British Journal of Management, Vol. 17, 215–236 (2006)
DOI: 10.1111/j.1467-8551.2006.00498.x

Phases of the Adoption of Innovation in Organizations: Effects of Environment, Organization and Top Managers[1]

Fariborz Damanpour* and Marguerite Schneider†
*Rutgers University, 111 Washington Street, Newark, NJ 07102-3027 and †New Jersey Institute of Technology, University Heights, Newark, NJ 07102-1982 USA
Email: damanpour@business.rutgers.edu [Damanpour]; mschneid@adm.njit.edu [Schneider]

Multidimensional empirical examinations of the adoption of innovations in organizations, and the influence of factors within each dimension on the phases of adoption, are scarce. This study examines the effects of environmental, organizational and top managers' characteristics on the initiation, adoption decision and implementation of innovation. Using a sample of approximately 1200 public organizations in the United States, we found that while each dimension accounts for unique variance in the adoption of innovation, organizational characteristics and top managers' attitudes toward innovation have a stronger influence than environmental and top managers' demographic characteristics. We also found no difference in the direction of effects of any antecedent, but did find differences in the significance of effects of several antecedents, on the phases of innovation adoption. We discuss the implications of these findings and suggest ideas for future research.

Introduction

Innovation is considered a source of competitive advantage and economic growth, and worthy of study under the conditions of increased global competition, technological change, fast-changing market situations and continuous customer/client demand for quality services (Ekvall and Arvonen, 1994; Howell and Higgins, 1990; Tushman and O'Reilly, 2002). In both academic and practitioner communities, it is commonly perceived that organizations should innovate to be effective, or even to survive, and that research can guide the management of innovation in organizations. Scholars have continually investigated questions of interest to executives, such as what organizational processes facilitate the generation or adoption of innovation and why some organizations are able to generate or adopt more innovations than others. Despite many studies, however, reviews of research suggest that these questions have not been clearly answered and recommend more research to identify the characteristics of innovative organizations (Drazin and Schoonhoven, 1996; Tidd, 2001; Wolfe, 1994).

This article focuses on the adoption of innovation in organizations and contributes by addressing three issues in this body of work. First, while scholars have conceptualized innovation adoption as a multiphase process (Hage, 1980; Rogers, 1995; Van de Van, Angle and Poole, 2000; Zaltman, Duncan and Holbek, 1973), most large sample empirical studies of organizational innovation have conceived innovation as an event or outcome and have measured its adoption as a dichotomous decision (Germain, 1996; Kimberly and Evanisko, 1981; Nystrom, Ramamurthy and Wilson, 2002). That is, innovation adoption has been conceptualized

[1]This study was supported by a grant from the Technology Management Research Center, Rutgers Business School. The authors thank Francis Mendez for his assistance in statistical analysis.

as a multi-event but operationalized as a single event phenomenon (King, 1990; Pierce and Delbecq, 1977). King (1990) and Wolfe (1994) argue that antecedents of innovation may have a different effect at different points in the adoption process. We incorporate three widely recognized phases of innovation adoption – initiation, adoption decision and implementation – representing respectively pre-adoption activities, the managerial decision to adopt the innovation and post-adoption activities (Jasperson, Carter and Zmud, 2005; Pierce and Delbecq, 1977; Rogers, 1995), and examine their antecedents in a sample of approximately 1200 local government organizations in the United States.

Second, in addition to being multiphase, innovation adoption is also multidimensional; that is, it is influenced by factors within several dimensions, including environmental or contextual factors, characteristics of the individuals and organizations that adopt the innovation, and characteristics and attributes of the innovation itself (Rogers, 1995; Tornatzky and Fleischer, 1990; Wolfe, 1994). With few exceptions (Baldridge and Burnham, 1975; Kimberly and Evanisko, 1981; Meyer and Goes, 1988), however, previous studies have mainly focused on factors within one dimension only – organizational factors – which are deemed as primary determinants of innovation adoption in organizations (Subramanian and Nilakanta, 1996; Wolfe, 1994). Hence, the salient factors of each dimension and their relative explanatory power on innovation adoption have not been determined (Kimberly and Evanisko, 1981). We incorporate environmental, organizational and individual (organizational leader) factors, and develop and test hypotheses on the extent to which factors within each dimension affect the three phases of innovation adoption. For instance, compared with organizational factors, are environmental factors or top managers' attitudes toward innovation strong predictors of innovation adoption? Do their effects differ for different phases of adoption?

Third, perhaps the most influential people affecting innovation and change in organizations are top executives. Managers and administrators can influence workers' motivation and job satisfaction, create a work and social climate to improve morale and encourage and reward innovation and change (Ekvall and Arvonen, 1994; Elenkov, Judge and Wright, 2005; Hooijberg and DiTomaso, 1996; Kimberly, 1981). Hage and Dewar (1973) examined the combined effects of organizational and leader factors, and found that the explanatory power of leader factors was greater than organizational factors in predicting organizational innovation. Previous studies have examined the role of demographic and behavioural characteristics of top managers and top management teams on innovation adoption (Bantel and Jackson, 1989; Howell and Higgins, 1990; Scott and Bruce, 1994; West and Anderson, 1996). This study adds to them by comparing the relative importance of top managers' characteristics – their demography and attitude toward change – with environmental and organizational antecedents on phases of innovation adoption.

Theoretical framework

Adoption of innovation in organizations

Innovation is studied in many disciplines and has been defined from different perspectives. In a broad way, *innovation* is defined as the creation or adoption of new ideas (Amabile, 1988; Daft, 1978; Zaltman, Duncan and Holbek, 1973). 'Newness', a property of the definition of innovation in all disciplines, is a relative term. An innovation can be considered new to an individual adopter, a group or team, an organization, an industry or the wider society (Gopalakrishnan and Damanpour, 1997; West and Farr, 1990). That is, newness is a property of innovation with respect to the field's level of analysis; for instance, most studies of innovation in psychology are at the individual level, in economics at the industry level and in management at the firm level (Gopalakrishnan and Damanpour, 1997).

At the organizational level, innovation is defined as the adoption of a new product, service, process, technology, policy, structure or administrative system (Daft, 1978; Damanpour, 1991; Zaltman, Duncan and Holbek, 1973). The adoption of innovation basically means that the innovation is new to the adopting unit (Angle and Van de Ven, 2000); it intends to derive anticipated benefits from changes that the innovation may bring to the organization (West and Anderson, 1996). The adoption of innovation can be the direct result of managerial choice or can be imposed by external conditions; for

instance, the adoption of a new strategy, structure or reward system may be stimulated by a performance gap as a result of internal inefficiency or stimulated by environmental change. Regardless of the internal or external origin of the impetus for change, innovation adoption is a means of creating change in the organization to ensure adaptive behaviour and is intended to change the organization so that it maintains or improves its level of performance or effectiveness.

Process of adoption

The process of adoption of innovation in organizations has been divided into a variety of phases; for instance: evaluation, initiation, implementation and routinization (Hage and Aiken, 1970); awareness, selection, adoption, implementation and routinization (Klein and Sorra, 1996); knowledge awareness, attitudes formation, decision, initial implementation and sustained implementation (Zaltman, Duncan and Holbek, 1973); and initiation, development, implementation and termination (Angle and Van de Van, 2000). As stated earlier, these phases can be grouped into three more general phases of pre-adoption, adoption decision and post-adoption, often referred to as initiation, adoption (decision) and implementation (Rogers, 1995; Pierce and Delbecq, 1977; Zmud, 1982).[2]

Initiation consists of activities that pertain to recognizing a need, searching for solutions, becoming aware of existing innovations, identifying suitable innovations and proposing some for adoption (Duncan, 1976; Rogers, 1995). In this phase organizational members learn of the innovation's existence, consider its suitability for the organization, communicate with others and propose its adoption (Meyer and Goes, 1988). *Adoption decision* reflects evaluating the proposed ideas from technical, financial and strategic perspectives, making the decision to accept an idea as the desired solution, and allocating resources for its acquisition, alteration and assimilation (Meyer and Goes, 1988). In this phase top organizational echelons (managers, committees and boards) decide to adopt the innovation and allocate resources to it. *Implementation* consists of events and actions that pertain to modifying the innovation, preparing the organization for its use, trial use, acceptance of the innovation by the users and continued use of the innovation until it becomes a routine feature of the organization (Duncan, 1976; Meyer and Goes, 1988; Rogers, 1995). In this phase the innovation is put into use by organizational members, clients or customers.

Environmental antecedents of adoption

Organizations conduct activities within an environmental context – they obtain inputs from the environment, respond to its demands and offer their services or products to it. The external environment provides opportunities (information, resources, technology) and constraints (regulation, restriction on capital or information). The adoption of innovation can be a means of changing the organization in response to environmental demands and constraints by exploiting environmental opportunities. Innovation scholars have often posited that the primary stimulus for organizational innovation and change come from the external environment; hence, characteristics of an organization's environment may be critical to its ability to innovate (Camison-Zornoza, Boronat-Navarro and Segarra-Cipes, forthcoming; Pierce and Delbecq, 1977; Tornatzky and Fleischer, 1990).

Environmental characteristics may refer to the market or sector within which the organization operates, or may represent cultural, societal, political or geographical conditions (King, 1990; Wejnert, 2002). In business organizations, the structure of the market (competition, concentration), technological dynamism, appropriability conditions and market growth are considered the prominent environmental factors influencing technological product and process innovations

[2]The innovation process, as well as group and organizational decision-making processes, have been conceived to follow both a unitary sequence and a multiple sequence pattern (Mintzberg, Raisinghani and Theoret, 1976; Poole, 1981). The unitary sequence pattern generally assumes that the adoption process is orderly and occurs in a linear sequence; the multiple sequence pattern assumes that the process is more random and the phases and the sequence of their occurrence cannot be predicted (see Gopalakrishnan and Damanpour, 1994, pp. 100–102). Both have been found useful in describing the decision making process and innovation adoption process (Ettlie, 1980; Poole, 1983). In this study, we adopt a unitary pattern because it is more appropriate to a large sample study; multiple sequence pattern can best be examined in case studies (e.g. Schroeder *et al*., 2000).

