«ΣΠΟΥΔΑΙ», Τόμος 59, Τεύχος 1ο-2ο, (2009) / «SPOUDAI», Vol. 59, No 1-2, (2009), University of Piraeus, pp. 100-124

INNOVATION ADOPTION: AN INTEGRATIVE MODEL

By

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Abstract

Innovation adoption is critical for firms' survival and growth. Despite its importance, however, research on the subject is highly fragmented. In this paper, I draw on diverse streams of research to develop a coherent model that depicts adoption as a two-stage process, comprising initiation and implementation. Initiation is the stage at which a decision is made regarding the acceptance or rejection of a given innovation. Perceptual characteristics of the innovation, cognitive traits of the decision makers and environmental stimuli are the key issues here. Implementation concerns the systematic exploitation of the innovation by its intended users. Effective implementation depends on a coherent set of policies facilitating the use of the innovation and, importantly, on the fit of the innovation with the values of its intended users. Finally, the model delineates the role of the wider organizational context as the common ground upon which the adoption process unfolds. JEL Classifications: M1, O33.

Keywords: Innovation Adoption; Management of Innovation.

1. Introduction

Innovation has always been a key element in economic development and firms' competitive success. Since the 1990s, however, innovation has become, and still remains, a managerial imperative, something like a 'recipe' for success in the face of hyper-competition stemming from globalization and technological revolution. As even the most stable environments (eventually) change, firms need to innovate in order to maintain and/or improve their competitive position. To innovate, however, is not a simple task. Even if innovation means to adopt and successfully implement an innovation developed elsewhere, as opposed to generate "in-house" an innovation that others may want subsequently to adopt or imitate (see for example the Frascati Manual, 2002), this very fact presupposes a multitude of personal, organizational and environmental factors that together, not in isolation, through their complex interplay generate the capacity for effective innovation adoption.

In this paper I examine the theoretical foundations of the phenomenon of innovation adoption. Based on an extensive literature review I present an integrative model that synthesizes extant research on the subject. The model depicts innovation adoption as a two-stage process comprising innovation initiation and innovation implementation; for each of these stages a number of factors is identified that act as important antecedents. In innovation initiation, the perceived (as opposed to objective) characteristics of the innovation in question play the crucial part (Rogers, 1995). Decision-makers decide to proceed or not with the prospective innovation based on how they perceive the potential benefits stemming from its adoption. To a significant extent, these perceptions are determined by the decision-makers' personal and psychological traits (Kimberly and Evanisko, 1981; Boeker, 1997), as well as by the broader organizational context (Hurley and Hult, 1998; Srinivasan *et al*., 1999), in which the innovation will be embedded and the environmental pressures to which the firm needs to adapt (Gatignon and Robertson, 1989).

After a decision has been made to accept an innovation, the critical next step concerns its implementation within organizational boundaries. To a lesser or greater extent, the innovation has to be "re-invented" so that it fits the particular circumstances of the adopting organization (see for example, Swanson, 1994). Any innovation, particularly when it is radical with respect to the adopting organization's context, brings with it a certain degree of change in the preexisting practices, activities and organizational arrangements. Seen this way, innovation implementation is never a simple process. In contrast, it necessitates significant and well-orchestrated efforts from the part of management to ease its acceptance by those employee groups in the firm that are affected by the innovation. Innovation implementation is effective in as far as the targeted employees are committed to use and exploit to the full the innovation, a sentiment that, in turn, is affected by the degree to which the innovation fits their deep held values (Klein and Sorra, 1996).

As should be obvious from this brief introduction, and as will be elaborated below, innovation adoption is a highly complex process. Furthermore, it is driven by personal views and traits of the decision makers, and the values of those who are intended to make use of the innovation. In this respect, the importance of the human factor cannot be overemphasized. More "objective" characteristics, such as the organizational context, are (of-course) present in the framework presented here, and their influence on innovation adoption cannot be ignored. For example, the presence of slack resources, that is, resources available to be used for the adoption of innovation is a factor with obvious conse-

quences in the decision to adopt (or not) an innovation (Damanpour, 1991; Kuitunen, 1993). In general, the ultimate objective of the model proposed here is to provide a cohesive picture of the factors at work so that it may serve as a navigation plan for firms wishing to embark in the "innovation journey".

The remainder of this paper unfolds as follows. In the following section we provide some terminology about innovation. Section 3 follows with the proposed model and a detailed description of the factors affecting adoption, beginning with innovation initiation and then with implementation. The last section concludes.

2. Defining the Domain: What is Innovation?

Innovation has been the subject of a vast amount of academic and practice-oriented literature, and has been examined from a number of different angles of view (e.g. industrial policy, sociology, marketing, organizational behavior, management of technology, see for example, Fagerberg *et al*., 2006; Stoneman and Ball, 1995; Burns and Stalker, 1994). Innovation can involve a new product (outcome) or a new process or a new managerial system or procedure. The extant literature refers to these different forms of innovation on the basis of three contrasting sets of attributes (Wolfe, 1994):

Product vs. Process. This distinction relates to the areas and activities that an innovation affects. Whereas process innovations are defined as tools, devices and knowledge in throughput technology, product innovations are outputs or services that are introduced for the benefit of clients.

