

**ORGANIZATIONAL RESISTANCE TO PERFORMANCE-ENHANCING
TECHNOLOGICAL INNOVATIONS:
A MOTIVATION-THREAT-ABILITY FRAMEWORK**

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ABSTRACT

Many technological innovations have encountered resistance from organizational buyers despite the fact that they are superior to existing technologies. This study aims at developing a theory for this widespread marketing phenomenon. Guided by the motivation-threat-ability (MTA) framework, I identify a comprehensive set of determinants of organizational resistance to superior technological innovations and the moderating variables that operate to mitigate the effects of these antecedents. The research findings provide strategic views on overcoming organizational innovation resistance and offers marketing insights about segmentation and targeting of organizational buyers in technology markets. The theoretical arguments are supported by real-life business cases.

Introduction

A large number of innovations have failed in the marketplace despite their benefits to the economy and the firms (e.g. Crawford, 1983; Mahajan, Muller, and Wind, 2000). One of the major causes for market failure of innovations is customer resistance to innovation (e.g. Ram, 1989; Ram and Sheth, 1989; Sheth, 1981). The diffusion of many new industrial products also encountered resistance from organizational buyers. A recent article in the *Wall Street Journal* reported stories of firms finding it difficult to get their technological innovations adopted by potential organizational customers (Essick, 2005). These new products were past winners of the *Journal's* annual Technology Innovation Awards. For instance, Sun Microsystems Inc. won the Gold award in 2004 for a wireless protocol technology that can increase the computing speed of supercomputers by up to 100 times. However, the company had a difficult time persuading its business customers to accept the new technology that can significantly improve the performance of their computers. The frustration with the difficulty is echoed in the comments of an award winner:

“Breaking through the wall of resistance has been a huge challenge, because most people would rather keep doing things the way they’ve been done for decades.” (Essick, 2005)

If it is a challenge for these winners to commercialize their outstanding technologies, imagine how difficult it would be for other firms to push their innovations to the market. Back in the 1980s, JIT (just-in-time) production technology contributed to the success of Japan’s superior manufacturing process. But when it was first introduced in the US, few companies had incentives to adopt it (Walleigh, 1986).

New industrial technologies are intended to improve the production efficiency and/or enhance the product value of the target organizational buyers. Such benefits seem to ensure the market success of these technologies. However, the real stories contradict this naïve expectation. Why do some organizational buyers resist innovations that can enhance the performance of these companies? To address this research question, I develop a robust theoretical framework – i.e. the motivation-threat-ability (MTA) model,

which is adapted from the motivation-opportunity-ability (MOA) paradigm in information processing literature (Batra and Ray, 1986; MacInnis, Moorman, and Jaworski, 1991). The application of this theoretical heuristics is based on two premises: 1) a technological innovation is essentially new knowledge or information that can be employed for production or consumption purposes, and 2) an organization's decision to purchase an innovation is an information processing outcome.

The bulk of current research in diffusion of innovation is skewed toward adoption of innovation with limited attention to innovation resistance. Although some progress has been made in explaining *consumer* resistance to innovations (e.g. Ellen, Bearden and Sharma, 1991; Ram, 1989; Ram and Sheth, 1989), little is known about the reasons for innovation resistance of *organizational* buyers. This study fills the research gap. It also carries important managerial implications. Suppliers in business-to-business markets primarily rely on demographic (e.g. firm size and industry type) and geographic (e.g. location) variables to segment industrial buyers (Griffith and Louis, 1994). However, these variables may not be appropriate for segmenting the technology-based industrial markets due to the specific characteristics of technological innovations. This paper offers useful segmentation variables for this type of market. Moreover, the research findings can be used by technology vendors to develop effective marketing strategies to overcome organizational buyers' resistance.

The paper is organized as follows. First, it presents the view that innovation resistance is not the mirror image of innovation adoption and explains the importance of research on this topic. Second, it describes the MTA conceptual framework, in which a set of propositions are presented with respect to the effects of the determinants and moderators of organizational innovation resistance. Third, it discusses the managerial implications and proposes strategies to overcome organizational buyers' resistance to technological innovations. Finally, the paper concludes with a summary of the research findings and a discussion of the research limitations.

Innovation resistance

Innovation resistance is an example of resistance to change, because an innovation causes changes in either consumption or production (Gatignon and Robertson, 1989). Zaltman and Duncan (1977) define resistance to change as "*any conduct that*

serves to maintain the status quo in the face of pressure to alter the status quo” (pp. 63). Resistance to change is a natural response of a human being or an institution to any changes that disrupt the existing equilibrium of living conditions or organizational activities (Watson, 1971; Zaltman and Duncan, 1977). As for innovation resistance, it is not an innovation *per se* that people resist but the changes associated with it (Ellen *et al.*, 1991; Schein, 1985).

Innovation resistance is not equivalent to the obverse of innovation adoption or non-adoption (Ram, 1987; Gatignon and Robertson, 1989; Zaltman and Duncan, 1977). In the innovation diffusion process, resistance occurs at a stage prior to adoption (Ram, 1987; Woodside and Biemans, 2005). If an innovation vendor cannot break through the resistance, adoption of the innovation may be delayed or never be realized. More importantly, resistance is an effort to maintain the status quo whereas non-adoption is not necessarily driven by such an incentive. A technological innovation may or may not carry attributes that enhance the performance of an organizational buyer, such as production efficiency or product quality. If an innovation fails to deliver the intended benefits, it is not surprising that a buyer chooses not to adopt the innovation. The non-adoption decision is made not because the buyer wants to stick with the existing technology but simply due to the lack of benefits. In contrast, resistance occurs when a prospective buyer intends to maintain the status quo by refusing to adopt an innovation that carries the performance-enhancing attributes, despite the fact that the improvement in performance creates an alluring pressure in favor of adoption. From this perspective, innovation resistance is consistent in meaning with the construct of resistance to change since both behaviors counteract the force of change.

