



# A descriptive model of innovation and creativity in organizations: a synthesis of research and practice

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## Abstract

Based on a review of the reported theoretical advances that are affirmed by empirical works from published management practice, this paper finds that innovation is an outcome of an intentional and designed effort of the organization, and synthesizes the findings for enhancing creativity and innovation by developing three antecedents that positively influence innovation in organizations: (1) the garnered knowledge, (2) the presence of a knowledge-supporting culture, and (3) the accumulation of social capital. The paper also provides a summary of transferable management practices that organizations are employing to enhance innovation and productivity. *Knowledge Management Research & Practice* (2008) 6, 298–311.  
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## Introduction

Broadly speaking, innovation is an idea, practice or object that is perceived to be new either by an individual or other unit of adoption (Van de Ven, 1986; Rogers, 2003, p. 12). It is a fundamental output of the organization because it directly impacts the firm's viability and is responsible for profound economic and social change (Sorensen & Stuart, 2000). To the firm, it adds profits from new values, and to the society, an expanded circular flow of economic activities (Cantwell & Santangelo, 1998). New products, methods of production and distribution, new markets, and new forms of organizations that keep capitalism humming (Schumpeter, 1942, p. 83) all come from innovation. Innovation gives the organization the ability to respond to changes in markets, technology, and competition (Dougherty & Hardy, 1996), which have become especially important due to the globalization of business activities. Whereas innovation has been responsible for the economic growth of America (Kanter, 1984, p. 20) and American companies in the world for the last few decades, today it is important for all firms in all countries, developed or emerging, such as India and China. With innovation, firms differentiate themselves from their competitors by efficiently bringing to the marketplace products that are perceived by buyers to be superior and unique in fulfilling customer needs (Dougherty & Hardy, 1996). This requires organizations to be more ingenious in creating value for the customer by developing new knowledge or finding new ways to use existing knowledge. The current wave of globalization has made innovation more important than at any other time in the past when firms mostly operated within their isolated and protected markets. Based on a recently conducted survey of 1356 respondents

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worldwide by the American Management Association and Human Resource Institute, more than two-thirds of the organizations believe that innovation is highly-to-extremely important to them today, and it will become even more important to them in the next 10 years (AMA, 2006, p. ix). Firms are exploiting innovation to gain a big competitive advantage domestically, and for developing markets internationally. Their success depends on effectively using innovation in all of their operations (Conklin, 1996; Zahra *et al.*, 2000).

### **New paradigms of organizational innovation**

Previously, in line with Schumpeterian concepts, innovation was taken to belong in the realm of R&D labs where new knowledge was discovered (Ruttan, 1959; Romer, 1990; AMA, 2006, p. ix). It was this innovation that was instrumental in bringing about the technological change that increased economic progress by increasing the rate of growth of output per worker. R&D intensity resulted in the rate of patenting of a society (Zachariadis, 2003) that in turn resulted in new applications. However, today innovation, in all its forms, products, services, market strategies, processes, and work practices (Kanter, 1984, p. 18), is deemed more a product of the human mind (Kanter, 1984, p. 18; Rogers, 2003, p. 213), where tacit knowledge resides. It may or may not be routed through R&D labs. Today, innovation involves finding smart new ways of exploiting the existing knowledge in all functions performed by the organization. This requires firms to garner knowledge and develop human creativity appropriate for the innovation to develop advanced technologies and methodologies, new or improved products, effective and economical services, and efficient conversion processes. Because the starting point of innovation is creativity (Amabile *et al.*, 1996) combined with tacit knowledge (Koskinen & Vanharanta, 2002), organizations constantly search for the right employees whose knowledge and insight will help them achieve success in the marketplace. The deployment of these employees, known as knowledge pockets (Van den Bulte & Moenaert, 1998; the term is covered in detail later in this work in a separate section titled 'Knowledge pockets' where it ties more appropriately), has become so important that organizations that put proper emphasis on it will not only benefit their stakeholders but also the overall growth and well-being of their wider society and the nation. This process starts with developing the talent of employees to observe opportunities and to apply their tacit knowledge to these opportunities for the benefit of the firm (Mascitelli, 2000).