Radical vs. Incremental. Radical innovations cause fundamental changes in the activities of an organization and represent clear departure from received practices. Highly radical, competence-destroying innovations may result in the increase of environmental uncertainty and the transformation of firms or industries. Incremental innovations, on the other hand, represent minor departure from existing practices and usually reinforce the stock of available firm capabilities.

Technical vs. Administrative. The distinction is important because it reflects the more general distinction between internal, organizational social fabric and technology. Technical innovations refer to products, processes and technologies to produce these products. They relate directly to the basic work activities of an organization. Administrative innovations pertain to organizational structure, management processes and human resources; they are indirectly related to the basic work activity of the firm and are directly related to its management (Damanpour, 1991).

A common underlying theme in the above contrasts is the notion of newness. At the most basic level, innovation signifies something that is new. This "newness", however, may signify a *new-to-the-world* technology or product, but may also reflect newness at the level of the *adopting organization*, even though the product or technology may have been developed elsewhere. Put differently, there are two kinds of innovation processes: the first concerns innovation from the perspective of the innovation developer, that is, the firm that develops, generates something new and brings it to the market. The second, in contrast, is looking at innovation from the point of view of the user, that is, the perspective of the firm that adopts an "external" innovation. From within this perspective, innovation is a technology or a practice that is being used for the first time by members of an organization, whether or not other organizations have used it previously. For present purposes, *it is this latter variety of innovation that concerns us the most*, as Greek firms, which represent the vast majority of the country's industrial fabric, are more likely to adopt innovations rather than to develop them by their own initiative. In this paper, therefore, I concentrate on innovation adoption, particularly –but not exclusively- process innovations in the form of new technologies developed elsewhere that can be profitably exploited by SMEs to improve their manufacturing and, more generally, their competitive performance.

3. An Integrative Model of Innovation Adoption

Innovation adoption, technology acceptance, or technology transfer, is the terminology used to refer to the decision of any individual or organization to make use of an innovation, whereas innovation diffusion refers to the accumulated level of users of an innovation in a market. It is important to realize that innovation adoption is not a single yes or no decision. In contrast, it involves a sequence of steps through which a firm –more specifically, a decision-making unit within the firm- passes through before accepting a new technology, product, or administrative procedure (henceforth: innovation). This process extends from initial awareness of the innovation, evaluation of the pros and cons and subsequently formation of an attitude and intention towards the innovation, to the ultimate decision to adopt or reject the new idea (Frambach and Schillewaert, 2002). This is the **initiation** stage.

Initiation, however, does not exhaust the process of adoption, since a positive decision to adopt progresses towards ***implementation*** of the new idea within the boundaries of the adopting organization. Implementation signifies the process of gaining targeted employees' appropriate and committed use of an innovation (Klein and Sorra, 1996). Obviously, implementation presupposes a positive deci-

sion to initiate an innovation, that is, as noted above, a decision typically made by senior managers that employees will use the innovation (be it a new technology, a new product, or new administrative procedure) in their work. In the implementation stage, the organization actually acquires the innovation and invests resources and time in putting it into productive use. At this stage, the important problem is that of securing the acceptance and assimilation of the new idea and of exploiting it to the best possible way. As Rogers (1995) has put it, innovation adoption is defined as the "[...] *decision to make **full use** of an innovation as the best course of action available"* (ibid: 21, emphasis added).

Under this light, innovation adoption is a highly complex process that unfolds on the two consecutive stages of initiation and implementation. In order to understand why some firms actually adopt and exploit a given innovation whereas others (perhaps greater in numbers) do not, one needs to gain an appreciation of the factors affecting innovation initiation and implementation. The literature on innovation adoption (see for example, Damanpour and Gopalakrishnan, 1998; Cooper, 1998; Jeyaraj *et al*., 2006) has long been preoccupied with these factors, mainly in the context of initiation and less so of implementation, and has broadly categorised them into three main classes of effects: (a) organizational context, (b) personal characteristics, values, and perceptions of individuals involved in the adoption process, and (c) environmental pressures.

The following Figure synthesizes the extant literature and presents an integrative view of the innovation adoption process. As discussed above, even though initiation and implementation are the two parts of one and the same process, they are qualitatively different in the mechanisms and criteria involved, and are therefore affected by different sets of factors. A central element in the initiation stage is the way by which the innovation in question is perceived by the decision makers (Wolfe, 1994). The decision to adopt or not an innovation is typically of strategic significance to the adopting organization and, hence, the perceived properties of the innovation are of paramount importance. These perceptions are influenced by the personal traits and characteristics of the decision makers, together with the organizational context and factors from the external environment such as competitive pressures and the intensity of the marketing efforts of the "supplier" of the innovation.

Once the decision has been made in favour of the innovation, the task then becomes to introduce and eventually integrate the innovation in the operational activities of the firm. What is at stake at this stage is the consistent and coherent use of the innovation by its intended "audience", that is, by those employees that their tasks are affected by the innovation. This is a difficult

undertaking that depends on the implementation policies and practices exercised by the firm's management as well as by the degree to which the innovation fits the prevailing values of its targeted groups within the organization (Klein and Sorra, 1996; Pennings and Harianto, 1992).