(Cohen and Levin, 1989; Nohria and Gulati, 1996). For the adoption of administrative innovations in public organizations in this study, however, we include four relevant environmental factors of urbanization, community wealth, population growth and unemployment rate (Boyne *et al.*, 2005; Huber *et al.*, 1993; Rogers, 1995).

Research has found that the size of the community in which an organization is located affects the adoption of innovation (Corwin, 1972; Kimberly and Evanisko, 1981). Urban locations are usually large and have more resources and higher density of information linkages (Fennel, 1984). Organizations in urban areas have easier access to service providers and face more diverse and complex environments than those in rural areas (Boyne *et al.*, 2005). Greater environmental complexity leads to more numerous, specialized and interconnected organizational parts, stimulating higher rates of innovation and change (Daft, 2001; Huber *et al.*, 1993; Meyer and Goes, 1988).

While less wealthy communities have greater need for government services and have less ability to provide them, motivating their local governments to seek cost-saving programmes, this motivation is tempered by their few financial and other resources, making it difficult to adopt new programmes (Goes and Park, 1997). Resources also provide local governments of wealthier communities with a greater ability to prepare organizational and community members for implementing the new programmes or services.

Similarly, while the possibility of a declining tax base might well motivate local governments facing negative or low population growth to seek efficient delivery of services, these organizations may have few managerial and financial resources to take new administrative initiatives. On the other hand, local governments experiencing greater population growth may face an increasing tax base and may aim to attract newcomers by maintaining low taxes through adopting cost-saving programmes; therefore, they would have greater ability to initiate, adopt and implement new programmes.

Contrary to urbanization, community wealth and population growth, which will influence innovation adoption positively, unemployment rate will negatively affect the adoption of innovation because deprivation in the environment imposes constraints on local governments; those whose communities have higher unemployment rates will have far fewer resources for adopting new programmes (Boyne *et al.*, 2005).

Pierce and Delbecq (1977) proposed that environmental uncertainty positively influences the three phases of innovation adoption. We propose that the environmental factors affect the three phases of adoption similarly (positively or negatively) because primarily they determine the extent to which extra-organizational resources and information are available to local governments for supporting innovation. Innovation does not happen on its own; it requires special knowledge and funding. The availability of financial resources promotes organizational innovation and the lack of resources inhibits it (Damanpour, 1991; Nohria and Gulati, 1996). Access and ability for contact and information exchange with external organizational systems are also essential for innovation (Fennel, 1984; Kimberly, 1978).

H1: Urbanization, community wealth and population growth will positively influence all phases of innovation adoption.

H2: Unemployment rate will negatively influence all phases of innovation adoption.

Organizational antecedents of adoption

Cooper (1999, pp. 115–116) discusses two sets of critical success factors for product innovation projects: one deals with 'doing the right projects' and the other with 'doing projects right'. Whereas the first set is primarily captured by the external environmental characteristics, the second set is mainly influenced by internal organizational characteristics. The second set of factors, the focus of this and the next section, is more controllable and discretionary to the organization and its top executives than the first set.

Burn and Stalker (1961) distinguished between mechanistic and organic structures, and advanced that these ways of organizing influence innovation and change. Consequently, innovation scholars investigated effects of a wide range of structural antecedents of innovation adoption such as centralization, formalization, specialization, professionalism and functional differentiation. Meta-analyses of empirical research findings have generally provided support for the Burns and Stalker thesis by finding that centralization and formalization negatively, and specialization, professionalism and differentiation positively, influence innovation

adoption (Camison-Zornoza, Boronat-Navarro and Segarra-Cipres, forthcoming; Damanpour, 1991). However, the extent to which these and other organizational variables influence phases of innovation adoption has not been examined. We advance hypotheses on the influence of organizational complexity, size, financial resources and external communication, which are among the most commonly accepted predictors of innovation adoption (Damanpour, 1996a; Nystrom, Ramamurthy and Wilson, 2002), and unions, which has not been examined widely, on the three phases of adoption. Inclusion of the existence of trades unions is important because local governments tend to be unionized, and the cooperation or opposition of trades unions may influence the success of any managerial change endeavour.

Complexity and size. Complexity and size are two primary components of organization design and are among the most important predictors of organizational innovation (Blau and McKinley, 1979; Camison-Zornoza, Boronat-Navarro and Segarra-Cipres, 2004; Damanpour, 1996a).

In complex organizations the depth and diversity of the knowledge base stimulate creativity and increase awareness and cross-fertilization of ideas, facilitating initiation (Damanpour, 1996a). More complex organizations have more access to information about different innovations and thus are more likely to identify and acquire them (Fennel, 1984). Coalitions within organizational subsystems could pressure the organization into a higher level of adoption and implementation (Pierce and Delbecq, 1977). However, potential conflict and diversity of values arising from complexity may lead to resistance in accepting the innovation, moderating complexity's positive impact on implementation.

Different arguments have been advanced on the relationship between size and innovation. Some scholars propose that large organizations are more innovative because they have more financial resources, diverse facilities, professional and skilled workers, higher technical potential and knowledge and better scale economies for raising capital (Fennel, 1984; Hitt, Hoskisson and Ireland, 1990; Nord and Tucker, 1987). Others argue that small organizations are more innovative because they can make quicker decisions to go ahead with new and ambitious projects, have less bureaucratic and more flexible structures and greater ability to adapt and improve, and have less difficulty in accepting and implementing change (Damanpour, 1992; Nord and Tucker, 1987).

While empirical results from single studies in support of both arguments exist, the aggregate finding from quantitative reviews suggests a positive relationship between size and innovation (Camison-Zornoza, Boronat-Navarro and Segarra-Cipres, 2004; Damanpour, 1992). We propose that while the reasons for the positive effect of size – mainly more financial and human resources – influence all phases of adoption, those reasons for the negative effect of size – less flexible structure, lower ability to adapt and more difficulty in assimilating change – primarily affect implementation, reducing the positive effect of resources. Therefore, similar to complexity, organizational size would influence the implementation of innovation less positively than initiation and adoption decision.

> *H3:* Complexity and size will positively influence all phases of innovation adoption, but will more positively influence initiation and adoption decision than implementation.

Economic health. Organizations with greater economic health invest more in innovation, partly because they can afford to take more risk and can more easily absorb the cost of failure (Aiken and Hage, 1971; Nystrom *et al*., 2002). While economic health is expected to positively affect all phases of innovation, it will most strongly influence adoption decision, as initiation and implementation are greatly influenced by internal organizational dynamics.

An innovation is adopted when top managers decide to go ahead with the new idea and allocate resources to it. Initiation and implementation, on the other hand, require cooperation and commitment of non-managers. For instance, successful initiation requires more coordination among units to facilitate cross-fertilization of ideas among organizational members with diverse backgrounds and training; successful implementation requires continued commitment of top managers to the innovation, involvement and support of middle managers, and motivation of organizational members or clients to use the innovation (Dougherty and Hardy, 1996; Klein and Sorra, 1996). In general, initiation and implementation phases of the adoption process are more complex and more

challenging for top managers than making the adoption decision.

H4: Economic health will positively influence all phases of innovation adoption, but will more positively influence adoption decision than initiation or implementation.

Unions. The existence of trades unions provides an extra element of power within the organization that should be accommodated to enable change (Lambright, 1980). Organizational change because of innovation will affect the balance of the relationship between unions and management, especially where interests and goals of the unions and managers diverge. Concerns for potential job loss and lack of involvement in the innovation process influence unions' opposition to the adoption of new government services (Lambright, 1980). Research suggests that trades unions are not frequently consulted in the initiation of new programmes and do not often endorse the adoption of them (Fennel, 1984). Unions' concerns for greater management control and job loss may also hinder the management-labour coalition necessary for facilitating the implementation of innovation.

H5: The existence of trades unions will negatively influence all phases of innovation adoption.

External communication. As stated earlier, organizations adopt innovation in part to adapt to new environmental conditions. Hence, exchange of information with the environment and extra-organizational professional activities can help managers and non-managers to improve their knowledge of environmental events and trends in order to initiate change and propose new ideas for adoption. External communication also informs decision-makers for selecting from proposed ideas, and prepares organizational members to accept the innovation and help assimilate it into organizational practices and routines.

H6: External communication will positively influence all phases of innovation adoption.

Managerial antecedents of adoption

Organizational and strategic leadership research posits that strategic leaders or top managers heavily influence organizational capabilities by establishing organizational culture, motivating and enabling managers and employees, and building capacity for change and innovation (Daft, 2001; Elenkov, Judge and Wright, 2005; Yukl, 1999). Top managers affect innovation adoption because they modulate the process of scanning the environment and formulating policy to respond to environmental change; they control resources and influence major decisions, especially strategic decisions. Top managers are a potent force for or against innovation, especially if decision-making power is concentrated in their hands (Dewar and Dutton, 1986), and are largely responsible for the cultural values that prevail in support of innovation within the organization (Bantel and Jackson, 1989; Elenkov, Judge and Wright, 2005). Thus, top managers' personal and positional characteristics, functional and general management expertise, and attitude toward change influence organizational climate conducive to innovation (Ekvall, 1996; Hoffman and Hegarty, 1993; West and Anderson, 1996).[3] Below, we present hypotheses on how top executives affect phases of innovation adoption.

Age. Younger managers are expected to initiate and adopt more innovations than older managers because: (1) they bring better cognitive resources to decision-making, as some cognitive abilities such as learning, reasoning and memory seem to diminish with age (Bantel and Jackson, 1989); (2) they are more receptive to adopting new ideas and behaviours, as innovation entails some risk and younger managers are more willing to take risk (Hambrick and Mason, 1984); and (3) they have been trained more recently and their technical knowledge is more current (Bantel and Jackson, 1989). Age may also hinder implemen-

[3]There is a large body of literature on individual creativity and creative problem solving. Creativity researchers have examined personality, motivational, emotional or situational factors that identify differences between creative and non-creative individuals (e.g. adaptors and innovators (Kirton, 1976), associative and bisociative thinkers (Jabri, 1991)) and encourage the occurrence of creative acts or outcomes (for reviews see Amabile, 1988; Ford, 1995; King, 1990; Mumford, 2000). We have not referred to these studies here because they are primarily at the individual level of analysis and often disregard the role of organizational and environmental contexts (see King, 1990).

tation because older managers have been socialized into accepting the prevailing organizational conditions and routines and have greater psychological commitment to them; hence, they may be less willing to commit to changing them (Huber *et al*., 1993).