### **Innovation and invention**

In the context of what organizations do, an invention provides the base for new technological paradigms and trajectories that become responsible for the destruction of extant technologies, products, and techniques (Ahuja & Lampert, 2001). Joseph A. Schumpeter, in his 1939 book on business cycles, said that innovation may be

possible without anything known as invention (Ruttan, 1959). Although invention may be innovation, it is only one form of it, and perhaps one of its more generic forms. Whereas invention is the new knowledge that may (or, may not) cause a radical impact on the firm, the economy, the society (Sorensen & Stuart, 2000) and, possibly, the global economy; innovation may not involve new knowledge (Rogers, 2003, p. 12). Innovation also comes in other forms, such as marketing strategies, organizational designs, products, services, processes, and techniques (Kanter, 1984, p. 18; von Hippel, 1994, p. 6; Dougherty & Hardy, 1996; Jamrog *et al.*, 2006). Innovation may include re-invention, which is modifying or changing an invention to make it adoptable and implementable to the application at hand (Rogers, 2003, p. 36).

Schumpeter identified innovation, with credit and profit maximization, as an essential function of entrepreneurship (Ruttan, 1959).

A simple analogy describing the process of innovation can be derived from the growing of a plant: the seed is the tacit knowledge, the fertilizer is the explicit knowledge, and the soil is human creativity; all three are essential to get innovation.

### **The role of the human element in innovation**

Peter Drucker (1967, 1969) in his earlier writings indicates the importance to organizations of workers who use knowledge in performing their jobs; these individuals are known as knowledge workers (using Peter Drucker's terminology). He also emphasizes management practices that could best utilize such workers for the good of their employers. Many other authors recognize the importance of knowledge as a competitive resource of any organization (Barney, 1991; Quinn, 1992, 1999; Drucker, 1993, 1999; Davenport & Prusak, 1998). Several of these authors value the firm dependent on its knowledge-based resources (Rumelt, 1984; Wernerfelt, 1984; Leonard-Barton, 1992; Bohn, 1994; Conner & Prahalad, 1996; Teece *et al.*, 1997; Schroeder *et al.*, 2002). They also observe the importance of knowledge workers, stating that organizations that can successfully deploy the expertise that their workers have to offer will succeed in generating innovation, higher productivity, and effectiveness in the marketplace (Wernerfelt, 1984; Grant, 1996; Argote, 1999). In contrast to the scientific management that endeavored to eliminate the human element from the system, contemporary organizations need the human element for innovation. Human competence has become an essential ingredient for the success of all organizations whether they produce cars, transport passengers, or educate the population (Sandberg, 2000).

### **The creativity link**

Human creativity, the result of the interaction between the thoughts of a person and a context, gives birth to innovation. Whereas in a broader sense the context is

sociocultural (Csikszentmihalyi, 1997, p. 23), in organizations it is imperative that this context relate to any of the external or internal environmental factors of the firm. Creativity may not be a sort of mental activity or an insight that happens in the heads of some special people (Csikszentmihalyi, 1997, p. 23); however, contextual mental activity or insight is an essential important element of the innovation process. Creativity has to be managed for the generation and conversion of thoughts to innovation.

The process of creativity begins from the human mind. Creativity results either from the gradual cognitive/cultural accumulations or the human genotype. Nevertheless, it resides in the employees. The success in garnering creativity for achieving innovation in organizations actually boils down to having a creative, motivated workforce as well as an environment that facilitates this functioning. The process constitutes managing these workers, their personal knowledge and their capacity for combining observational, interpretive, and practical endowments (Polanyi, 1964, p. 103). However, management of these workers is quite different from that of the traditional workers because of the differences in the work expectations, such as the emphasis on creativity. A particular difficulty that managers face has to do with the question of how to make knowledge workers creative and innovative. Management has to know how to motivate workers to use their minds, a task that is quite different from motivating workers to use their muscles. While the perception of external pressure on traditional workers brought on by organizational motivators may work to enhance their productivity, such pressure on knowledge workers to make them more creative or to get innovation from them can actually work contrary to the goal. Monge *et al.* (1992) found that in one of the five companies in their study, perceptions of social pressure to innovate actually had a negative effect on workers. Consequently, managers look for the practices that will turn the organizational system into a catalyst for motivating workers, and making their minds more ingenious and productive. Managers form groups, encourage teamwork, and build cohesion in their workers for the establishment of knowledge in the individuals and the teams. They also offer incentives for the acquisition and sharing of knowledge by individual members to innovatively formulate and solve problems of the organization.