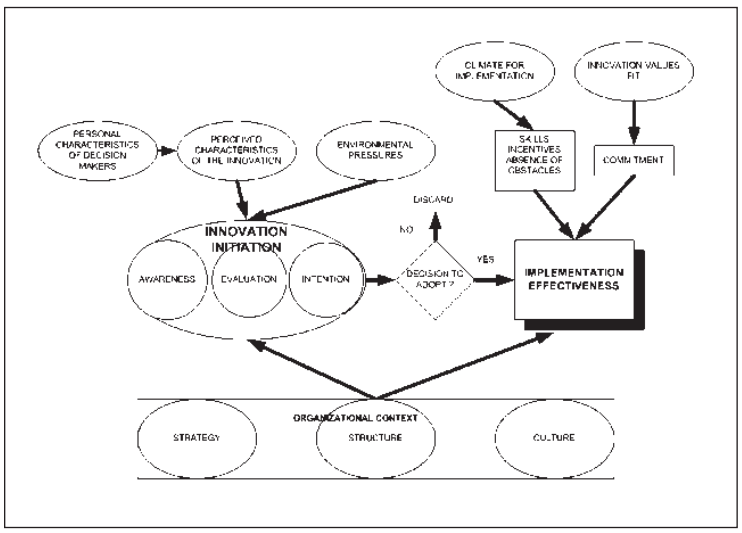
In what follows we will present these factors in more detail, beginning with innovation initiation.

3.1 Factors affecting Innovation Initiation

Decisions to adopt a radical innovation, that is, an innovation that signifies an important –or at least a visible- difference in the ways the firm operates, typically represent complex and unstructured decisions of a strategic nature. The acquisition (or not) of an innovation from an external source is by any measure a critical strategic decision that is typically perceived by the decision makers to have a significant impact in the future competitiveness of the firm. As such, the initiation stage is critically affected by the way in which the managerial elite responsible for the decision frames and makes sense of the "problem" posed by the prospective innovation. This is why the perceived characteristics of the innovation in question are placed at the heart of the factors affecting the initiation stage in Figure 1.

FIGURE 1

An Integrative Model of Innovation Initiation and Implementation



3.1.1 Perceived innovation characteristics

The perceptions of an innovation by members of an organization's decision makers quite naturally affect their evaluation of, and propensity to, adopt a given innovation. But what is that which decision makers make sense out of an innovation?

The potential benefits stemming from adopting a particular innovation represent a critical input for the decision makers. These benefits –related to perceived characteristics of the innovation- should exceed the costs (initial financial investment and ongoing expenses) as well as the perceived characteristics of alternative innovations, including the "null" option of no adoption at all. Some of the most important of these characteristics that have been identified in the literature include the following (Wolfe, 1994; Rogers, 1995)

Relative Advantage – that is, the potential advantage conferred to the firm in terms of competitiveness (Mansfield, 1993).

Adaptability (flexible vs. inflexible) – the ability to refine, elaborate, and modify the innovation to the needs and objectives of the adopting firm.

Compatibility – the degree to which an innovation is consistent with the existing values, past experiences, and needs of the adopting organization (Holak, 1988).

Complexity – the extent to which an innovation is perceived as relatively difficult to understand and use.

Observability – the extent to which the results of the innovation are expected to be visible to important others within and outside the firm.

3.1.2 Personal Characteristics of the Decision Makers

It is generally known that every decision maker brings his or her own idiosyncratic perspective in the decision situation in which she or he is involved. In this sense, any decision, particularly when it is an important one, is subject to to behavioral components rather than to strictly rational decision making. As noted earlier, strategic decision-making is based on managerial perceptions, which, in turn, reflect the decision makers' cognitive base and values as well as personality and demographic factors (Hambrick and Mason, 1984). Prior research on the subject suggests risk propensity, self-efficacy, and cognitive complexity as important determinants of intentions to adopt an innovation. In the integrative framework depicted in Figure 1 we contend that these and other

common demographic characteristics of the decision-makers (i.e. age, education, and past experiences), affect their perceptions about the character of the innovation, and through these perceptions, the decision to adopt or not.

Risk propensity

Risk propensity denotes the decision-maker's tendency either to take or to avoid risks (Sitkin and Pablo, 1992). This tendency in turn depends on the individual's tolerance for risk and tolerance for ambiguity (Baird and Thomas, 1985). Research has shown that those executives with high tolerance for ambiguity tend to take more risks. Innovation is clearly a realm of high risk and uncertainty and as such we would clearly expect that innovators will be those with the propensity to take (calculated) risks. Innovation adoption not only entails sizable commitment of financial and human resources at both the initiation and the implementation stages, but is also highly risky in that it brings considerable change in the existing structure, practices, and flow of activities of the organization. Hence, we expect that risk propensity of the key decision-makers will translate in favorable and optimistic perceptions concerning key aspects of the prospective innovation and will, therefore, lead to positive intentions towards adoption.