H7: Manager age will negatively influence all phases of innovation adoption.

Gender. Research on the effect of gender on innovation is mixed. Stelter (2002) indicates that women tend to evidence a leadership style that is more transformational than their male counterparts, suggesting that female leaders will positively affect innovation adoption. But DiTomaso and Farris (1992) find that women R&D engineers tend to rate themselves lower than men do on innovativeness, while Sonfield *et al*. (2001) report no gender differences among business owners in their chosen venture innovation/risk situation strategies. Nevertheless, researchers have noted differences in communication style, willingness to take risk, values and socialization between men and women (Hooijberg and DiTomaso, 1996), which may affect the phases of innovation adoption. For instance, based on their propensity to take risks compared to their female counterparts, male top managers would initiate more innovation because they are more willing to change the *status quo*, and would more easily decide to adopt the innovation and allocate resources to it. On the other hand, female top managers would influence implementation more than their male counterparts because they are inclined to use a participative leadership style, are socialized to display care and consideration, and better establish rapport with organizational members (Eagly and Johnson, 1990; Hooijberg and DiTomaso, 1996).

H8a: Male managers will more positively influence initiation and adoption decision than their female counterparts.

H8b: Female managers will more positively influence implementation than their male counterparts.

Education. The adoption of innovation involves the initiation of novel ideas that can successfully be implemented to solve organizational problems. Novel ideas and solutions require knowledge and expertise (Mumford, 2000). Education might provide individuals with specific knowledge required for task performance and novel problem solving (Lee, Wong and Chong, 2005). Highly educated top managers are more likely to use complex and diverse approaches to problem solving and decision-making (Huber *et al*., 1993; Lee, Wong and Chong, 2005). Since the newness of innovation creates a sense of uncertainty, these managers' greater ability to gain information to reduce that uncertainty would facilitate the adoption of innovation (Rogers, 1995). In addition to increasing the ability to generate creative solutions to complex problems (Bantel and Jackson, 1989), education also inspires receptivity to new ideas, which play an important role in both detecting the need for innovation and creating a favourable environment for its implementation.

H9: Education of managers will positively influence all phases of innovation adoption.

Tenure in position and in management. Top managers new to their position are more receptive to innovation because they bring a fresh perspective to their job (Huber *et al*., 1993). Over time, however, these managers would become more inclined to accept the position as it has become, championing fewer innovations and supporting fewer changes. Similarly, managers with longer tenure in the organization are more likely to have been socialized into accepting the organization as it is, and are less likely to initiate and adopt new ways of doing things (Hambrick and Mason, 1984; Huber *et al*., 1993). Thus, tenure in position and in management would inhibit the adoption of innovation, as managers' sensitivity to information related to their work responsibilities may bias their inclination to change the *status quo* (Hambrick and Mason, 1984; Huber *et al*., 1993).

However, managerial experience can have some particular advantages for the implementation of innovation, which moderates its negative effect for this phase. Successful implementation requires skills in integrating the innovation into ongoing organizational processes and facilitating its use by organizational members. Top managers' tenure in position provides legitimacy and knowledge of how to accomplish tasks, manage political processes and obtain desired outcomes (Kimberly and Evanisko, 1981). Moreover, managers with longer

tenure in management have undertaken a variety of assignments in the organization and have developed a greater breadth of contacts with peers and reports (Finkelstein, 1992). Therefore, more experienced managers have better knowledge of critical contingencies that may arise during the implementation process and have more skills to manage them (Mumford, 2000).

H10: Tenure in position and in management will negatively influence all phases of innovation adoption, but will influence implementation less negatively than initiation or adoption.

Attitude toward innovation. In addition to task-oriented and employee-oriented behaviours, studies of leadership behaviour have found a third dimension, often referred to as change-oriented behaviour (Ekvall and Arvonen, 1991; Yukl, 1999). This leadership dimension entails an executive who takes long-term perspectives, describes appealing visions, encourages and accepts new ideas and forges agreements and approvals with people inside and outside of the organization to initiate and implement change (Ekvall and Arvonen, 1991; Yukl, 1999).

Studies of organizational innovation have found that senior executives influence the adoption of innovation by creating a favourable climate toward innovation (Damanpour, 1991; Dewar and Dutton; 1986; Hage and Dewar, 1973). Top executives' favourable attitude toward innovation facilitates the initiation of innovation by building feelings of confidence and providing support to organizational members for proposing new ideas (Mumford, 2000). It also facilitates adoption decision because strategic decision-makers with a more favourable attitude toward innovation would more likely decide to adopt innovative ideas that depart from existing practices, instead of those that are more consistent with current practices, and allocate resources to acquire and implement them.

Successful implementation of innovation requires laying the social, technical and intellectual groundwork, building coalitions among different constituencies and helping coordination and conflict resolution among units and members (Damanpour, 1991; Mumford, 2000). Building and maintaining networks of organizational connections and resolving conflicts among units is time-consuming, and top managers' enthusiasm may wane over time or may not trickle down sufficiently to commit all units and members to forge successful implementation. Compared to initiation and adoption decision, implementation takes more time and includes more players, so that top executives exert less influence over this phase. Therefore, we suggest that top managers' favourable attitude toward innovation would influence the initiation and adoption decision more positively than implementation.

H11: Managers' favourable attitude toward innovation will positively influence all phases of innovation adoption, but will more positively influence initiation and adoption decision than implementation.

Methods

The source of our data to test the above hypotheses is a survey conducted in 1997 by the International City/County Management Association (ICMA) about 'reinventing government' in the United States. The ICMA is a professional organization that as part of its mission conducts frequent surveys on a variety of public-sector topics and issues. Its sampling is broad, based on municipalities and counties meeting size or other selection criteria, and is not confined to ICMA members. The data were collected by a questionnaire mailed twice to the city managers/chief administrators of 2858 cities with a population of 10,000 or more, from which 1276 (44.6%) responses were returned (Moon and deLeon, 2001). The response rate was relatively homogeneous among population – size categories and local government urban status; for instance, for seven population-size categories response rates were between 35.3% and 54.5%, and for three location-status categories – central city, suburban and others – they were 45.0, 44.7 and 44.3%, respectively.[4]

Measures

Dependent variables. We employed three dependent variables to represent initiation, adoption decision and implementation of ten administra-

[4]Source: http://www.icma.org; reinventing local government 1997; survey response.

tive programmes associated with the new public management (NPM) movement of government reinvention (OECD, 1995; Osborne and Gaebler, 1992) that were adopted by local governments between 1992 and 1997.[5] Administrative innovations are mainly process innovations related to organizational strategy, structure, administrative processes and employees (Daft, 1978; Kimberly and Evanisko, 1981). Examples of programmes included in the survey are: training government employees for customer service and for decision-making, contracting out government services to outside vendors, partnering with private business, training neighbourhood organizations for decision-making and conducting surveys to measure citizens' expectation and satisfaction.[6]

Initiation is operationalized by the organization's proposal to request funding for each programme from the city council (no request for funding = 0; request for funding = 1). *Adoption decision* is measured by the council's degree of support for programme funding (no funding = 0; partial funding = 1; full funding = 2). *Implementation* is operationalized by the degree of employment of the programme in the organization (not implemented = 0; sometimes implemented = 1; always implemented = 2). The sums of scores for initiation, adoption decision and implementation for the ten programmes in an organization constitute, respectively, the initiation, adoption decision and implementation of innovations in that organization.

The survey relies on single respondents to collect data on the adoption of innovation. While multiple respondents are always preferred, it should be noted that approximately 55% of the respondents served in their current position (city manager/chief administrator) for five or more years, and about 90% of them had held management positions for five or more years. These periods of longevity add to the confidence that respondents were knowledgeable and did possess accurate information on the NPM programmes adopted by their organizations from 1992–1997.

Independent variables. Measures of the independent variables are presented in Table 1. To identify dimensions of top managers' attitude toward NPM programmes, we conducted exploratory factor analysis with varimax rotation on ten items from the questionnaire. Respondents rated these items on a five-point scale choosing a number that best reflected their opinion (strongly disagree = 1 to strongly agree = 5). Three factors were identified (Table 2). One consists of items reflecting top administrators' favourable attitude toward traditional public administration and practices; we labelled this factor *traditional*. The second reflects an emphasis on the importance of competition in public organizations, one aspect of NPM; we labelled this factor 'favouring competition'. The third reflects a tendency toward entrepreneurship and views public organizations as similar to business organizations, a second aspect of NPM; we labelled this factor 'entrepreneurial'.

We used Chronbach's alpha to confirm the internal consistency of the three factors (Table 2). An alpha of 0.70 is usually considered adequate; however, for scales with a small number of items and for new scales a smaller alpha is considered permissible (Hull and Nie, 1981; Nunnally, 1978). We did not include the traditional factor in the regression analysis because of its very low reliability (0.24); however, we included 'favouring competition' and 'entrepreneurial' factors (alphas of 0.63 and 0.59, respectively) because they met the conditions for permissible lower alpha suggested by Nunnally (1978). In strategy and organization theory research, Chronbach alphas of about 0.60 have frequently been used under similar conditions (e.g. Amis, Slack and Hinings,

[5]While the survey instrument included twelve administrative programmes associated with the NPM movement, we used ten, for which the survey instrument contained questions for collecting data on all three phases of innovation adoption.