A case in point is the hydraulic technology embodied in mechanical excavators, the earthmoving equipment (Christensen, 2003)¹. Before the 1950s, the standard technology for excavators was cable-actuated systems. When the first hydraulic excavator emerged in the marketplace, it possessed an inferior functionality (i.e. smaller capacity of earth lifted and shorter extension distance) compared to the cable excavator, and had no use to excavation contractors. Consequently, few contractors chose to adopt this new technology. The non-adoption decision can't be considered as a manifestation of resistance to hydraulic excavators, since the technology was simply not useful. In

subsequent years, the functionality of hydraulic technology improved significantly to the degree that it was not only comparable to the cable substitute in terms of capacity and reach but also superior on the reliability attribute. However, some contractors appeared to stick with the cable excavator before they eventually migrated to the hydraulic technology. This kind of inertia is exemplary of innovation resistance because the customers clung to the usage of the cable excavator despite the alluring benefits of the hydraulic excavator.

The view that innovation resistance is not the flip side of adoption also receives empirical support. In the seminal study on organizational adoption of technological innovations, Gatignon and Robertson (1989) found that almost all determinants of innovation adoption have null effects on innovation rejection, from which they concluded that innovation rejection is not a “mirror image” of adoption and could be influenced by different factors than adoption.

Knowledge about organizational innovation resistance is sparse. According to a recent literature review on organizational innovation adoption, little is known about factors that prevent a firm from migrating to the adoption decision (Frambach and Schillewaert, 2002). In a pioneering work on this topic, Woodside (1996) attributes organizational innovation resistance to buyers’ lack of familiarity or purchase experience with a new technology and the defensive marketing actions of incumbent technology vendors. There are at least two critical problems with these explanations. First, for any new product, customers are always unfamiliar with the product or lack purchase experience before the product usage, but this factor cannot explain why they resist purchasing the product. Neither does the factor of competitive actions. It is plausible that a buyer would be interested in the product trial when conditions favoring adoption are present (Rogers, 2003), regardless of the competitive reactions. Second, the theory carries limited predictive value and can’t help us understand how innovation resistance responds to changes in the proposed explanatory variables. The buyers’ lack of product experience or familiarity is invariably present prior to a purchase, and the technology vendors cannot command competitors in a free market to stop defensive activities. Therefore, the real causes of organizational innovation resistance remain unknown.

In the current study, I examine organizational resistance to *technological innovations*, which are defined as new knowledge or know-how employed to develop or manufacture a product / service (Capon and Glazer, 1987; John, Weiss, and Dutta, 1999). The scope of this definition covers both product technology, such as modular telecommunication systems, and process technology, such as the Just-In-Time (JIT) manufacturing process. Following the construct of resistance to change (Zaltman and Duncan, 1977), organizational resistance to technological innovations is defined as “*organizational behavior that serves to prevent a firm from purchasing a performance-enhancing technological innovation and to maintain the status quo.*” Notably, not every technological innovation is able to improve the performance of industrial customers or better satisfy their needs than existing technologies. For example, when disruptive innovations – innovations that deviate from the improvement trajectories of the mainstream technologies – first come into place, they always deliver an inferior product performance or are of no use to customers in the established markets before they overtake the mainstream technologies (Christensen, 2003). The focus on performance-enhancing innovations is due to the consideration of the key differences between resistance and non-adoption as illustrated previously. Consistent with this definition, this study examines factors that favor the maintenance of the status quo and / or inhibit an organizational buyer from making changes.

The Motivation-Threat-Ability (MTA) framework

Marketing literature has shown that adoption of innovation is mainly determined by factors related to the benefits or values of an innovation (e.g. Dewar and Dutton, 1986; Gatignon and Robertson, 1989). This study contends instead that the driving forces of innovation resistance are rooted in the costs and risks associated with an innovation and a buyer’s satisfaction with the status quo. According to prospect theory (Kahneman and Tversky, 1979), people perceive deviation from the reference point as either gains or losses and weigh losses more than gains in decision making. For an organization in the presence of an emerging innovation, the reference point is the status quo defined by its utilization of the incumbent technology. Migration to a new technology would cause a deviation from the reference point, and end up in either positive or negative outcomes, or both. Although not all organizations are risk-averse, it is reasonable to speculate that

adopting firms focus on the benefits and values of a technological innovation whereas resisting firms weigh more the costs and risks or are just content with the status quo. Organization studies have shown – within the prospect theory framework – that reference points influence an organization’s attitude toward risk taking (e.g. Fiegenbaum and Thomas 1988; Fiegenbaum, Hart, and Schendel 1996). During an exploratory interview, the CEO of a medical supplies company informed the author that its business customers refused to purchase a new medical diagnostic technology simply because they were more concerned about the negative outcomes associated with the technology.