Self efficacy

Self-efficacy, a psychological term, refers to one's perceived ability of accomplishing one's tasks (Bandura, 1989). Individuals with high levels of self-efficacy esteem are generally considered to be more active, attempt to proactively handle situations as opposed to after-the-fact reaction, and are more creative in problem-solving. It follows that managers on the high-end of a self efficacy "scale" would be more likely to support and/or initiate innovative decisions and activities simply because they would feel capable in dealing with the complexities, adhocracies, risks and challenges associated with innovation. We would therefore expect more positive perceptions and, consequently, more chances for innovation adoption.

Cognitive complexity

Cognitive complexity refers to an individual's measure of ability to process and manipulate different dimensions/constructs in evaluating alternatives in a decision situation (Tabak and Barr, 1999). Individuals who use a larger number of constructs in interpreting, perceiving, understanding and predicting complex phenomena are said to have a more complex cognitive structure. They are more capable at analyzing and integrating concepts and data in a way that goes

beyond surface understanding, and are also more capable at reaching creative and novel solutions. Within an innovation decision-making context, cognitive complexity represents a match to the inherent complexity and novelty of the decision situation, thus allowing individuals to comprehend and appreciate alternatives and aspects of the situation that would otherwise seem incomprehensible and even threatening. Consequently, we would expect that managers characterized by high cognitive complexity would be more capable of developing a more accurate understanding of the pros and cons of the prospective innovation and hence, would be more likely to lead towards positive decisions for adoption.

Demographic characteristics of the decision-makers

The literature on innovation adoption has long used demographic characteristics as proxies for cognitive orientations of the key decision-makers. The three most commonly used characteristics to explain adoption decisions have been managers' *age, education*, and *past experience* (Hambrick and Mason, 1984; Bateman and Zeithaml, 1989). Regarding age, it is assumed that younger managers are generally more receptive to new ideas as a result of their being more recently educated, of their more pronounced learning ability (which generally diminishes with age), and their more risk-taking and progressive profile. In a similar vein, higher and better formal education brings more focus and receptivity in new ideas, opens new perspectives, and strengthens cognitive complexity and perceptions of self-efficacy. Finally, past experience with innovation will naturally have a bearing on how executives frame the current decision situation (Tabak and Barr, 1999). Past successes would normally promote a sense of self-efficacy, would increase optimism about the potential benefits stemming from the prospective innovation, and would generally increase the tendency to view the current situation from a more positive angle. In summary then, all of the above demographic characteristics are expected to be positively associated with intentions to decide in favor of a given prospective innovation.

3.1.3 Environmental Influences

The market environment within which a firm operates presents certain threats and opportunities for its survival and growth. In this sense, it is generally argued that every organization should be open to communication with customers, suppliers, distributors, institutional groups, and (even) rivals, in order to exploit opportunities to produce innovative forms of competitive advantage and adapt to changing market conditions. The literature has focused on environmental factors such as industry structure and competitive pressures, net-

works and regional clustering, and environmental dynamism. These have been found to pose the greatest impact on firm's propensity for innovation adoption (Frambach and Schillewaert, 2002).

Industry Structure and Competition

Simple logic suggests that in highly competitive markets, innovation adoption may be necessary for a firm's competitive advantage, if not survival. The decision not to adopt an innovation that rivals have chosen to implement may lead to failure, depending of course on the strategic significance of the innovation in question and its effects on efficiency and effectiveness. Empirical research on the effects of industry structure on innovation, however, has produced mixed results. There exist studies (e.g., Scherer, 1967; Bozeman and Link, 1983; Huiban and Bouhsina, 1998) that identify a positive relationship between industrial concentration and innovation. This is evidence against the logic noted above, since high levels of concentration imply low intensity of competition. Other studies report results in line with the main argument. For example, research on Dutch (Acs and Audretsch, 1990) and Northern Ireland manufacturing firms (Harris and Trainor, 1995) has found that highly concentrated markets inhibit innovation. In the same vein, several studies found that low competitive intensity relates negatively to innovation, mainly because, as suggested above, competition is regarded as a driving force that induces firms to actively search for new and innovative ways to maintain or improve their competitive positions (e.g., Thong and Yap, 1995). Still other researchers (e.g., Malerba *et al*., 1997) argue that no significant relation exists between innovation and industry concentration. Despite these conflicting results, however, and for present purposes, we will assume that intensity of competition induces firms, at the very least, to consider seriously the prospect of adopting innovations that other actors in the firm's domain appear to favour, a proposition that leads us in the role of networks.

Networks and Positive Externalities

Market and institutional pressures towards inter-organizational networks (i.e. enduring transactions, flows, and linkages with suppliers, customers, institutional actors –e.g., governmental bodies-, and competitors) positively affect a firm's propensity to innovate by providing opportunities for shared learning, transfer of know-how, and resource exchange (Nohria and Eccles, 1992; Goes and Park, 1997). This tendency is more pronounced the more members of the network in which the firm belongs have adopted the focal innovation. The literature refers to this phenomenon as network externalities, meaning that the

value of innovation and, hence, its adoption probability, increases with the number of other users. To the extent that the focal innovation becomes, or has the prospects to become, instrumental in constituting the prevailing rules of the competitive game, the propensity to adopt it will increase accordingly. It is interesting to note in this respect, that this phenomenon resembles very much a "self-fulfilling prophecy" situation. The promise of network externalities induces firms to adopt the innovation, and the more they do so the more the promise of externalities is fulfilled, thus resulting in a mutual reinforcing positive feedback loop.