### The motivation to innovate

Innovation in organizations does not happen automatically (Cummings & Oldham, 1997), it is *intentional* (Monge *et al.*, 1992). Thus the employees are required to cognitively engage in efforts to make it happen. A manager has to make sure that there is sufficient motivation to keep knowledge workers engaged, as human capital deteriorates if left idle (Schultz, 1961; Csikszentmihalyi, 1997, p. 6). It is for this reason that individuals have to be kept motivated. It is generally the

manager's responsibility to ascertain that his knowledge workforce is motivated, that is, there is the presence of a combination of forces that causes a person to act in the pursuit of the organization's goals (Amar, 2004). These forces may be internal or external. An internal force is associated with certain conditions arising within the individual's mind that may cause him or her to engage in a particular behavior. Sometimes just internal, or intrinsic, motivation, though very important, may not be enough to cause excitement or create a spark to drive actions towards the goals espoused by the organization. In such cases, external, or extrinsic, motivation becomes necessary to perpetuate the required behavior through what Monge *et al.* (1992) calls intentional motivation. The latter is the kind of motivation that is essential for innovation. Scenarios where an employee's intrinsic motivation may not be enough to derive behavior that suits the organization's needs usually arise in organizations. Managers drive their employees extrinsically primarily by administering incentives. However, this in itself may not be what works in getting innovation from knowledge workers. Management, therefore, needs to provide external motivators that will catalyze certain stimuli in their knowledge workers' minds. These incentives should spark a desire to transfer knowledge interpersonally, which, although a difficult challenge for managers (Argote *et al.*, 2000), is the biggest building block of organizational learning (Argote, 1999).

### Synthesizing research on innovation and creativity

'Whatever is performed with knowledge, faith, and concentration is more effective...' (Chandogya Upanishid 1.1.10)

Recognizing the importance of innovation and the role of human creativity and motivation in attaining organizational innovation, this research was initiated to synthesize published theoretical and applications research in order to help managers of knowledge workers understand how to develop an environment for motivating creativity and innovation, and for getting higher productivity from their workers. The academic inquiry into these areas that was initiated mainly after realizing the increased importance of the tasks of gathering, processing, and applying cutting-edge knowledge has still not provided much grounded research that could generate a theoretical framework to guide the practicing manager.

Although we know that creativity is the root of innovation (Amabile *et al.*, 1996), for the reasons given above, we do not know with confidence what causes creativity in people and leads to increased innovation in organizations. This study is undertaken to find some answers. We integrate available research from the theoretical academic journals, practitioner-oriented periodicals, professional association surveys, and books published by experts. For our inquiry, we selected well-accepted scholarly journals, such as (in alphabetical order)

*Academy of Management Journal*, *Academy of Management Review*, *Management Science*, *Organization Science*, and *Strategic Management Journal*. The list also includes applied research journals aimed at understanding the practice aspects of the topic, such as *California Management Review*, *Harvard Business Review*, and *Sloan Management Review*. Further, to expand the search, we included some European publications and a few books that have made a significant impact in the field of knowledge, creativity, and innovation, such as the works by Michael Polanyi and Mihaly Csikszentmihalyi. In all, we found 106 research items (80 research articles and 26 books and monographs) to be relevant and connected, providing the basis for a synthesis of the theory and practice on how to improve innovation and creativity in knowledge organizations. A complete list of all the sources, their classification (scholarly (S) or applied/practitioner (P)), and the number of articles included in our study from each of the periodicals in this list is given in Table 1.

### The creativities

We found that for organizational implementation purposes, all human behavior that goes beyond the mere reapplication of the established scripts or action-patterns reflects human creativity (Carruthers, 2002). The importance of human creativity is not limited to only that form which Csikszentmihalyi (1997, p. 26) considers *creative*, such as the one possessed by Edison and Einstein. Creativity, in fact, is beneficial and should be available to the organization in all its three forms conceived by Csikszentmihalyi. These forms are described by him through the behavior of creative people: (1) creativity may be *brilliant* that involves having unusual thoughts and quick mind; (2) it may be *personally creative* that involves experiencing issues in novel and original ways, having fresh perceptions and insightful judgments; (3) it may be *creative* which involves radically changing culture through inventions and discoveries (Csikszentmihalyi, 1997, p. 26).

We deduce that all employees who engage in any of the three above given human creativities are important to the organization and can generate innovation from novel solutions to understanding phenomena, formulating and/or solving problems, or implementing solutions for the benefit of the organization.