But, what specific factors give rise to the negative perception of a performance-enhancing technological innovation? To answer this question, I develop a unified theoretical framework, which draws on the motivation-opportunity-ability (MOA) paradigm. The MOA framework was originally established to study consumer information processing of brand advertisements (Batra and Ray, 1986; MacInnis, Moorman, and Jaworski, 1991). In the context of brand information processing, the three ingredients are defined by MacInnis *et al.* (1991) as follows: 1) *motivation* is consumers’ desire or readiness to process brand information in an ad, 2) *opportunity* is the extent to which distractions or limited exposure time affect consumer attention to brand information in an advertisement, and 3) *ability* is consumers’ skills or proficiencies in interpreting brand information in an advertisement. Some studies extend the framework to examine the effects of the three elements on organizational information processing of marketing performance and to identify factors that cause introduction delay of preannounced new products (Clark, Abela, and Ambler, 2005; Wu, Balasubramanian, and Mahajan, 2004).

The adoption of the MOA framework for the development of innovation resistance theory is driven by the consideration that a technological innovation is essentially scientific know-how employed for production or selling purpose (Capon and Glazer, 1987; John, Weiss, and Dutta, 1999). Indeed, the technology market features intensive information for buyers (Glazer, 1991). Thus, information processing is indispensably embedded in the purchase decision process of a technological innovation (e.g. Eisenhardt, 1989; Weiss and Heide, 1993). Because innovation resistance is partly a response to the negative outcomes of the purchase decision, this study modifies the MOA

framework to emphasize the costs and risks in the decision process. The new framework is termed motivation-threat-ability (MTA) and is defined as follows: 1) *motivation* refers to a firm's incentive to process information about an innovation, 2) *threat* refers to the internal or external conditions that restrict a firm from processing information about an innovation, and 3) *ability* refers to a firm's ability to process information in an unbiased way. The unified framework provides us with guidelines to identify a comprehensive set of factors that influence organizational resistance to technological innovations, which includes psychological (organizational complacency), economic (switching cost), strategic (market orientation), technological (technological uncertainty), political (political threat and product champions), and organizational structural (formalization, centralization, and specialization) factors. Figure 1 exhibits the relationships between these explanatory variables and organizational innovation resistance.

[take in Figure 1]

Complacency inertia and switching cost disincentive

An organization can be construed as a homeostatic system that strives to maintain the equilibrium of routine operations (Goldstein, 1988, 1989). Past business success is an equilibrium outcome. Yet, it breeds complacency or satisfaction with the status quo within an organization (Gault, 1994; Jayachandran, 1999; Harari, 1993; Tushman and O'Reilly, 1997). On one hand, complacency fulfills a psychological autonomy to sustain the "homeostasis" and equilibrium status of an organization (Watson, 1971), but on the other hand, it reduces a firm's motivation to respond to environmental changes (Meyer, 1982). Tushman and O'Reilly (1997) contended that past success may stifle changes of an organization through reinforcement of the status quo and that creating dissatisfaction with the status quo can alleviate organizational members' resistance to change.

When an incumbent technology contributes to the success of an organization, the firm may turn to be complacent about the product performance. Although a new technology delivers more benefits than the existing one, such as improving a firm's production efficiency or increasing product value to customers, it can cause disturbance of organizational equilibrium and result in discontinuity of the status quo. Thus, a complacent firm lacks the incentive to process useful information about a new technology, even if it possesses performance-improving attributes. Under this circumstance,

resistance to innovation is likely to occur in order to preserve the equilibrium of an organizational system or the status quo.

Organizational complacency is a less studied construct in research related to organizational behavior. It is defined in this paper as *the satisfaction with the performance of current technologies*. The complacency factor was the most threatening and the most prevalent contributor to the downfall of many US industries (Walleigh, 1986). When just-in-time (JIT) manufacturing technology was first introduced, few US companies were interested in adopting and implementing it in the production process despite the many benefits offered by this technology. One of the excuses was (Walleigh, 1986, pp. 50): “*Our factory is operating okay already. We don’t need to put in the effort to convert our operations to JIT.*” If the customers of JIT continuously committed to quality improvement, the technology would encounter the least resistance (Walleigh, 1986). In one of the previous examples, Sun Microsystems met with marketing difficulty for its high-powered protocol technology that can accelerate the computing speed of supercomputers. Following the complacency argument, one explanation for the resistance is that the industrial customers of Sun Microsystems were simply satisfied with the speed performance of the computers in current use and hence did not have the incentive to upgrade. An empirical finding on consumer innovation resistance parallels the positive effect of complacency on organizational innovation resistance. The study shows that when consumers are satisfied with the performance of existing technologies, they tend to resist a technological innovation (Ellen, Bearden, and Sharma, 1991). The reason is that satisfaction with current performance encourages repetition of the existing consumption behavior and mitigates a person’s motivation to make any changes. This explanation echoes the rationales underlying organizational buyers’ innovation resistance. The analysis and the empirical evidence give rise to the following proposition:

P1: The greater the organizational complacency, the more likely the organizational resistance to a technological innovation.

Organizational complacency constitutes a psychological barrier to organizational adoption of a technological innovation. By contrast, switching costs are the economic constraint that reduces a firm’s incentive to consider new technologies. In industrial markets, switching costs refer to any costs that result from an organizational buyer’s

decision to change either a vendor or a product and have been found to influence the purchase decision of technological products (e.g. Heide and Weiss, 1995; Stremersch *et al.*, 2003). In the context of this research study, switching costs are defined as *any costs that are incurred for an organizational buyer due to the technology substitution*.