Regional clustering is a particular case in the more general problematic of networking. It is generally assumed that clustering positively influences a firm's propensity to innovate. It appears, however, that the relationship is complex and ambiguous. As some scholars argue (Pouder and John, 1996; Staber, 1996), there exists a temporal variation in the effects of clustering on innovation. Initially, the very fact of clustering and the resulting complementarities in the activities of the clustered firms lead to low transactions costs, resource exchange, and transfer of knowledge. These, together with institutional forces create an environment conducive to innovation. In the course of time, however, those same factors tend to create a homogeneous culture that eventually suppresses innovation. Therefore, in the long run, innovation may relate negatively with clustering.

Market Dynamism

Another dimension of industry and market environment that is often emphasized in the literature is that of dynamism. Environmental dynamism basically refers to the frequency and (un)predictability of changes in environmental factors such as competitors' moves, or customers' preferences. Past research shows that environmental dynamism positively affects all aspects of organizational change and innovation (Huber *et al*., 1993; Covin and Slevin, 1989). For example Lawrence and Lorsch (1967) argued that organizations operating in dynamic environments find themselves in the midst of flows of information, changing consumer needs, and potential new opportunities. Such environments are conducive to innovation. Within this line of reasoning, it is only logical to assume that under these circumstances firms are more motivated and more open to innovating than in environments that change little (Hambrick, 1981), a hypothesis that has been confirmed in many empirical studies (e.g., Pierce and Delbecq, 1977; Damanpour, 1996).

3.1.4 The Role of the Supplier of the Innovation

The ways in which the decision makers perceive the focal innovation, and consequently its probability to be adopted, not only depend on their personal characteristics, the influence of the external environment, and the broad organizational context (more on this below), but also depend on the marketing activities of its supplier (Ram and Jung, 1994; Hultink *et al*., 1997). Simple logic suggests that supplier (or its representative) marketing activity can significantly influence the probability that firms will adopt a given innovation. Even though the marketing of a new technology is a complex issue, the literature appears to converge on the importance of three related factors (Frambach and Schillewaert, 2002): ***targeting*** of the marketing effort, ***communication***, and activities of the supplier to ***reduce perceived uncertainty*** on the part of the potential adopter. Careful and specific targeting of marketing activities towards selected potential adopters can, quite obviously, facilitate acceptance. The effectiveness of the marketing message in creating awareness and influencing intentions is also crucial. Finally, and perhaps more importantly, for creating positive intentions for adoption the supplier must be able to demonstrate concrete measures that reduce the perceived financial and operational risks associated with the use (implementation) of the focal innovation.

3.2 Factors affecting Innovation Implementation

As noted earlier, innovation implementation refers to the process of gaining targeted employees' *appropriate and committed use* of an innovation (Klein and Sorra, 1996). This definition, of course, presupposes that a decision has previously been made by senior managers to adopt the focal innovation and by extension, that employees within the firm will use the innovation in their normal work activities. Seen this way, subsequent failure of a firm to realize the intended benefits of an adopted innovation may reflect either a failure of implementation or a failure of the innovation itself to deliver its promises (on which promises the adoption decision was based in the first place).

What are the factors affecting implementation success? There exists a paucity of research on innovation implementation as opposed to initiation, or perhaps it is more accurate to say that issues of implementation are mostly confounded within the problematic of initiation. Damanpour's (1991) seminal meta-analysis, for example, even though acknowledging the differential impact of organizational variables on innovation, is not very informative on what really works for implementation. The one, and relatively recent, exception is the integrative framework

presented by Klein and Sorra (1996) that attempts to conceptualize the determinants and consequences of implementation effectiveness.

According to Klein and Sorra the effectiveness with which an innovation is implemented is basically a function of (a) an organization's climate for the implementation of a given innovation and (b) targeted employees' perceptions of the fit of the innovation to their values.

3.2.1 Climate for Implementation

This is a term used to signify the multiplicity of policies, practices and procedures that a firm's management is using in order to institute the innovation and facilitate its acceptance and systematic use from its intended "audience" within organizational boundaries. What needs to be stressed here is that these practices do not necessarily refer to a general disposition of the firm but rather refer to how a *specific* innovation is implemented. Examples of such policies and practices include training in innovation use, user support services, time to experiment with the innovation, praise from supervisors for innovation use, financial and other types of incentives for innovation use, and the user-friendliness of the innovation.

Different innovations may necessitate a different mix of such practices and policies, but at the most general level they refer to targeted employees' *shared summary perceptions of the extent to which their use of a specific innovation is* ***rewarded, supported****, and* ***expected*** *within their organization*. As with the case of innovation initiation, what matters the most is not some objective characteristic(s) of the innovation per se, but how decision makers perceive these and the value they ascribe to them. In the same vein, the extent to which targeted employees, actually and "wholeheartedly" accept, make use, and exploit a given innovation is a function of how they collectively perceive their organization's implementation policies and procedures.