[6]Two approaches are usually used for collecting data on the adoption of innovation. One, referred to as the 'closed list' approach, involves including a list of innovations in the survey and asking the respondents to identify those that were adopted within a time period. An alternative approach is to define a set of criteria to identify an innovation, and ask the respondents to report all innovations adopted by the organization that meet the criteria (Aiken and Hage, 1971). The ICMA survey has used the first approach. This approach avoids the 'criterion problem' that may result from the second approach (Daft and Becker, 1978, p. 36), and help improve the validity of findings by providing better control opportunities in determining innovation scores. However, it does not allow the respondents to report programmes originated by them that have not been included in the survey. This limitation, however, would be more considerable in the studies that focus on the 'generation' rather than 'adoption' of innovations (Damanpour and Wischnevsky, 2006).

Table 1. Measures of independent variables

Variable	Measure
Urbanization	Measured on a 5-point scale: 1 = rural; 2 = not urbanized, central city; 3 = low-density suburb; 4 = high-density suburb; and 5 = urban, central city.
Community wealth	Measured by the income of the residents: 1 = low to moderate income; 2 = moderate to middle income; and 3 = high income.
Population growth	Measured on a 5-point scale: −2 = decreased more than 10%; −1 = decreased between 1–10%; 0 = stayed the same; 1 = increased between 1–10%; 2 = increased more than 10%.
Unemployment rate	Measured on a 4-point scale: 1 = under 3%; 2 = 3–4.9%; 3 = 5–7%; and 4 = greater than 7%.
Complexity	Measured by the number of services the city/county offers (0–9).
Size	Measured by the number of employees on a 7-point scale: 1 = fewer than 50; 3 = 100–250; 5 = 500–750; 7 = more than 1000.
Economic health	Measured on a 5-point scale: 1 = poor; 2 = fair; 3 = good; 4 = very good; and 5 = excellent.
Unions	The existence of trade unions in the organization was measured dichotomously: 0 = no unions; and 1 = unions.
External communication	Measured by the number of memberships in professional associations (0–4).
Age	The range of age (years): 1 = 25–34; 2 = 35–49; 3 = 50–64; and 4 = 65 or older.
Gender	0 = female; 1 = male
Education	The highest level of education was measured on a 5-point scale: 1 = less than years of college; 3 = graduate degree; and 5 = PhD or equivalent.
Tenure in position	Number of years served in current position (5-point scale): 1 = less than 2 years; 3 = between 5–9 years; and 5 = more than 15 years.
Tenure in management	Total number of years served in managerial positions (5-point scale): 1 = less than 5 years; 3 = between 10–14 years; and 5 = more than 20 years.

Table 2. Results of exploratory factor analysis of managers' attitude toward innovation

Items	Factor loadings Favouring Traditional	Factor loadings Favouring Competition	Factor loadings Favouring Entrepreneurial
Competition should be introduced in the delivery of government services	−0.13	**0.79**	0.18
Departments should bid against third-party contractors for government work	−0.09	**0.72**	0.21
Competition plays an important role in moderating the cost of services	0.11	**0.73**	0.11
Local governments should be entrepreneurial	−0.12	0.17	**0.72**
Local governments should develop non-tax revenue services	0.04	0.10	**0.67**
There should be financial incentives for employees to be entrepreneurial	−0.03	0.12	**0.68**
It is important to have a mission statement for local government	−0.05	0.14	**0.54**
A traditional administrative Model is preferable to a less structured model	**0.47**	−0.02	−0.17
There can be accountability problems when government services are privatized	**0.70**	−0.08	0.16
The aims, structures, activities, and responsibilities of government are unlike those of business	**0.68**	0.02	−0.07
Eigenvalue	1.10	1.19	2.53
Percentage of variance explained	11.00	11.91	25.34
Cumulative percentage of variance explained	11.00	22.91	48.25
Cronbach's alpha	0.24	0.63	0.59

2004; Kikulis, Slack and Hinings, 1995; Steensma and Corely, 2000).

Results

Table 3 shows descriptive statistics and correlation coefficients for all variables. We conducted hierarchical regression analyses entering environmental, organizational, managers' demographic characteristics and attitude toward innovation, respectively (Table 4). In testing for the effects of multicollinearity using variance inflation factors, these factors for all the models in Table 4 were between 1.02–1.45, less than the threshold value of 10 indicating the presence of multicollinearity (Neter, Wasserman and Kutner, 1958, p. 392).

Models 1–3 (Table 4), including only environmental variables, are statistically significant ($p < 0.001$) indicating that these variables influence initiation, adoption decision and implementation of innovation. The addition of organizational characteristics (Models 4–6) increased the explanatory power of the models over those including only environmental characteristics; the change in R^2 is statistically significant ($p < 0.001$) for the three dependent variables. The addition of top administrators' personal and positional attributes (Models 7–9) adds to the predictability of the models; however, the change in explained variance is much smaller. The two factors reflecting managers' attitude toward innovation were entered last (Models 10–12). The change in R^2 suggests a strong effect for these factors in predicting initiation, adoption decision and implementation of NPM programmes.

Overall, the results generally confirm our expectation that characteristics of the external environment, organization, and top managers each account for unique variance in the initiation, adoption decision and implementation of innovation. However, the results derived from the full models (Models 10–12, Table 4) are mixed in supporting our hypotheses regarding effects of each independent variable on the three phases of innovation adoption.

Environmental factors

We hypothesized that urbanization, community wealth and population growth positively (*H1*), and unemployment rate negatively (*H2*), influence all phases of the adoption of innovation. The data supported our hypotheses on community wealth and population growth, but not for urbanization and unemployment rate (Models 10–12, Table 4).

As expected, local governments located in wealthier and growing communities initiate, adopt and implement more innovations. The greater resources of wealthier and growing communities overshadow the greater need and motivation of less wealthy and lower-growth communities in using innovation to better serve the constituencies. However, contrary to our expectation, but in line with Meyer and Goes' (1988) finding, urbanization did not have a positive effect on any phase of the adoption. A possible explanation is the association between urbanization and organizational size (Table 3) and the strong positive effect of size on all phases of the adoption process (Table 4); that is, size alone may fully account for the more complex and diverse environment of local government organizations in urbanized areas. Also contrary to our expectation, unemployment rate does not have a significant influence on any phase of innovation adoption. We surmise that the unemployment rate may reflect short-term vagaries of the larger economic system, more so than systemic differences across local communities, which are better reflected in the community wealth and growth variables.

Organizational factors

We proposed that organizational complexity and size influence all phases of innovation adoption positively, with a more moderate influence on implementation than on initiation and adoption decision (*H3*). The results are mixed (Models 10–12, Table 4). While consistent with the accumulations of past research results (Camison-Zornoza *et al.*, 2004; Damanpour, 1992) we found that size influences all phases positively ($p < 0.001$), the strength of its influence on implementation is similar to that of the other two phases.

For organizational complexity, contrary to our expectation, we found a positive effect on initiation only ($p < 0.05$). Prior research suggests that both organizational size and innovation type may moderate the complexity-innovation association. For example, Dewar and Dutton (1986) found a positive association between complexity and incremental technical innovations when size was not included in the regression model and a non-significant association when it was. Kimberly and Evanisko (1981) reported significant effects for specialization and functional differentiation, two indicators of organizational complexity, on the adoption of technical but not administrative innovations. Zmud (1982) found that professionalism, another indicator of organizational complexity, positively affected the initiation stage of technical innovations, akin to our finding for administrative innovation. These findings suggest that in addition to the phases of adoption considered in this study, a distinction among types of innovation and finer grain measures of organizational complexity are needed to depict complexity's true association with innovation adoption.

Table 3. Descriptive Statistics and Correlations

	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Urbanization	3.12	1.24																			
2. Community wealth	1.93	0.60	**0.08**																		
3. Population growth	1.04	0.99	**−0.06**	**0.14**																	
4. Unemployment rate	2.05	0.90	**−0.12**	**−0.46**	**−0.12**																
5. Complexity	7.23	1.49	0.00	**−0.09**	**−0.07**	0.02															
6. Size	3.64	1.43	**0.31**	**−0.12**	0.04	**0.06**	**0.36**														
7. Economic health	3.62	1.02	0.05	**0.44**	**0.21**	**−0.42**	**0.06**	0.04													
8. Unions	0.73	0.44	**0.08**	−0.01	**−0.12**	0.04	0.04	−0.01	**−0.07**												
9. Age	2.37	0.62	0.00	−0.03	**−0.06**	0.03	**0.06**	0.05	0.01	0.01											
10. Gender	0.89	0.31	−0.02	−0.01	**0.07**	0.03	0.01	**−0.06**	0.03	−0.04	0.05										
11. Education	2.70	0.67	0.05	0.04	**0.07**	0.01	0.05	**0.08**	−0.04	0.03	**−0.16**	**0.11**									
12. External communication	1.81	0.95	0.43	**0.09**	0.05	**−0.08**	**0.07**	**0.07**	**0.09**	**−0.09**	**−0.06**	**0.10**	**0.20**								
13. Tenure in position	2.70	1.28	0.01	**0.10**	0.00	−0.04	**0.06**	0.00	**0.14**	−0.01	**0.23**	**0.06**	**−0.08**	0.05							
14. Tenure in management	3.72	1.36	−0.02	0.03	−0.03	−0.01	0.05	0.03	0.04	−0.02	**0.38**	**0.20**	0.03	**0.20**	**0.37**						
15. Favouring competition	0.00	1.00	**0.13**	0.00	−0.03	−0.02	0.05	**0.13**	0.01	**0.09**	0.01	**0.06**	0.05	0.04	−0.01	0.05					
16. Entrepreneurial	0.00	1.00	0.04	0.00	**0.06**	−0.03	0.04	**0.12**	0.03	0.00	**−0.06**	0.02	**0.18**	**0.14**	**−0.09**	0.01	0.00				
17. Initiation	6.24	2.23	**0.08**	**0.08**	**0.18**	**−0.06**	**0.18**	**0.27**	**0.11**	−0.04	0.03	**0.09**	**0.14**	**0.22**	**0.07**	**0.20**	**0.20**	**0.31**			
18. Adoption decision	10.18	4.36	**0.10**	**0.12**	**0.16**	**−0.06**	**0.17**	**0.26**	**0.17**	−0.05	0.05	**0.06**	**0.11**	**0.19**	**0.13**	**0.21**	**0.17**	**0.28**	**0.86**		
19. Implementation	9.41	4.66	**0.11**	**0.10**	**0.16**	**−0.06**	**0.16**	**0.25**	**0.14**	−0.05	0.01	**0.07**	**0.11**	**0.19**	**0.09**	**0.16**	**0.17**	**0.25**	**0.79**	**0.85**	

Notes: Figures in bold are significant: $|r| \geq 0.06$, $p < 0.05$; $|r| \geq 0.08$, $p < 0.01$; $|r| \geq 0.10$, $p < 0.001$.
$N = 1212–1276$.