The technology replacement results in at least three forms of switching costs. First, a company accumulates invisible investments over time in technology utilization, such as tacit know-how and transaction-specific assets. These intangible investments are usually treated as organizational assets (Teece, 1981; Williamson, 1985). A new technology may not be compatible with the assets invested in the incumbent technology. The incompatibility between technologies can transform the assets into obsolete investments. Second, if the new technology comes from suppliers other than the existing vendor, a firm may have to forego the business relationship with the existing vendor and establish an entirely different set of norms and working routines with the new supplier (Heide and John, 1990). Third, the technology substitution requires investments in learning and adapting on the part of organizational members when it comes to the application of new technology (Jackson, 1985).

Organizational buyers foreseeing switching costs are reluctant to pursue the technological change (Jackson, 1985) and thus lack incentives to acquire information about the new technology. As shown in high-technology marketing research, switching costs affect industrial customers' incentives to search the market information of technological innovations. Weiss and Heide (1993) and Heide and Weiss (1995) provide empirical support to the view that the vendor- and compatibility-related switching costs both reduce the information search efforts and restrict a buyer's consideration set to existing vendors. The learning-based switching cost may also cause a disincentive to search beyond the existing portfolio of technologies or vendors. A case in point is the legend of IBM customers strongly resisting the conversion of IBM computer models in the 1980s, when IBM was considering migrating to a new mainframe system – i.e. the 360 computer family (Jackson, 1985). Despite the offering of new capabilities in networking and database management that proved important to the customers, the company encountered abrupt resistance to this new model from its lead customers, who raised the objection that the conversion would cause massive extra investments and

adjustment efforts. The above analysis and example clearly support the following proposition:

P2: The greater the switching costs associated with technology substitution, the more likely the organizational resistance to a technological innovation.

The moderating role of market orientation

One of the main considerations of a marketing firm in purchasing a technological innovation is to enhance the value of a product/service to end consumers, which is an important source of competitive advantage in the marketplace. For instance, the microprocessor technology is an essential component of computers and the upgrades of microprocessors continuously add value to computer users. The importance of consumers is reflected in the classic marketing construct – i.e. market orientation, which refers to a business philosophy that a marketing firm should understand customers' current and future needs and take actions to satisfy them (Kohli and Jaworski, 1990; Narver and Slater, 1990). The construct of market orientation consists of three elements: generation of market intelligence, dissemination of market intelligence, and responsiveness to market intelligence. Market intelligence refers to information about customers' needs and preferences. Generation of market intelligence means that a firm collects information about customers and analyzes it to get a thorough understanding of customers' preferences. Dissemination of market intelligence means that the customer information is communicated and shared within an organization so that every functional unit obtains the knowledge. Responsiveness means that a firm acts on the acquired information to cater to the customers' needs through inter-functional coordination of organizational tasks and activities such as production and marketing.

Given that market orientation centers on information acquisition and utilization, it is reasonable to speculate that an organization constantly engaged in these activities becomes sensitive to market information and has a strong motivation to acquire the information to better satisfy customers' needs. Hence, market orientation may increase a prospective buyer's awareness of the benefits of a technological innovation. It may also mobilize the buyer to be more innovative and more willing to accept innovations (Han, Kim, and Srivastava, 1998). The receptivity to innovation is likely to cultivate a pro-change organizational culture (Hurley and Hult, 1998). All these effects of market

orientation can help a buyer break through the organizational inertia caused by complacency and concerns over costs of change. As shown previously, organizational complacency and switching costs contribute to innovation resistance because a buyer lacks the motivation to change and is reluctant to abandon prior investments in the existing technology. The incentive problems become less severe in the presence of market orientation, due to its information-seeking and pro-change effects. To the extent that market orientation reduces the incentive barrier, it can expand the consideration set of an organizational buyer and consequently alleviate the effects of organizational complacency and switching costs.

For example, Dell, recently announced that it would forgo the long-time business relationship with Intel in one of its high-end servers and switch to the AMD Opteron chip in order to improve the company's sagging sales and market share (Darlin, 2006). AMD Opteron is a microprocessor considered to be superior to its rival Intel. Asked about the reasons for the switch, the company's chief executive, Mr. Rollins, explained that "*the company had been watching the market to see what customers who buy its servers wanted... A.M.D. was very successful, so we are using it*" (Darlin, 2006). The story clearly exemplifies the moderating effect of market orientation. The reasoning and the evidence lead us to postulate that:

P3a: The greater the market orientation, the less the effect of organizational complacency on the likelihood of organizational resistance to a technological innovation.

P3b: The greater the market orientation, the less the effect of switching costs on the likelihood of organizational resistance to a technological innovation.

Technological environment and political conditions

The market for technological innovations possesses a unique characteristic that is absent in other product markets – i.e. technological uncertainty, which consists of two dimensions: technological velocity and technological heterogeneity (Eisenhardt, 1989; Weiss and Heide, 1993). The first dimension refers to the rate of change in product features or performance of a technological innovation. For instance, since the first generation of Intel chips, the speed of the microprocessor has increased exponentially over the years. The second dimension of technological uncertainty refers to the co-

existence of different industrial technologies serving similar functions. For example, organizational buyers in the global telecommunications industry are commonly confronted with a wide range of telecommunications systems (Stremersch *et al.*, 2003). These two dimensions of technological uncertainty have been shown to influence organizational buyers' purchase process and their choice of technology suppliers (e.g. Heide and Weiss, 1995; Stremersch *et al.*, 2003).