The more the employees perceive that the firm's management has formulated and operates a comprehensive and consistent set of policies aimed at encouraging, cultivating, and rewarding their use of a focal innovation, the stronger the climate for the implementation of that innovation. What such a strong perceived climate for implementation offers is (a) necessary ***skills*** in innovation use, (b) ***incentives*** for use and ***disincentives*** for innovation avoidance, and (c) the ***removal of obstacles*** to innovation use. For example, a strong climate for implementation of a given innovation exists when training is readily and broadly available to targeted employees (skill); additional assistance is available following training

(skill); ample time is given that employees can both learn and use the innovation on an ongoing basis (skill, removing obstacles); employees' concerns and complaints are responded to by those responsible for the innovation implementation (removing obstacles); and employees' use of the innovation is monitored and praised by managers and supervisors (incentives).

Creating a strong climate for implementing a given innovation is, therefore, a controllable task from the part of firm's management. It does not ensure, however, that employees will *commit* themselves in the innovation; it will assure a certain degree of ***compliance***, but this is a different thing. Psychologists distinguish between compliance, the acceptance of an external influence in order to gain specific rewards and to avoid punishments and ***internalization*** (commitment), the acceptance of an external influence because it is congruent with one's values (Sussman and Vecchio, 1991). This distinction leads to the second determinant of implementation effectiveness, that is, the innovation–employees' values fit.

3.2.2 Innovation-Values Fit

Note that we have defined implementation as the process through which the organization gains the targeted employees' appropriate and committed use of an innovation. According to Klein and Sorra, employees' *commitment* does not depend on a strong climate for implementation of the focal innovation. As explained above, the latter can only ensure compliant use. Employees' commitment, on the other hand, rests on their perceived fit of the innovation to their values. This is not something that a firm's management can control; at least not as much as the creation of a strong implementation climate.

Even though (or precisely because) the term "values" is often used in common parlance, some formal definition is in order. Organizational values represent implicit or explicit views that are *shared* to a considerable extent by organizational members. These values pertain to both the external relations of the organization (i.e., how the organization should relate with customers, competitors, and other external constituencies) and the internal integration of the organization, that is, how members should relate to, and work with, one another (Schein, 1992). Each individual is clearly a distinct personality but organizational values represent some kind of a common denominator about these views; organizational members, through their common experiences and through their belonging in the same organization, come to develop a shared set of values about what is and what is not important for them and the organization they belong. These values are to a large extent stable but are not fixed; they evolve in response

to changing circumstances. Moreover, their intensity is not uniform; values vary depending on the perceived importance of the issue at hand. There exist issues about which values encapsulate strong views regarding what is (and what is not) desirable, as well as issues of relatively little importance to organizational members about which the corresponding values are of low intensity.

By the term innovation-values fit, Klein and Sorra describe *the extent to which targeted users perceive that use of the innovation in question will promote (or, conversely, inhibit) the fulfillment of their values*. These perceptions are socially constructed; it is one thing the objective characteristics of the innovation and another the meaning ascribed to these characteristics by the targeted users of the innovation. These perceptions are the arbiters of the congruence, and the extent thereof, between group values and innovation characteristics. Theoretically, there are three possibilities. Innovation-values fit is ***good*** when targeted innovation users find the innovation highly congruent with their high intensity values (note that as issues vary in their importance, so do the values associated with them). The fit is ***poor*** when targeted users perceive the innovation as highly incongruent with their high-intensity values. Finally, the fit is ***neutral*** when targeted users regard the innovation as either moderately congruent or moderately incongruent with their low-intensity values. It is important to note at this point that, by definition, any major innovation is adopted by senior management with the aim to change, to a lower or greater extent, prevailing norms and practices within the firm. As such, any major external innovation introduced to the firm represents some degree of departure to the status quo and hence to prevailing values. It follows therefore that the more radical the innovation the more likely it is that it will not fit the prevailing values of the targeted employees.

3.2.3 Implementation Effectiveness

Based on the above discussion, it follows that implementation effectiveness is a function of the combined effects of two "forces": climate for implementation and innovation-values fit. When innovation-values fit is good and the implementation climate is also strong, then it quite naturally follows that employees are skilled in using the innovation, they are offered with the incentives to use it, and obstacles for doing so are absent or few. Moreover they feel that the particular innovation reinforces their existing values. This is clearly the ideal situation where targeted employees are likely to be highly committed in using appropriately and consistently the innovation. Perhaps more than that, they are likely to exploit the innovation to the full.

When the fit is good, yet the organization's implementation climate is weak, targeted users are committed to the innovation, but they lack the skills, and they probably experience few incentives and many obstacles for using the innovation. As a result, employees' use of the innovation is likely to be sporadic and inadequate. Good fit is by itself inadequate to produce skillful and consistent innovation use.

When innovation-values fit is poor, yet the climate for implementation is strong, the likely outcome is resistance to change. On the one hand, the organization through the implementation climate makes it imperative to the targeted employees to use the innovation, whereas, on the other, they emotionally oppose the use of that innovation. This conflict between externally imposed necessity and internally generated emotional aversion may result at compliant use, at best.

When fit is poor and implementation climate is also weak, then targeted employees do not have to resist the innovation. The anemic and erratic implementation policies put in place by the firm's management enforce little pressure to employees to comply. Unskilled, unmotivated and opposed to the particular innovation, targeted employees are unlikely to use the innovation at all.