Table 4. Results of regression analyses

Variable	Model 1 Ini	Model 2 AdpD	Model 3 Impl	Model 4 Ini	Model 5 AdpD	Model 6 Impl	Model 7 Ini	Model 8 AdpD	Model 9 Impl	Model 10 Ini	Model 11 AdpD	Model 12 Impl
Urbanization	0.109***	0.116***	0.137***	0.033	0.042	0.069*	0.034	0.044	0.069*	0.017	0.029	0.055
Community wealth	0.052	0.098**	0.074*	0.069*	0.099**	0.079*	0.063	0.092**	0.074*	0.067*	0.095**	0.077*
Population growth	0.179***	0.140***	0.146***	0.156***	0.108***	0.119***	0.153***	0.109***	0.114***	0.147***	0.103***	0.110***
Unemployment rate	0.008	0.015	0.009	0.022	0.044	0.033	0.015	0.036	0.026	0.028	0.047	0.036
Complexity				0.060*	0.060*	0.054	0.059*	0.058	0.054	0.057*	0.056	0.052
Size				0.202***	0.202***	0.182***	0.201***	0.201***	0.187***	0.165***	0.171***	0.159***
Economic health				0.032	0.091**	0.066*	0.031	0.083**	0.061	0.027	0.080**	0.058
Unions				−0.026	−0.043	−0.038	−0.027	−0.044	−0.038	−0.042	−0.057*	−0.050
External communication				0.178***	0.150***	0.157***	0.136***	0.109***	0.121***	0.107***	0.085**	0.099***
Age							−0.013	−0.004	−0.040	−0.009	−0.001	−0.037
Gender							0.024	0.010	0.041	0.020	0.007	0.038
Education							0.055	0.037	0.034	0.013	0.001	0.002
Tenure in position							0.004	0.035	0.025	0.032	0.059*	0.047
Tenure in management							0.149***	0.155***	0.116***	0.135***	0.144***	0.105**
Favoring competition										0.162***	0.138***	0.138***
Entrepreneurial										0.275***	0.238***	0.211***
Adjusted R^2	0.043***	0.041***	0.043***	0.128***	0.126***	0.116***	0.150***	0.152***	0.131***	0.244***	0.221***	0.188***
Change in R^2				0.088***	0.088***	0.076***	0.026***	0.029***	0.018***	0.094***	0.069***	0.058***
F	14.11	13.36	14.05	19.88	19.50	17.84	15.61	15.77	13.39	24.27	21.46	17.75
d.f.	1151	1151	1151	1146	1146	1146	1141	1141	1141	1139	1139	1139

Notes: Table entries are standardized regression coefficients.
Ini = Initiation; AdpD = Adoption Decision; Impl = Implementation.
*$p<0.05$; **$p<0.01$; ***$p<0.001$.

We proposed that the organization's economic health affects all phases of innovation adoption positively, with a stronger influence on adoption decision (*H4*). The results partially support our hypothesis as economic health positively influences adoption decision ($p < 0.01$) but does not have a significant effect on initiation or implementation phases of adoption (Models 10–12, Table 4). Past studies have not distinguished among phases of adoption, but have generally found that financial resources positively affect innovation (Damanpour, 1991; Nohria and Gulati, 1996; Rosner, 1968). Our findings add by indicating that both external (community wealth) and internal (economic health) resources more positively affect adoption decision than initiation or implementation. They suggest that financial resources influence decision-makers to take risk and invest in the new programmes more than they influence organizational members to initiate or utilize those new programmes.

The findings on the relationship between trades unions and phases of innovation also reveal the importance of distinguishing among phases of adoption. Results partially support *H5* by showing a negative association with adoption decision ($p < 0.05$), but not with initiation or implementation. They suggest that the existence of trades unions has a stronger negative influence on managers and administrators who decide to adopt the innovation and allocate resources for its implementation than on efforts required to initiate the innovation or implement it. Although this preliminary finding should be confirmed by more research, it suggests that the argument for a general negative effect of trades unions on innovation may reflect managers' perception of unions' role in the innovation process more than the true effects that unions might have in initiating or implementing innovations by non-managers.

The results supported *H6* as external communication achieved through involvement in professional associations positively affected all three phases of adoption.

Managerial factors

Our hypotheses on demographic characteristics of top administrators are not supported by the data (Models 10–12, Table 4). Age (*H7*), gender (*H8*) and education (*H9*) did not significantly affect initiation, adoption decision or implementation. The non-significant result for age has precedence as other studies have reported that both organizational and manager age are not significantly associated with organizational change or innovation (Huber *et al.*, 1993; Nystrom *et al.*, 2002). The finding on gender supports the assertion that despite possible differences in characteristics and values between men and women, there is no strong evidence that such differences would affect their leadership styles (Hooijberg and DiTomaso, 1996). Female leaders do not behave differently from male leaders in the same type of positions, and both leaders exhibit equal amount of task-oriented and employee-oriented behavior (Bass, 1990; Dobbins and Paltz, 1986). Thus, male and female executives could also exhibit similar behaviours regarding innovation adoption.

Our finding on education, however, does not necessarily correspond with past studies. For example, while similar to our study Huber *et al.* (1993) and Meyer and Goes (1988) report a non-significant relationship between education and innovation, other studies have found a positive effect (Kimberly and Evanisko, 1981; Lee, Wong and Chong, 2005). The type of innovation examined may influence the mixed findings on education. Bantel and Jackson (1989) found that the average education level of top management team has a non-significant effect on administrative innovations, similar to our finding, but has a positive effect on technological innovations. But Kimberly and Evanisko (1981) found that the education level of administrators positively influences the adoption of both administrative and technological innovations. These studies did not distinguish among phases of innovation adoption; therefore, our findings on the influence of education on the three phases of adoption should be confirmed by future multiphase studies of innovation types.

Two existing meta-analyses have found contradictory results on the effect of management tenure on innovation – Damanpour (1991) reported a non-significant association, but Camison-Zornoza, Boronat-Navarro and Segarra-Cipres (forthcoming) found a positive association. The distinction among phases of adoption here has not alleviated the problem. Contrary to our hypothesis (*H10*), we found that tenure in management positively influences all three phases ($p < 0.01$), and tenure in position positively affects

adoption decision ($p < 0.05$). These findings may reflect the context of this study, however. In civil service and unionized public organizations, an internal environment may exist in which seniority is respected and rewarded. Thus, as their true values and intent are well known within the local government, top administrators with greater managerial tenure may effectively advocate for new administrative programmes that significantly depart from existing practices.

As expected, top managers' attitudes toward competition and entrepreneurship in local governments positively influence initiation, adoption decision and implementation of the NPM programs ($p < 0.001$). We hypothesized a stronger influence on initiation and adoption decision than on implementation (*H11*); however, we found the same significance levels across the three phases for both attitudes toward competition and entrepreneurship (Models 10–12, Table 4). The findings indicate that public administrators do have discretion despite the impact of environmental and organizational factors, but their discretion is shaped by their attitudes toward innovation rather than their demographic characteristics. This finding supports the growing critique of the use of demographic characteristics as proxies for psychosocial constructs (Boal and Hooijberg, 2000; Priem, Lyon and Dess, 1999).

Further analysis of phases of innovation adoption

The results in Table 4 show that all three dependent variables are significantly affected by the set of independent variables. Because the three phases of innovation adoption are sequential and are highly correlated (Table 3), a question might be raised as to the effect of associations between consequent phases on the results of regression models. To examine this effect we conducted the Roy-Bargmann stepdown F-test (Finn, 1974). In this test the dependent variables rather than the independent variables are considered in an elimination process.

The order in which the dependent variables are entered into the process will affect the test's outcome. Finn states that dependent variables should be entered according to a logical or theoretical order 'when measures involve progressively more complex behaviors, or whenever there exists a systematic progression from one outcome measure to another' (1974, p. 157). Thus, we entered the three dependent variables according to the logical order in the adoption process: initiation → adoption decision → implementation, and conducted two tests: initiation and adoption decision; and initiation, adoption decision and implementation (Table 5).

The results from MANOVA (Table 5) show that the set of antecedent variables has a significant impact on both initiation and adoption decision together (Lambda = 0.714, $p < 0.001$), and initiation, adoption decision and implementation together (Lambda = 0.702, $p < 0.001$). According to the Roy-Bargmann stepdown F-test (Table 5), when only initiation and adoption decision are included, both are significant ($p < 0.001$) suggesting that adoption decision relates to the set of independent variables above and beyond how initiation alone relates to the variables. However, when all three dependent variables are included, implementation is not significant ($p > 0.05$) suggesting that, taking initiation and adoption decision into account, implementation does not significantly contribute to the association of innovation adoption with the set of antecedents.

Discussion

Innovation has widely been studied in many fields at different levels of analysis. This article focuses on the adoption of innovation at the firm level and departs from previous studies of innovation adoption in several ways. It: (1) distinguishes among the three phases of adoption; (2) develops hypotheses on the antecedents of adoption for each phase; (3) includes antecedents from three dimensions; and (4) examines the influence of the

Table 5. Results of MANOVA and Roy-Bargmann Stepdown F-test

Dependent Variable	Degrees of Freedom	Wilks' Lambda	F-value
Initiation → adoption decision	32, 2276	0.714	13.04***
Initiation	16, 1139		24.26***
Adoption decision	16, 1138		3.15***
Initiation → adoption decision → implementation	48, 3383	0.702	8.89***
Initiation	16, 1139		24.27***
Adoption decision	16, 1138		3.14***
Implementation	16, 1137		1.21

Notes: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

antecedents on the phases of adoption. It adds to existing case studies of innovation process (Jelinek and Schoonhoven, 1993; Nord and Tucker, 1987; Van de Ven, Angle and Poole, 2000) by conducting a large sample study of the antecedents of phases of innovation adoption.