This study contends that they also affect a buyer's attitude toward a new technological innovation. First, a high pace of technological change can cause obsolescence of the knowledge embedded in a technology (Eisenhardt, 1989). As a result, the value of a technological innovation becomes time sensitive – that is, the technology deemed superior today may turn out to be less valuable tomorrow. This may restrain a buyer from considering a new technology. For example, Weiss (1994) found that a greater pace of quality upgrades in a technological innovation makes it more likely for a buyer to suspend the adoption decision. Second, the diverse availability of technologies in a marketplace creates difficulty for a buyer to optimize the product choice. One defining feature of technology markets is the existence of multiple standards and a lack of “dominant design” (Anderson and Tushman, 1990). The choice among heterogeneous technologies increases the search efforts and information processing requirements for an organizational buyer (Weiss and Heide, 1993). Therefore, it is postulated that:

P4: The greater the technological uncertainty, the more likely the organizational resistance to a technological innovation.

The uncertain environment in a technology market imposes an *external* threat to a buyer. The *internal* threat (i.e. political threat) originates from a technological innovation itself and refers to the negative influences on an organizational power structure. Tushman and O'Reilly (1997) suggested that management of political forces is one of the indispensable tasks for counteracting resistance to organizational change. Research in marketing has rarely examined the role of politics in the innovation purchase process. Yet, it is evident that organizational politics and innovations are intertwined. Studies show that the political structure of an organization embodies implicit rules and the hierarchy of management power; the rules and power are inherently embedded in the innovation development, adoption, or implementation process (Frost and Egri, 1991; Hardy and

Dougherty, 1997). Integration of a technological innovation into an organizational system may disturb the power equilibrium, because utilization of an innovation requires possession of different expertise and may put under scrutiny the power legitimacy of organizational members whose vested interests are built on the existing technology. As such, the political threat may prevent a buyer from discerning the innovation benefits. The fear caused by the threat can be overwhelmingly felt by the top management team (Zaltman, Duncan, and Holbek, 1973). As Schon (1967) put it,

“If the president came up through the business and draws his confidence from his intimate knowledge of the details of the present operation, technological innovation may throw him onto completely unfamiliar ground. He understood the old business; he does not understand the new one. How can he manage if he does not understand the business he is in?” (p. 68)

In response to the threat of an innovation to the power structure, interest groups within an organization are forced to involve themselves in the political contests for the preservation of control and power (Frost and Egri, 1991). As a result, resistance to an innovation follows. This view is supported by a case study on machine tool automation (Frost and Egri, 1991). As an important linkage in the manufacturing production process, machine tool automation once was achieved through the application of either the Record Playback (R/P) or the Numerical Control (N/C) innovation. Managers were in favor of the N/C technology since it enabled them to gain control over production. In contrast, the R/P technology relied on the skills of workers and hence allowed them to share control. To sustain exclusive control over the manufacturing process, corporate management teams in many companies such as GE and Ford Motor mounted their political efforts to cancel the experiments of the competing R/P technology. This case illustrates how organizational decision makers can orchestrate resistance to an innovation out of the need to protect their political interests. The theory and the case study support the following proposition:

P5: The greater the political threat, the more likely the organizational resistance to a technological innovation.

The moderating role of product championship

One of the reasons for market failure of many technological innovations is a lack of influential product champions (Chandy and Tellis, 1998). Product champions are individuals with certain personal traits in favor of new ideas or technologies, such as leadership charisma, risk taking, political astuteness, and innovativeness (Howell and Higgins, 1990). A formal definition of a product champion is “*a member of an organization who creates, defines, or adopts an idea for a new technological innovation and who is willing to risk his or her position or prestige to make possible the innovation’s successful implementation*” (Maidique 1980, p. 64). A number of research studies show that product champions play the pivotal role in the success of an innovation (e.g. Chandy and Tellis, 1998; Ettie, Bridges, and Keefe, 1984). For instance, it would be hard-pressed to imagine that the powerful “continuous aim fire” technology² could make its way into the US Navy at the turn of last century without the persistent, sometimes aggressive, championship of a US naval officer, Lt. Sims (Tushman and O’Reilly, 1997). Product champions contribute to the success of an innovation because they are both enthusiastic about and capable of promoting the generation and diffusion of new ideas and innovations.

In the purchase decision process of a technological innovation, product champions can serve to mitigate both the external threat of technological uncertainty and the internal political threat by framing the innovation information in a positive manner for organizational buyers. This particular function is due to the unique characteristics of product champions. First, product champions are technology savvy to the degree that they carry sound knowledge of a technology (Chakrabarti, 1974). Second, product champions are innovators and receptive to new ideas. People differ with respect to their readiness to accept new products. Rogers (2003) classifies people with these characteristics into five groups: innovators, early adopters, early majority, late majority, and laggards. Product champions definitely belong to the category of innovators, who are the most venturesome and risk-taking (Howell and Higgins, 1990). Third, product champions exhibit the characteristics of transformational leaders – leaders who are able to articulate vision, instill faith and loyalty, inspire and mobilize followers to pursue elevated goals (Bass, 1985; Howell and Higgins, 1990). To persuade followers to espouse the creative ideas and new technologies, product champions rely on a variety of influence tactics, such as

rational justification, expression of enthusiasm and confidence, and informal exchange of information with potential coalition members (Dean, 1987; Howell and Higgins, 1990). These qualities of product champions – i.e. technological knowledge, innovativeness, and persuasion tactics, work together to reduce the effects of technological uncertainty and political threat on organizational innovation resistance.

