9. Goodman, R.A., and Lawless, M.W. (1994) Technology and Strategy: Conceptual Models and Diagnostics, Oxford University Press.
10. Hannan, M.T., and Freeman,J. (1984) Structural Inertia and Organizational Change, *American Sociological Review*, 49, 149-164.
11. Heil, O., and Robertson, T.S. (1991) Toward a Theory of Competitive Market Signaling: A Research Agenda, *Strategic Management Journal*, 12, 6, 403-418.
12. Herbig, P., and Milewicz, J. (1996) Market Signaling: A Review, *Management Decision*, 34, 1, 35-45.
13. Im, K.S., K.E. Dow, and V. Grover (2001) Research Report: A Reexamination of IT Investment and the Market Value of the Firm-An Event Study Methodology, *Information Systems Research*, 12, 1, 103-117

14. Link, A. N., and Tassey, G. (1987) Strategies for Technology-based Competition: Meeting the New Global Challenge, D.C. Health and Company.
15. Milliken, F. (1987) Three Types of Uncertainty about the Environment: State, Effect and Response Uncertainty, *Academy of Management Review*, 12, 1, 313-330.
16. Rogers, E. M. (1995) Diffusion of Innovation, 4th Ed., Macmillan.
17. Subramani, M. and E. Walden (2001) The Impact of E-Commerce Announcements on the Market Value of Firms, *Information Systems Research*, 12, 2, 135-154
18. Utterback, J.M. (1994) Mastering the Dynamics of Innovation, Harvard Business School Press.
19. Van de Ven, A.H., Polley, D.E., Garud, R., and Venkataraman, S. (1999) The Innovation Journey, Oxford University Press.
20. Wood, D. J. (1994) Business and Society, 2nd Ed., HarperCollins.