Implications for research

As noted in the introduction, this study was carried out to address three issues in innovation adoption research. Below we discuss the implications of our findings for each issue and suggest ideas for future research.

Phases of innovation adoption. Duncan (1976) and Pierce and Delbecq (1977) developed hypotheses on phases of innovation adoption, generally arguing that organic organizational characteristics facilitate initiation and mechanistic characteristics facilitate implementation. For instance, Duncan (1976) proposed that lower bureaucratic control (formalization, centralization) and higher organizational complexity (differentiation, professionalism) facilitate the initiation of innovation, and higher bureaucratic control and lower complexity facilitate implementation.

The empirical examinations of these theories are scarce and limited to organizational factors, and the findings are mixed. Considering formalization and centralization, Damanpour (1996b) reported no significant difference in the relationship between these two variables and initiation or implementation of innovation. Zmud (1982) found support for Duncan's hypothesis for technical innovations but not for administrative innovations. Considering organizational complexity, Damanpour (1996a) reported that complexity influences initiation less positively than implementation, while our results suggest that it has a positive influence on initiation but not on implementation (Table 4).

In addition to testing effects of organizational factors, we developed hypotheses and tested effects of environmental and organizational leader factors on the phases of adoption. We found that antecedents belonging to each dimension affect the three phases of adoption in the same direction. Also, considering possible differences in the strength of influence of the antecedents on the phases of adoption, we found differences for effects of complexity, economic health, unions and tenure in position. An interesting finding is the positive effect of organizational economic health and the negative effect of trades unions on adoption decision only. Since the adoption decision is typically made by top managers or boards, this finding suggests that both the extent of organizational resources and the existence of trades unions would influence top managers' decision in adopting the innovation more strongly that they would affect initiation and implementation.

We tested the role of associations among initiation, adoption decision and implementation and found that, taking initiation into account, adoption decision significantly contributes in explaining the relationship between antecedents and innovation adoption but implementation does not contribute over and beyond initiation and adoption decision (Table 5). A possible explanation for this finding could be the type of innovation we studied. Research suggests differences in the attributes and processes of adoption of different types of innovation (Daft, 2001; Hoffman and Hagerty, 1993; Zahra, Neubaum and Huse, 2000). For instance, focusing on initiation versus implementation, Daft (2001) proposed that administrative innovations follow a top-down process of adoption as they are mainly initiated at the administrative core and implemented in the technical core, but technological innovations follow a bottom-up process as they are mainly initiated at the technical core and implemented at the administrative core. Differences in organizational cores in which innovations are initiated or implemented may influence the extent to which a phase of adoption contributes in explaining the variance in innovation adoption over and beyond another phase. Therefore, this study's findings on phases of the adoption of administrative innovation would need to be confirmed by multiphase studies of the adoption of technological innovations.

Explanatory power of dimensions. We simultaneously examined the influence of environmental, organizational, and top managers' characteristics on the adoption of innovation and found while factors within each dimension significantly contribute to the explanation of innovation adoption, organizational factors are more powerful predictors of innovation adoption than environmental or individual demographic factors. Furthermore, our analyses indicate that the relative

explanatory power of organizational factors applies to all three phases of the adoption process (see change in R^2, Table 4).

In interpreting this finding it should be noted that our data are limited to organizations as adopters or users of innovation. In addition to being an adopter, an organization can be the generator or inventor of innovation (Kimberly, 1986). The antecedents of innovation may differ for organizations that are mainly adopters from those that are primarily generators. The adopter organization may rely primarily on its managerial and organizational capabilities to select and assimilate innovations, while the generator organization may depend more heavily on specialized knowledge of its members and its market capabilities to develop and commercialize innovations (Damanpour and Wischnevsky, 2006). Thus, the relative explanatory power of dimensions may be different in the two organizational types, and our finding on the explanatory power of organizational predictors of the phases of adoption may not necessarily be applicable to the phases of generation of innovation. Future comparative studies are needed to examine the differences (if any) between the generators and adopters of innovation.

The factors included in our study are mainly drawn from the individualist and structuralist perspectives of innovation research (Slappendel, 1996). Slappendel (1996) and Wolfe (1994) advocate the interactive process perspective, in which the complex relationship between individual action and organizational context is examined. We did test interaction effects between antecedents on dependent variables (data not shown) and found that they generally do not add to the explanatory power of the models in Table 4. Slappendel rightly notes that 'a focus on the interconnection of action and structure is distinct from multivariate analysis' and multidimensional studies do not operationalize the notion of interconnection over time (1996, p. 119). Interactive process studies, often case studies of one or several innovations in few organizations over time (Van de Ven, Angle and Poole, 2000; Woiceshyn, 2000), primarily contribute by developing theory, while large sample, multivariate studies such as ours mainly contribute by testing and refining theory. These research perspectives are thus complementary, and both should be pursued for helping to understand the multiphase process of organizational innovation.

Managers' attitude toward innovation. A contribution of this study is its examination of top managers' attitude toward innovation, a factor often neglected in previous multidimensional studies of innovation adoption. Our results confirm Hage and Dewar's (1973) finding on the explanatory power of organizational leaders' attitudes, and add by showing that the impact of managers' attitude toward innovation on the adoption of innovation is considerably stronger than both environmental and managers' demographic characteristics, and is nearly as strong as that of organizational factors. Managers' attitudes toward competition and entrepreneurship positively affect all phases of innovation adoption.

Nystrom *et al.* (2002) argue that organizational climate moderates the relation between context and innovation. Ekvall (1996), considering climate as an attribute of the organization that intervenes between organizational resources and outcomes, finds that organizational climate is positively associated with an organization's capacity to innovate even after controlling for organizational factors such as goal clarity, formalization and professionalism. Organizational leaders are instrumental in creating and maintaining the organization's climate for change and innovation, especially when the leader has longevity in position. Organizations led by managers with unfavourable attitudes toward innovation are most likely not to develop structures and administrative processes required for innovation and do not encourage their members to develop new perceptual frames for innovation. As executive succession literature suggests (Nutt and Backoff, 1997; Sherman and Chaganti, 1998), the replacement of top executives is an important step to trigger innovation in such condition. Accordingly, a new leader (especially an outsider) who values change is more likely to bring in a new vision and new schema that enhance organizational members' facilitation of the adoption of innovation.

This view of top managers' role in innovation, however, may be more relevant in the United States than other nations, as most executive succession studies have been conducted in North America. National culture affects innovation because it influences both the inquisitiveness of the members of a society and their tolerance for change (Hofstede, 2001). It also influences the relationship between organizational leaders' characteristics and innovation adoption, especially for

administrative innovations (Hoffman and Hagerty, 1993). Elenkov, Judge and Wright studied executive influence on innovation in six countries within three different sociocultural clusters and found that 'product-market innovations transcend socio-cultural differences, but administrative innovations might be contingent on specific cultural characteristics' (2005, p. 678). Therefore, we recommend further examination of our study's results regarding top managers' attitude toward innovation on phases of adoption in both public sector and business organizations in other nations.

Implications for management

The study offers a few important implications for the management of innovation in organizations. First, it highlights the importance of both external and internal resources for organizational innovativeness. Innovation requires both financial and human resources, and is facilitated if top executives specifically allocate them to innovation; i.e. separate the resources for innovation from those for operations. For example, the positive effect of external communication on all phases of adoption (Table 4) suggests that allocation of resources to extra-organizational professional activities of managers and members could facilitate innovation. Second, the positive effect of tenure in management on all phases of adoption, coupled with the non-significant effect of top managers' age, suggests that perhaps negative effects of these variables on innovation are overstated. Hence, organizations can be advised not to necessarily shy away from appointing mature, well-experienced managers to oversee the innovation adoption process. Lastly, the strong positive effect of attitudes toward competition and entrepreneurship on all phases of adoption suggests that appointment of managers with favourable attitudes toward innovation to key positions and roles in innovation projects may be essential for successful management of the innovation adoption process.

Limitations

Innovation is a complex construct and capturing all its facets in a single study is impossible. Our study therefore has several limitations that should be considered in interpreting its findings. First, although we have studied sixteen determinants from three dimensions, there are many others we have not included; for example: (1) structural factors such as centralization, formalization and differentiation; (2) personality characteristics of top managers such as need for achievement, locus of control and tolerance for ambiguity; and (3) innovation attributes such as relative advantage, observability and compatibility. These omissions could increase error variance in our study. Second, we have studied administrative innovations in local governments. Our findings for the three phases of adoption would need to be confirmed for technological innovations and in business organizations. Third, the study is cross-sectional and data were collected by questionnaires. The process of innovation adoption is a dynamic process and longitudinal data collection using observation and interviews in addition to questionnaires would provide a richer understanding of the process. However, such diverse data-collection methods can be employed more easily to case studies of one or few innovations in a small number of organizations than to a large sample study of multiple innovations. Fourth, data are collected from a single source, the ICMA survey. However, the problem of single-source methodology is somewhat alleviated because with the exception of attitude toward innovation, for which we conducted an exploratory factor analysis, other variables entail objective answers (Table 1). Moreover, high correlations among variables, which can be in part a result of overall response tendency from a single source, are not abundant in this study (Table 3).

In conclusion, despite its limitations, this article makes several important contributions. First, it shows that organizational context is more influential in predicting all phases of innovation adoption than environmental context. Second, it delineates that organizational leaders' attitude toward innovation influences all phases of innovation adoption more than leaders' demographic characteristics and environmental factors, suggesting that this variable should be given a more prominent role in developing models of innovation adoption in the future. Third, the results generally suggest that influences of the antecedents on the three phases of adoption are not drastically different; that is, differences are mainly in terms of the degree than the direction of the effects. However, because this study is the first large sample study of multidimensional antecedents

of phases of innovation adoption, its findings should be considered preliminary until confirmed in other settings and contexts.