As shown previously, the effect of technological uncertainty arises because it engenders the risk of technological obsolescence and incurs extra information search costs and processing efforts on the part of an organizational buyer. Product champions are capable of combating these negative influences and facilitating the migration of technologies. Specifically, they enable a marketing firm to: 1) better understand the values of a technological innovation, and 2) reduce the search costs and efforts on new technologies (e.g. Chakrabarti, 1974; Maidique, 1980). For example, IBM was traditionally an assembler of computer components. In the 1960s, it invented its own computers – i.e. the legendary IBM 360 computer system family based on an innovative micro-circuitry technology. The product success was largely attributed to IBM managers who arduously promoted the application of this new technology at that time (Maidique, 1980).

The effect of political threat on organizational innovation resistance arises because a technological innovation can cause disturbance to the power and do harm to the prestige of interest groups within a firm. Product champions are not only adept at technology but also astute in organizational politics (e.g. Dean, 1987; Howell and Higgins, 1990). For example, in a case study of NASA innovations, Chakrabarti (1974) found that product champions possess high interpersonal skills and the acumen to deal with different types of people. Their political prowess facilitates them in forming coalitions and to overcome decision makers' concerns about potential threats to their power and status posed by a new technology. Consequently, it attenuated organizational resistance to NASA innovative instruments during the new product development process that involved the application of these technologies. Therefore, it is proposed that:

P6a: The greater the influence of product champions, the less the effect of technological uncertainty on the organizational resistance to a technological innovation.

P6b: The greater the influence of product champions, the less the effect of political threat on the organizational resistance to a technological innovation.

Structural characteristics of organizational buyers

Research studies have shown that organizational structure affects the innovation purchase process in an organization (e.g. Kimberly and Evanisko, 1981; Zmud, 1982). According to the literature, an organization's structural characteristics can be defined along three dimensions: formalization, centralization, and specialization (Olson, Slater, and Hult, 2005; Walker and Ruekert, 1987). Formalization refers to the degree to which formal rules and procedures govern the decision making process and the job performance in an organization. Centralization refers to the hierarchy of decision authority and control in an organization. Specialization refers to the division of tasks and activities in an organization and the degree to which each department of the organization specializes in these tasks and activities. The structural characteristics of an organization determine its information processing ability. Marketing research indicates that the information processing ability is important for the appropriate functioning of organizational systems (Moorman, 1995). This study shows that it also constitutes one of the governing forces for organizational innovation resistance.

The relationship between the structural characteristics and innovation resistance stems from their effects on organizational information processing of a technological innovation. In a highly formalized organization, rules and policies standardize tasks and activities. Although standardization is useful for achieving organizational efficiency, it lacks flexibility and responsiveness to an environmental change (Ruekert, Walkerm and Roering, 1985; Zaltman *et al.*, 1973). As a result, the rigid rules and operating procedures may affect a buyer's ability to seek new information in a marketplace. For example, Heide and Weiss (1995) found that formalization constrains an organizational buyer's ability to acquire and utilize new information related to computer workstations and leads to a continuous dependence on the relationship with its existing vendors. By the same token, formalization may drive a buyer to resist changes caused by a technological innovation.

Centralization influences organizational information processing in a different way but gives rise to a similar outcome. A highly centralized organization is characterized by

the concentration of decision power at upper management levels, which inhibits the channel of communications from the other organizational members. Thus, centralization may induce decision makers to consider only information in favor of the existing conditions of an organization and filter out any negative feedback about the status quo of an organization. When it comes to purchasing a new technology, centralization may cause a firm to ignore the beneficial changes generated by a new technology and focus instead on the costs and risks of the changes. As a result, a highly centralized firm may strongly object to the incorporation of a technological innovation into the organizational systems. A stream of empirical research studies have shown that centralization either has a negative impact on organizational innovation adoption or does not make any difference (Dewar and Dutton, 1986; Gatignon and Robertson, 1989; Kimberly and Evanisko, 1981). The findings hint at the positive correlation between centralization and innovation resistance. The following propositions summarize the effects of formalization and centralization:

P7: The greater the degree of formalization, the more likely the organizational resistance to a technological innovation.

P8: The greater the degree of centralization, the more likely the organizational resistance to a technological innovation.

The moderating role of specialization

The positive effects of formalization and centralization arise mainly because they restrict an organization's ability to acquire and process information about a technological innovation in an unbiased manner. At a given level of formalization and centralization, however, specialization or division of tasks and expertise improves the information acquisition and processing functions and facilitates the diffusion of information about a technological innovation. As a result, it reduces the effects of formalization and centralization on organizational innovation resistance. The moderating effect of specialization is rooted in its quality of adaptiveness, which refers to the ability to respond rapidly to the changing environmental conditions (Ruekert *et al.*, 1985; Walker and Ruekert, 1987). This benign outcome of a specialized structure is due to the following characteristics of specialists. First, specialists are more knowledgeable about their task areas and hence can better understand the beneficial impacts of a new

technology on the business operation of a firm. Second, specialists have more access to information sources beyond the domain of an organization (Ruekert, Walker, and Roering, 1985), such as business conferences and trade shows. The information exchange may make them more innovative and receptive to new ideas in accomplishing their tasks. Because access to both positive and negative information allows for an unbiased evaluation of a new technology, a specialized organizational structure is likely to expand a buyer's consideration set of technologies and enables decision makers to discern the benefits of a performance-enhancing innovation. Thus, it is proposed that:

P9a: The greater the degree of specialization, the less the effect of formalization on the organizational resistance to a technological innovation.