In between the two extremes of good and poor innovation-values fit lies a middle ground where the fit is neutral. Recall that the fit is neutral when the prospective innovation is regarded as either moderately congruent or moderately incongruent with low intensity values. In this type of situation, when the implementation climate is strong targeted employees may feel indifferent to the innovation and given the strong imperative for using it, as reflected by the firm's strong policies, it is likely that they use it adequately, that is, use that is more than compliant but less than committed. When the implementation climate is weak, employees are not likely to use the innovation at all.

3.3 Organizational Context: The Common Ground of Innovation Adoption

As can be seen in Figure 1 above, the organizational context represents the infrastructure against which a given innovation is initiated and implemented. As such, it affects both the initiation and implementation stages and thus it is not easy to isolate its effects on one or the other of the two adoption stages.

Organizational context refers to all these internal characteristics that facilitate (or inversely inhibit) the creation of an environment conducive to innovation. Of all potential influences in the decision to adopt and the subsequent implementation stage, organizational characteristics have been the most wide-

ly studied. The literature has emphasized the relevance of internal factors such as ***competitive strategy, organizational structure*** (e.g. formalization, centralization, slack resources, etc.) and ***cultural characteristics*** (i.e., organizational culture) as important determinants of the firm's capacity to adopt and effectively implement an innovation.

Competitive strategy reflects the stance and positioning pursued by a firm relative to its competitors (Venkatraman, 1989). According to Lefebvre *et al*., (1997), a competitive posture characterized by pro-activeness, futurity, aggressiveness, and defensiveness are strong predictors of a policy that actively seeks technological opportunities, which, in turn, leads to greater innovation efforts. Innovation is a critical aspect of competitive strategy. It not only affects the quality, uniqueness and perceived image of the firm's offerings, but also determines its productive and administrative capability of delivering such products in the market place. Hence, a firm with an articulated strategy seeking to create and secure competitive advantage is more likely to adopt and implement innovations in comparison to firms with a less clear, or perhaps absent, strategy.

The role of **organizational structure** has been widely studied in the literature and many authors have pointed to its primary importance as a determinant of innovation (Damanpour, 1987; Kimberly and Evanisko, 1981). Among several structural characteristics, *formalization, centralization, and vertical differentiation* are those that are perhaps most widely examined. This is because they collectively define what is termed a mechanistic organizational structure, which is generally assumed to reduce the firm's capacity for innovation and flexibility (Burns and Stalker, 1994).

Formalization refers to the existence of formal job descriptions, rules, policies, and procedures. Increased reliance on these discourages new ideas and initiatives, inhibits open and cross-functional communication and thus constrains innovative activity (Subramanian and Nilakanta, 1996). Other studies (Whittington *et al*., 1999; Chandrashekaran, 1995) found that the concentration of decision-making authority, that is centralization, prevents innovation by reducing organizational members' awareness, commitment and involvement in new ideas. Similarly, high levels of vertical differentiation (i.e. tall structures with many hierarchical levels) are found negatively related with innovation, as there exist more links in communication channels making communication between levels more difficult and inhibiting the flow of innovative ideas (Damanpour, 1991, 1996). To summarize, research has shown that firms that adopt a mechanistic structure have more difficulty initiating and implementing innovation because authority is consolidated with top managers who interact

less directly with the environment, formalization blocks innovative solutions, and tall vertical hierarchy limits cross-functional communication.

Specialization is another important structural characteristic that refers to the variety of job tasks in an organization. The relevant findings, however, present an ambiguous picture with regard to the specialization-innovation relationship. Some researchers argue that specialization provides a broad knowledge base, increase the cross-fertilization of ideas and hence promotes innovation (Subramanian and Nilakanta, 1996; Germain, 1996). On the other hand, others (e.g. Liker *et al*., 1999) note that excessive specialization may adversely affect cross-functional collaboration, block the flow of ideas and reduce the capacity to innovate.

Within the same line of research, several authors recognize the positive effects of scanning mechanisms on innovation. Scanning mechanisms refer to efforts directed towards the strategic awareness of rivals' actions, technology evolution, and customer preferences/needs. Lefebvre *et al*., (1997), for instance, have argued that the systematic use of scanning mechanisms that enable the identification of opportunities and threats stemming from competitors or emergent technologies is crucial and should be viewed as a powerful determinant of firm's technology policy which, in turn, positively influences innovation.

Another structural factor that was found positively related to innovation is the concentration of technical and scientific knowledge within firm boundaries, a phenomenon also termed technocratization. Past research (e.g. Ettlie and Bridges, 1987; Lefebvre *et al*., 1997) has found that an increased number of scientists, technicians or engineers in an organization are a powerful determinant of innovativeness, and a significant predictor of firm's technology policy.

Cross-functional cooperation, and more generally open communication within the firm are strongly emphasized in the management literature of innovation. Organizational communication refers to both the flow of information, ideas and knowledge among organizational units (internal communication) and between the firm and other organizations (external communication). Evidence on the effects of cross-functional cooperation and organizational communication has consistently produced positive results. Several researchers argue that the creation of intra and inter-organizational cooperative networks (e.g. cross-functional teams, participation in industry associations), facilitate the free flow of ideas and knowledge across departments (or between firms), promote organizational communication and thus fuel the adoption of innovation (Tsai and Ghoshal, 1998; Damanpour, 1991 Kusunoki and Nonaka, 1998).