References

Aiken, M. and J. Hage (1971). 'The Organic Organization and Innovation', *Sociology*, **5**, pp. 63–82.

Amabile, T. M. (1988). 'A Model of Creativity and Innovation in Organizations'. In: L. L. Cummings and B. M. Staw (eds), *Research in Organizational Behavior*, **10**, pp. 123–167. JAI Press, Greenwich, CT.

Amis, J., T. Slack and C. R. Hinings (2004). 'The Pace, Sequence, and Linearity of Radical Change', *Academy of Management Journal*, **47**, pp. 15–39.

Angle, H. L. and A. H. Van de Ven (2000). 'Suggestions for Managing the Innovation Journey'. In: A. H. Van de Ven, H. L. Angle and M. S. Poole (eds), *Research on the Management of Innovation: The Minnesota Studies*, pp. 663–697. Oxford University Press, New York.

Baldridge, J. V. and R. A. Burnham (1975). 'Organizational Innovation, Individual, Organizational, and Environmental Impacts', *Administrative Science Quarterly*, **20**, pp. 165–176.

Bantel, K. A. and S. E. Jackson (1989). 'Top Management and Innovations in Banking: Does the Composition of the Top Management Team Make a Difference', *Strategic Management Journal*, **10**(S), pp. 107–124.

Bass, B. M. (1990). *Bass and Stogdill's Handbook of Leadership: Theory, Research, and Managerial Application*. Free Press, New York.

Blau, J. R. and W. McKinley (1979). 'Idea, Complexity, and Innovation', *Administrative Science Quarterly*, **24**, pp. 200–219.

Boal, K. B. and R. Hooijberg (2000). 'Strategic Leadership Research: Moving on', *Leadership Quarterly*, **11**(4), pp. 515–549.

Boyne, G. A., J. S. Gould-Williams, J. Law and R. M. Walker (2005). 'Explaining the Adoption of Innovation: An Empirical Analysis of Public Management Reform', *Environment and Planning: Government and Policy*, **23**(3), pp. 419–435.

Burns, T. and G. M. Stalker (1961). *The Management of Innovation*. Tavistock Publications, London.

Camison-Zornoza, C., R. Lapiedra-Alcami, M. Segarra-Cipres and M. Boronat-Navarro (2004). 'A Meta-Analysis of Innovation and Organizational Size', *Organization Studies*, **25**, pp. 331–361.

Camison-Zornoza, C., M. Boronat-Navarro and M. Segarra-Cipres (forthcoming) 'A Meta-Analysis of Organizational Innovation: Moderator Effects and Internal and Market Variables'. In: J. Saee (ed.), *Contemporary Corporate Strategy: Global Perspectives*. Routledge, London.

Cohen, W. M. and R. C. Levin (1989). 'Empirical Studies of Innovation and Market Structure'. In: R. Schmalansee and R. D. Willing (eds), *Handbook of Industrial Organization*, **2**, pp. 1059–1107. Elsevier, Oxford.

Cooper, R. G. (1999). 'From Experience: The Invisible Success Factors in Product Innovation', *Journal of Product Innovation Management*, **16**, pp. 115–133.

Corwin, R. G. (1972). 'Strategies for Organizational Innovation: An Empirical Comparison', *American Sociological Review*, **37**, pp. 441–454.

Daft, R. L. (1978). 'A Dual-Core Model of Organizational Innovation', *Academy of Management Journal*, **21**, pp. 193–210.

Daft, R. L. (2001). *Organization Theory and Design*. South-Western, Cincinnati, OH.

Daft, R. L. and S. W. Becker (1978). *The Innovative Organization*. Elsevier, New York.

Damanpour, F. (1991). 'Organizational Innovation: A Meta-Analysis of Effects of Determinants and Moderators', *Academy of Management Journal*, **34**, pp. 555–590.

Damanpour, F. (1992). 'Organizational Size and Innovation', *Organization Studies*, **13**, pp. 375–402.

Damanpour, F. (1996a). 'Organizational Complexity and Innovation: Developing and Testing Multiple Contingency Models', *Management Science*, **42**, pp. 693–716.

Damanpour, F. (1996b). 'Bureaucracy and Innovation Revisited: Effects of Contingency Factors, Industrial Sectors, and Innovation Characteristics', *Journal of High Technology Innovation Management*, **7**, pp. 149–173.

Damanpour, F. and J. D. Wischnevsky (2006). 'Research on Organizational Innovation: Distinguishing Innovation-Generating from Innovation-Adopting Organizations'. Working Paper, Rutgers University.

Dewar, R. D. and J. E. Dutton (1986). 'The Adoption of Radical and Incremental Innovations: An Empirical Analysis', *Management Science*, **32**, pp. 1422–1433.

DiTomaso, N. and G. Farris (1992). 'Diversity and Performance in R&D', *IEEE Spectrum*, **29**(6), pp. 21–24.

Dobbins, G. H. and S. J. Paltz (1986). 'Sex Differences in Leadership: How Real are They?', *Academy of Management Review*, **11**, pp. 118–127.

Dougherty, D. and C. Hardy (1996). 'Sustained Product Innovation in Large, Mature Organizations: Overcoming Innovation-Organization Problems', *Academy of Management Journal*, **39**, pp. 1120–1153.

Drazin, R. and C. B. Schoonhoven (1996). 'Community, Population, and Organization Effects on Innovation: A Multilevel Perspective', *Academy of Management Journal*, **39**, pp. 1065–1083.

Duncan, R. B. (1976). 'The Ambidextrous Organization: Designing Dual Structures for Innovation'. In: R. H. Kilmann, L. R. Pondy and D. P. Slevin (eds), *The Management of Organizational Design: Strategy Implementation*, **1**, pp. 167–188. North-Holland, New York.

Eagly, A. H. and B. T. Johnson (1990). 'Gender and Leadership Style: A Meta-Analysis', *Psychological Bulletin*, **108**, pp. 233–256.

Elenkov, D. S., W. Judge and P. Wright (2005). 'Strategic Leadership and Executive Innovation Influence: An International Multi-Cluster Comparative Study', *Strategic Management Journal*, **26**, pp. 665–682.

Ekvall, G. (1996). 'Organizational Climate for Creativity and Innovation', *European Journal of Work and Organizational Psychology*, **5**, pp. 105–123.

Ekvall, G. and J. Arvonen (1991). 'Change-Centered Leadership: An Extension of the Two-Dimensional Model', *Scandinavian Journal of Management*, **7**, pp. 17–26.

Ekvall, G. and J. Arvonen (1994). 'Leadership Profiles, Situation and Effectiveness', *Creativity and Innovation Management*, **3**, pp. 139–161.

Ettlie, J. F. (1980). 'Adequacy of Stage Models for Decisions on the Adoption of Innovation', *Psychological Reports*, **46**, pp. 991–995.

Fennel, M. L. (1984). 'Synergy, Influence, and Information in the Adoption of Administrative Innovations', *Academy of Management Journal*, **27**, pp. 113–129.

Finkelstein, S. (1992). 'Power in Top Management Teams: Dimensions, Measurement, and Validation', *Academy of Management Journal*, **35**, pp. 505–538.

Finn, J. D. (1974). *A General Model for Multivariate Analysis*. Holt, Rinehart & Winston, Inc, New York.

Ford, C. M. (1995). 'Creativity is a Mystery: Clues from the Investigators' Notebooks'. In: C. M. Ford and D. A. Gioia (eds), *Creative Action in Organizations*, pp. 12–49. Sage Publications, Thousand Oaks, CA.

Germain, R. (1996). 'The Role of Context and Structure in Radical and Incremental Logistics Innovation Adoption', *Journal of Business Research*, **35**, pp. 117–127.

Goes, J. B. and S. H. Park (1997). 'Interorganizational Links and Innovation: The Case of Hospital Services', *Academy of Management Journal*, **40**, pp. 673–696.

Gopalakrishnan, S. and F. Damanpour (1994). 'Patterns of Generation and Adoption of Innovations in Organizations: Contingency Models of Innovation Attributes', *Journal of Engineering and Technology Management*, **11**, pp. 95–116.

Gopalakrishnan, S. and F. Damanpour (1997). 'A Review of Innovation Research in Economics, Sociology, and Technology Management', *Omega*, **25**, pp. 15–28.

Hage, J. (1980). *Theories of Organizations*. Wiley, New York.

Hage, J. and M. Aiken (1970). *Social Change in Complex Organizations*. Random House, New York.

Hage, J. and R. Dewar (1973). 'Elite Values Versus Organizational Structure in Predicting Innovation', *Administrative Science Quarterly*, **18**, pp. 279–290.

Hambrick, D. C. and P. A. Mason (1984). 'Upper Echelons: The Organization as a Reflection of its Top Managers', *Academy of Management Review*, **9**, pp. 193–206.

Hitt, M. A., R. E. Hoskisson and R. D. Ireland (1990). 'Mergers and Acquisitions and Managerial Commitment to Innovation in M-Form Firms', *Strategic Management Journal*, **11**(S), pp. 29–47.

Hoffman, R. C. and W. H. Hegarty (1993). 'Top Management Influence on Innovations: Effects of Executive Characteristics and Social Culture', *Journal of Management*, **19**, pp. 549–574.

Hofstede, G. (2001). *Culture's Consequences*. Sage Publications, Thousand Oaks, CA.

Hooijberg, R. and N. DiTomaso (1996). 'Leadership in and of Demographically Diverse Organizations', *Leadership Quarterly*, **7**, pp. 1–19.

Howell, J. M. and C. A. Higgins (1990). 'Champions of Technological Innovation', *Administrative Science Quarterly*, **35**, pp. 317–341.

Huber, G. P., K. M. Sutcliffe, C. C. Miller and W. M. Glick (1993). 'Understanding and Predicting Organizational Change'. In: G. P. Huber and W. H. Glick (eds), *Organizational Change and Redesign*, pp. 215–265. Oxford University Press, New York.