P9b: The greater the degree of specialization, the less the effect of centralization on the organizational resistance to a technological innovation.

Managerial implications

The above analysis suggests that information flow to an organization is the key to breaking through the barrier of resistance and promoting diffusion of innovations among industrial customers. This view is consistent with the "far-from-equilibrium" approach proposed by Goldstein (1988) to counteract resistance to change. According to his theory, organizational resistance to change works to sustain the organizational equilibrium, but also deprives an organization of the ability to adapt to environmental changes. When an organization starts to engage in intensive information exchanges with outside environments, the external changes would be absorbed in the organizational systems such that an organization becomes sensitive, responsive, and adaptive to the changes and eventually deviates from the original equilibrium.

The critical role of information offers clues to overcoming innovation resistance for both technology suppliers and buyers. On the part of buyers, they should be active in market research and collect information to keep abreast of the change in consumer preference and new technologies. To the extent that the incoming information challenges the assumptions and existing perception of a firm about itself and the environments, it may destroy the foundation of organizational complacency and dispel concerns for switching costs. In the example of Dell, the company forsook the long-time partnership with Intel for one of its servers and switched to the AMD microprocessor. The decision

was based on the information about customer preference in the server market and the knowledge of the superiority of the AMD product (Darlin, 2006).

For innovation vendors, this study suggests that they seek endorsements and supports from product champions and technology experts. Product champions are both technically capable and politically astute for promoting new technologies, whereas technology experts are capable of improving the organizational information processing ability by enhancing information exchanges of an organization with its external environments. Product champions can be found within an organization (Chandy and Tellis, 1998). They do not necessarily reside at the top management level. Employees at the middle level such as product line managers can also wield influence (Maidique, 1980). Innovation vendors need to develop close relationships with these stakeholders in an organization and cultivate their interests in a new technology so as to build up the momentum to accept the innovation. Secondly, the vendors should downplay the attributes of a new technology that may arouse a buyer's concerns for technological obsolescence and dissolution of core competency, or attributes that pose threats to the vested interests and power of decision makers. Marketers of shiny innovations have a habit of trumpeting the products' relative advantages, but often times ignore the disruptive impacts of changes caused by innovations. To avoid backfiring, marketing efforts need to add reassurance to a buyer that the changes are manageable and the vested interests of affected groups can be preserved.

In addition to strategies of overcoming innovation resistance, this study also provides useful insights on market segmentation and targeting for technological industrial products. Literature on business-to-business marketing has proposed a variety of segmentation variables for industrial markets, such as demographics, psychographics, operating variables, purchasing approaches, situational factors, personal characteristics, and strategy type adopted by a firm (Bonoma and Shapiro, 1983; File and Prince, 1996; Verhallen, Frambach, and Prabhu, 1998). The explanatory factors identified in this study expand the scope of segmentation variables, especially for high-technology industrial markets. The technology vendor can then target particular buyers with favorable characteristics along one or a combination of these dimensions. For instance, a seller may

search for buyers that exhibit little complacency, are less formalized or centralized, or are likely influenced by product champions.

Summary and conclusions

Organizational innovation resistance is a barrier to diffusion of innovations. It becomes more the rule than the exception that technological innovations encounter resistance from potential customers when they are introduced into a marketplace. Many innovation manufacturers are baffled by this phenomenon (Essick, 2005). The literature is replete with studies on innovation adoption (Frambach and Schillewaert, 2002). Much less research effort has been spent on resistance to innovations. Innovation resistance is not the mirror image of adoption or equivalent to non-adoption (Gatignon and Robertson, 1989). Resistance differs from non-adoption in two main aspects. First, resistance occurs at a distinct stage preceding adoption in the innovation process (Ram, 1987, 1989; Woodside and Biemans, 2005). Second and more importantly, resistance to an innovation is an attempt to counteract the force to change and an effort to maintain the status quo of an organization, even if an innovation carries performance-enhancing attributes. In contrast, non-adoption simply results from the lack of product benefits to a buyer.

Current research on innovation resistance focuses on *consumer* resistance to technological products. Little is known about innovation resistance at the organizational level. This study aims to address this research gap. Based on an information processing perspective, it develops a unified theoretical framework (i.e. the MTA model) to accommodate the dramatically diverse explanatory variables. This new overarching framework is multifaceted and comprehensive in itself, encompassing the psychological, economic, technological, political, structural, and strategic aspects of the innovation process of an organizational buyer. The theoretical arguments about the effects of these factors are supported by insights from related literature, real-life examples, and case studies. A recent literature review on organizational innovation adoption scanned the explanatory variables that had been examined in prior research (Frambach and Schillewaert, 2002). The determinants of innovation resistance identified in this study differ from those of innovation adoption in the literature. This contrast may also suggest that innovation resistance and adoption are driven by contrasting forces and mechanisms.