Slack resources are actual, or potential, resources that are available to be used for adjusting the firm in the face of external and/or internal demands. In our context, the presence of slack resources connotes the firm's reservoir of resources that are available to commit in innovation adoption. Slack denotes resources that are present beyond what is essentially needed to maintain the current operations of the organization efficiently. As such, it is no accident that a large body of the literature has pointed the positive relationship between slack and innovation. A firm with slack resources will have normally more room to be creative and innovative, and better positioned to take the risks and absorb the costs that are always associated with innovation adoption. Note also that slack is not confined only to financial resources; it also relates to human capital, a reservoir of knowledge and past experience with innovation, etc.

The final structural characteristic that is often argued to influence innovation is firm size. The relevant findings, however, are rather mixed. Firm size is usually expressed in terms of human, financial or physical resources (e.g. number of employees, total profits, number of plants or manufacturing equipment). Research in different contexts has provided evidence that large organizations are endowed with slack resources and tolerance to potential losses, a fact that positively affects innovation; in contrast, others argue that small firms may be more flexible, less bureaucratic and more adaptive to change and innovation (for an overview and meta-analysis see, Camis n-Zornoza *et al*., 2004).

Apart from structural characteristics, the management literature also stresses the role of **cultural factors** in the creation of an environment conducive to innovation. For example, managers' positive attitude towards change is taken to positively influence innovation, particularly decisions to adopt innovation, because it enhances entrepreneurship and creativity, and thus allows more risk taking and tolerance to ambiguity, both inherently associated with innovation (Kitchell, 1995).

4. Conclusions

In this paper, I have drawn from diverse set of research streams on innovation in an attempt to develop an integrative model of the factors affecting innovation adoption. The model depicts adoption as a two-stage process, comprising initiation and implementation. Initiation denotes the stage at which a decision is made by a firm's management regarding the adoption or rejection of a given innovation. The decision is dependent on perceptions regarding the characteristics of the prospective innovation, the personality and cognitive traits of

the decision makers, and environmental stimuli. Once a decision to adopt is made, the next stage in the adoption process concerns the implementation of the innovation. The key issue here is to successfully institute the innovation, which in effect translates in its systematic exploitation by its intended users. As discussed in some detail above, effective implementation depends on a strong supportive set of policies and practices that facilitate the use of the innovation and, importantly, on the fit of the innovation with the values of its intended users. Finally, the model delineates the role of the wider organizational context (i.e. strategy, structure, and culture) as the common ground upon which the innovation process unfolds.

What does the above discussion has to say to firms' management wishing to initiate and implement a given innovation? As regards initiation, the model brings forth the importance of an as accurate as possible assessment of the characteristics of the innovation in question vis-a-vis the firm's needs and the demands posed by its external environment. More important, the model calls attention to a simple, but often neglected fact: initiation (i.e. the decision to adopt) is not the end of the process; rather, it is the beginning of an "innovation journey" which ends only when a new technology, or management practice, is successfully institutionalized.

In this respect, the first and obvious implication of the model is that the climate for implementation is a critical *and controllable* factor that management should take seriously into account. It is important to note that implementation climate should be viewed as a comprehensive and interdependent whole of policies, actions, and measures rather than a collection of independent initiatives. Conceptualizing implementation climate as a "whole" brings forth the understanding that each measure reinforces, complements the other, and that the whole sum is greater that the simple addition of each. Three are the targets, mutually reinforcing one another, of these measures: ensuring skills in innovation use, providing the appropriate incentives (and disincentives for innovation avoidance), and removing the obstacles for effective and undisturbed innovation use.

The question of innovation-values fit is a less controllable factor, but there exist several things that management can do to help increase the possibility of committed acceptance of the innovation. First, it should try to persuade as many as possible of the affected employees about the real and pressing needs behind the decision to adopt the given innovation. Values cannot easily change, at least not in the short run, but appeal to reason and sentiments to create a sense of urgency about the need of implementing a certain innovation can win

neutral, if not committed, acceptance and use. The critical issue here is persuasion as opposed to simply enforcing its decision to adopt. Second, it is important that management takes seriously into account the possibility of poor innovation-values fit when considers the case to adopt a given innovation. Rather than been confronted to the problems associated with poor fit *ex post facto*, it is always better to have taken them into account *ex ante*. Third, employee values are enduring but not fixed beliefs, as we noted earlier. These values may shift over time, and increasing innovation-values fit depends to some extent on firms' past experiences with innovation implementation. Past successes that have demonstrably resulted in sustained firm growth and competitiveness, which in turn resulted in tangible and intangible benefits to employees (e.g. job security, better pay, job satisfaction, etc.) could help shift their pre-existing values concerning innovation towards more positive directions in future occasions for innovation implementation. Finally, and perhaps most important, management needs to actively build an environment that influences sentiments and values towards –as opposed to against- innovation. This requires that management, encourages the creation and sharing of new ideas, provides appropriate training and incentives, tolerates failures (provided that they lead to learning), sets ambitious targets and objectives that explicitly point towards innovation

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