Hull, C. H. and N. H. Nie (1982). *SPSS Update*. McGraw-Hill, New York.

Jabri, M. (1991). 'The development of conceptually independent subscales in the measurement of modes of problem solving', *Educational and Psychological Measurement*, **51**, pp. 975–983.

Jasperson, J., P. E. Carter and R. W. Zmud (2005). 'A Comprehensive Conceptualization of Post-Adoption Behaviors Associated with Information Technology Enabled Work Systems', *MIS Quarterly*, **29**, pp. 525–557.

Jelinek, M. and C. B. Schoonhoven (1993). *The Innovation Marathon*. Jossey-Bass, San Francisco.

Kikulis, L. M., T. Slack and C. R. Hinings (1995). 'Sector Specific Patterns of Organizational Design Change', *Journal of Management Studies*, **32**, pp. 67–100.

Kimberly, J. R. (1978). 'Hospital Innovation Adoption: The Role of Integration into External Informational Environments', *Journal of Health and Social Behavior*, **19**, pp. 361–373.

Kimberly, J. R. (1981). 'Managerial Innovation'. In W. Starbuck and P. Nystrom (eds), *Handbook of Organizational Design*, **1**, pp. 84–104. Oxford University Press, New York.

Kimberly, J. R. (1986). 'The Organization Context of Technological Innovation'. In: D. D. Davis (ed.), *Managing Technological Innovation*, pp. 23–43. Jossey-Bass, San Francisco.

Kimberly, J. R. and M. Evanisko (1981). 'Organizational Innovation: The Influence of Individual, Organizational, and Contextual Factors on Hospital Adoption of Technological and Administrative Innovations', *Academy of Management Journal*, **24**, pp. 679–713.

King, N (1990). 'Innovation at Work: The Research Literature'. In: M. A. West and J. L. Farr (eds), *Innovation and Creativity at Work*, pp. 15–59. Wiley, New York.

Kirton, M. (1976). 'Adaptors and Innovators: A Description and Measure', *Journal of Applied Psychology*, **61**, pp. 622–629.

Klein, K. J. and J. S. Sorra (1996). 'The Challenge of Innovation Implementation', *Academy of Management Review*, **21**, pp. 1055–1080.

Lambright, W. H. (1980). 'Decision-Making for Urban Technology', *Public Sciences*, **11**, pp. 329–341.

Lee, S. H., P. K. Wong and C. L. Chong (2005). 'Human and Social Capital Explanations for R&D Outcome', *IEEE Transactions on Engineering Management*, **52**, pp. 59–68.

Meyer, A. D. and J. B. Goes (1988). 'Organizational Assimilation of Innovation: A Multilevel Contextual Analysis', *Academy of Management Journal*, **31**, pp. 897–923.

Mintzberg, H., D. Raisinghani and A. Theoret (1976). 'The Structure of Unstructured Decision Processes', *Administrative Science Quarterly*, **21**, pp. 246–275.

Moon, M. J. and P. deLeon (2001). 'Municipal Reinvention: Managerial Values and Diffusion among Municipalities', *Journal of Public Administration Research and Theory*, **11**, pp. 327–351.

Mumford, M. D. (2000). 'Managing Creative People: Strategies and Tactics for Innovation', *Human Resources Management Review*, **10**, pp. 313–355.

Neter, J., W. Wasserman and M. H. Kutner (1985). *Applied Linear Statistical Models*. Irwin, Homewood, IL.

Nohria, N. and R. Gulati (1996). 'Is Slack Good or Bad for Innovation?', *Academy of Management Journal*, **39**, pp. 1245–1264.

Nord, W. R. and S. Tucker (1987). *Implementing Routine and Radical Innovations*. Lexington Books, Lexington, MA.

Nunnally, J. C. (1978). *Psychometric Theory*. McGraw-Hill, New York.

Nutt, P. C. and R. W. Backoff (1997). 'Transforming Organizations with Second-Order Change'. In: W. A. Pasmore and R. W. Woodman (eds), *Research in Organizational Change and Development*, **10**, pp. 229–274. JAI Press, Greenwich, CT.

Nystrom, P. C., K. Ramamurthy and A. L. Wilson (2002). 'Organizational Context, Climate and Innovativeness: Adoption of Imaging Technology', *Journal of Engineering Technology Management*, **19**, pp. 221–247.

Organization for Economic Cooperation and Development (OECD). (1995). *Government in Transition: Public Management Reforms in OECD Countries*. OECD, Paris.

Osborne, D. and T. Gaebler (1992). *Reinventing Government: How the Entrepreneurial Spirit Is Transforming the Public Sector*. Addison-Wesley, Reading, MA.

Pierce, J. L. and A. L. Delbecq (1977). 'Organization Structure, Individual Attitudes and Innovation', *Academy of Management Review*, **2**, pp. 27–37.

Poole, M. S. (1981). 'Decision Development in Small Groups I: A Comparison of Two Models', *Communication Monographs*, **48**, pp. 1–24.

Poole, M. S. (1983). 'Decision Development in Small Groups II: A Study of Multiple Sequences in Decision-Making', *Communication Monographs*, **50**, pp. 206–232.

Priem, R. L., D. W. Lyon and G. G. Dess (1999). 'Limitations of Demographic Proxies in Top Management Team Heterogeneity Research', *Journal of Management*, **6**, pp. 935–953.

Rogers, E. M. (1995). *Diffusion of Innovations*. Free Press, New York.

Rosner, M. M. (1968). 'Economic Determinants of Organizational Innovation', *Administrative Science Quarterly*, **12**, pp. 614–625.

Schroeder, R. G., A. H. Van de Ven, G. D. Scudder and D. Polley (2000). 'The Development of Innovation Ideas'. In: A. H. Van de Ven, H. L. Angle and M. S. Poole (eds), *Research on the Management of Innovation: The Minnesota Studies*, pp. 107–134. Oxford University Press, New York.

Scott, S. G. and R. A. Bruce (1994). 'Determinants of Innovative Behavior: A Path Model of Individual Innovation in the Workplace', *Academy of Management Journal*, **37**, pp. 580–607.

Sherman, H. and R. Chaganti (1998). *Corporate Governance and the Timeliness of Change: Reorientation in 100 American Firms*. Quorum, Westport, CT.

Slappendel, C. (1996). 'Perspectives on Innovation in Organizations', *Organization Studies*, **17**, pp. 107–129.

Sonfield, M., R. Lussier, J. Corman and M. McKinney (2001). 'Gender Comparisons in Strategic Decision-Making: An Empirical Analysis of the Entrepreneurial Strategy Mix', *Journal of Small Business Management*, **39**(2), pp. 165–173.

Steensma, H. K. and K. G. Corley (2000). 'On the Performance of Technology-Sourcing Partnerships: The Interaction Between Partner Interdependence and Technology Attributes', *Academy of Management Journal*, **43**, pp. 1045–1067.

Stelter, N. Z. (2002). 'Gender Differences in Leadership: Current Social Issues and Future Organizational Implications', *Journal of Leadership Studies*, **8**(4), pp. 88–99.

Subramanian, A. and S. Nilakanta (1996). 'Organizational Innovativeness: Exploring the Relationship Between Organizational Determinants of Innovation, Types of Innovations, and Measures of Organizational Performance', *Omega*, **24**, pp. 631–647.

Tidd, J. (2001). 'Innovation Management in Context: Environment, Organization and Performance', *International Journal of Management Review*, **3**(3), pp. 169–183.

Tornatzky, L. G. and M. Fleisher (1990). *The Process of Technological Innovation*. Lexington Books, Lexington, MA.

Tushman, M. L. and C. A. O'Reilly (2002). *Winning Through Innovation*. HBS Press, Boston.

Van de Ven, A. H., H. L. Angle and M. S. Poole (2000). *Research on the Management of Innovation: The Minnesota Studies*. Oxford University Press, New York.

Wejnert, B. (2002). 'Integrating Models of Diffusion of Innovations: A Conceptual Framework', *Annual Review of Sociology*, **28**, pp. 297–326.

West, M. A. and N. R. Anderson (1996). 'Innovation in Top Management Teams', *Journal of Applied Psychology*, **81**, pp. 680–693.

West, M. A. and J. L. Farr (1990). 'Innovation at Work'. In: M. A. West and J. L. Farr (eds), *Innovation and Creativity at Work*, pp. 3–13. Wiley, New York.

Woiceshyn, J. (2000). 'Technology Adoption: Organizational Learning in Oil Firms', *Organization Studies*, **21**, pp. 1095–1119.

Wolfe, R. A. (1994). 'Organizational Innovation: Review, Critique, and Suggested Research Directions', *Journal of Management Studies*, **31**, pp. 405–431.

Yukl, G. (1999). 'An Evaluative Essay on Current Conceptions of Effective Leadership', *European Journal of Work and Organizational Psychology*, **8**, pp. 33–48.

Zahra, S. A., D. O. Neubaum and M. Huse (2000). 'Entrepreneurship in Medium-Size Companies: Exploring the Effects of Ownership and Governance Systems', *Journal of Management*, **26**, pp. 947–976.

Zaltman, G., R. Duncan and J. Holbek (1973). *Innovations and Organizations*. Wiley, New York.

Zmud, R. W. (1982). 'Diffusion of Modern Software Practices: Influence of Centralization and Formalization', *Management Science*, **28**, pp. 1421–1431.

Fariborz Damanpour is Professor of Management at Rutgers Business School. His primary area of research is management of innovation and change. His articles have been published in organization management and technology management journals. He currently serves as the Department Editor of the Technology and Innovation Management Department, *IEEE Transactions on Engineering Management* and on the editorial boards of the *Journal of Engineering and Technology Management* and *Journal of Management Studies*.

Marguerite Schneider is an assistant professor at the School of Management at New Jersey Institute of Technology. Her research on institutional investment, public-sector organizations, and leadership has been published in journals including *Academy of Management Review, Organization Science* and *Administration & Society*. She serves on the editorial board of *Management Learning* and *Group* and *Organization Management*.