Limitations and future research

In this paper, I develop a conceptual framework to explain organizational resistance to technological innovations. Because the explanatory variables are identified within the unifying MTA framework, my study may leave out some important antecedents of innovation resistance. For instance, self-efficacy (ability to perform a task or activity) has a negative effect on consumer resistance to technological innovations (Ellen, Bearden, and Sharma, 1991). The reason is that if a person feels less capable of coping with the changes caused by an innovation, she may resist it in order to combat the discomfort or feeling of inadequacy arising from the anticipation of the change. By the same token, employees' ability to handle a new technology may have a similar influence on an organizational buyer's innovation resistance. Future research may expand the scope of the determinants of organizational innovation resistance along this direction. Second, a technological innovation may encounter resistance not only at the purchase decision making stage but also at the implementation stage during the process of admitting an innovation within an organization (Zaltman, Duncan, and Holbek, 1973). After an innovation is purchased, an organization has to make sure that the new technology can be put into use; otherwise, the adoption decision would generate little value. Future research needs to examine innovation resistance that affects the implementation of an innovation within a firm. Third, the intensity of organizational innovation resistance may differ between radical and incremental innovations. A radical innovation is built on a substantially different technology from the incumbent products (Chandy and Tellis, 1998), whereas an incremental innovation only involves small improvements over the existing products. Thus, radical innovations may cause changes of higher magnitude than incremental innovations and consequently induce more resistance from a prospective organizational buyer. In future study, one may compare the effects of those resistance determinants on these two types of technological innovations. Finally, an empirical study is needed to test for the external validity of the conceptual framework. This paper is a precursor and lays the theoretical foundation for the test.

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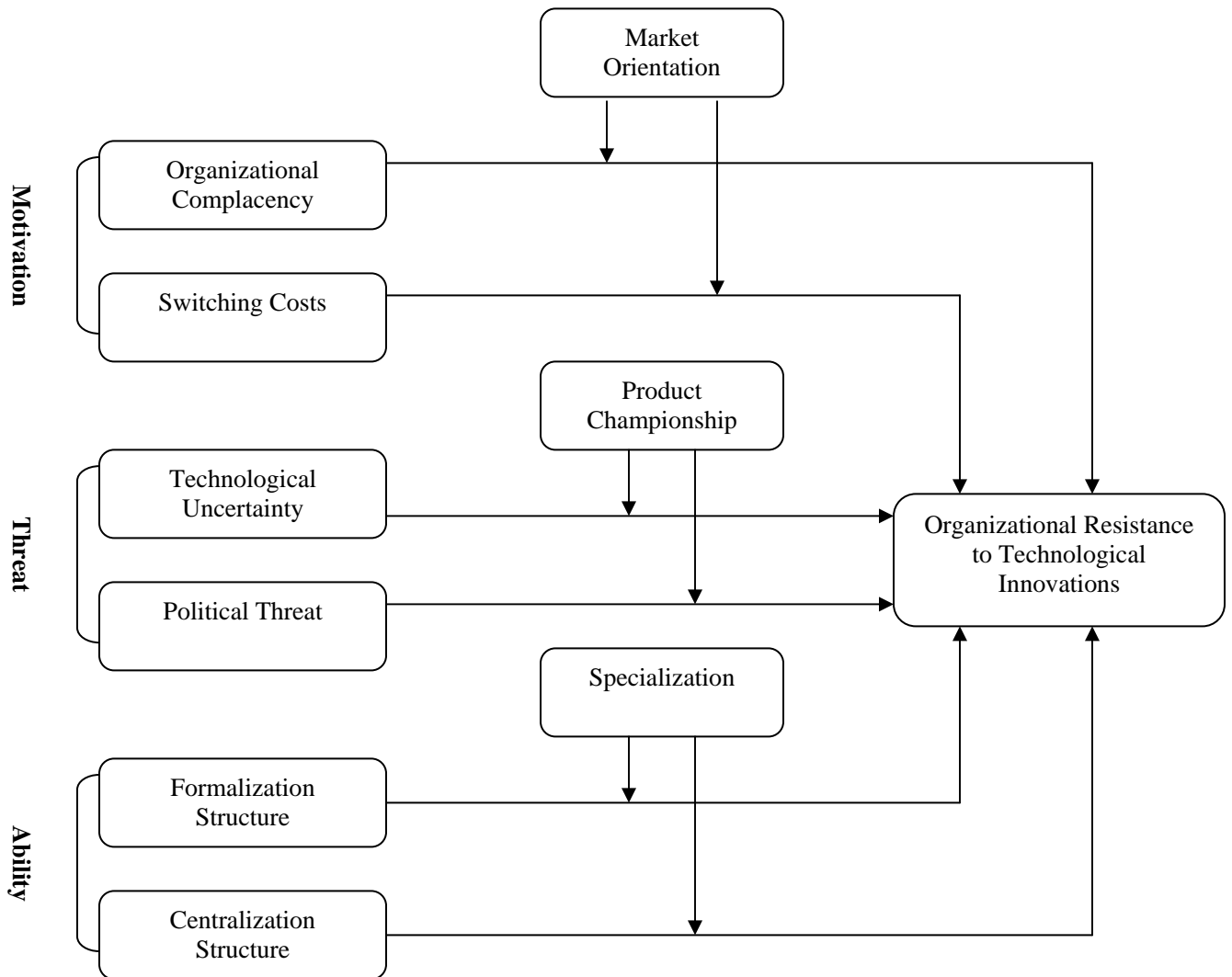
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Figure 1 The Motivation-Threat-Ability (MTA) Framework – A Model of Organizational Resistance to Technological Innovations



Notes

¹ Christensen (2003) elaborated the evolution of the hydraulic technology in his ground-breaking book on disruptive innovations - “*The Innovator’s Dilemma: The Revolutionary Book that Will Change the Way You Do Business*”. For detailed information about the history of this technology, please refer to Chapter 3 of this book.

² The technology was invented by an admiral of the British Navy to improve the hit rate of gunfire on the battleships. The accuracy of gunfire increased by 3000% after the technology was put into use. For details on this case, please refer to Tushman and O’Reilly (1997, pp. 4 – 6).