### Phenomenon, invention, and innovation

With knowledge and creativity, humans innovate in one of two ways: (1) observe new physical or metaphysical phenomena, interpret theoretical abstractions, and implement them for applications to situations in life; (2) give a new meaning to previously observed phenomena or scientific discoveries and inventions, and connect them to the situations on hand. An intelligent employee has six unique abilities/faculties: (1) skill to refract, (2) skill to work with the abstract, (3) skill to connect, (4) skill to extend, (5) skill to manipulate time and space, and (6) skill to disseminate (Amar, 2002a, pp. 10–14). These

**Table 1** Inclusion and contribution from journals in the study

No.	Journal	Classification	Citations
1	<i>Academy of Management Journal</i>	S	12
2	<i>Academy of Management Review</i>	S	2
3	<i>Administrative Science Quarterly</i>	S	3
4	<i>AI &amp; Society</i>	S	1
5	<i>American Behavioral Scientist</i>	S	1
6	<i>American Economic Review</i>	S	1
7	<i>American Sociological Review</i>	S	1
8	<i>Annual Review of Sociology</i>	S	1
9	<i>British Journal for the Philosophy of Science</i>	S	1
10	<i>California Management Review</i>	P	3
11	<i>Canadian Journal of Economics</i>	S	1
12	<i>European Journal of Innovation Management</i>	S	2
13	<i>Executive Excellence</i>	P	1
14	<i>Forbes</i>	P	1
15	<i>Harvard Business Review</i>	P	1
16	<i>Human Resource Management Journal</i>	S	1
17	<i>Human Resource planning</i>	S	1
18	<i>Industrial &amp; Corporate Change</i>	S	1
19	<i>International Journal of Production Economics</i>	S	1
20	<i>International Journal of Technology Management</i>	S	1
21	<i>Journal of Communication</i>	S	1
22	<i>Journal of European Industrial Training</i>	S	1
23	<i>Journal of Knowledge Management</i>	S	1
24	<i>Journal of Management</i>	S	1
25	<i>Journal of Management Studies</i>	S	2
26	<i>Journal of Political Economy</i>	S	1
27	<i>Journal of Private Equity</i>	S	1
28	<i>Journal of Product Innovation Management</i>	S	1
29	<i>Knowledge Management Research and Practice</i>	S	1
30	<i>Management Science</i>	S	4
31	<i>Long Range Planning</i>	S	2
32	<i>Organization Science</i>	S	8
33	<i>Organizational Behavior &amp; Human Decision Processes</i>	S	1
34	<i>Quarterly Journal of Economics</i>	S	1
35	<i>Research in Organizational Behavior</i>	S	2
36	<i>Sloan Management Review</i>	P	3
37	<i>Small Business Economics</i>	S	1
38	<i>Strategic Management Journal</i>	S	6
39	<i>Technology Analysis and Strategic Management</i>	S	2

S = Scholarly; P = Practitioner.

skills enable one to see reality in an exceptionally broad range. One sees problems and the hidden possibilities to solve them far beyond the anticipated powers of current conceptions (Polanyi, 1964, p. 124). This is how organizations move towards innovation.

While, an invention (or discovery) is a non-obvious (Huber, 2004, p. 178, Footnote a), intelligent response to the observed phenomenon, innovation takes invention/discovery to the next level by using it to expand the array of choices on products, services, and processes (Von Hippel, 1994, p. 3; Huber, 2004, p. 178, Footnote a). Innovation betters human life, and of course, in the process, brings secured market position and/or enhanced financial performance to the firm that deploys innovation. Innovation outcomes can come in several forms, such as increased sales and market share, market development, reduced cycle times to bring product to market or to fulfill customer needs, and higher customer and employee satisfaction.

In simple terms, connecting invention or scientific discovery to some context of importance to the organization and turning it into something tangible is innovation. The aim of innovation is to exploit research for commercial gain of the organization, and to apply it for the optimization of variables of consequence to the organization, such as the reduction of cost or the enhancement of revenue.

### Management proaction in innovation process

#### The antecedents

It has been long known that the effectiveness of firms in developing and implementing innovation is a function of various factors, such as the internal and environmental characteristics of the firm and the flow between the firm and its environment (Utterback, 1971). Organizational innovation is intentional; it is deliberate and thus has to be designed into the organizational system. Management has to take a proactive stance on innovation for it to occur. Based on the study of the cited literature, we find that the innovation transformation process in an organization is an outcome of many antecedents; some of which are indeed in control of the firm. By managing these antecedents, an organization can increase its chances of achieving innovation. A schematic representation of how this process works is given in Figure 1. It depicts a model that links what employees bring to the work, organizational actions leading to creativity in employees, the employment of creativity to develop innovation, and the eventual conversion of innovation into products, services, and processes. It denotes inter-relationships among the five main variables in the organizational innovation process: creativity, phenomenon, invention/discovery, context, and innovation; and three moderators: knowledge, culture, and social capital. For the sake of completeness of the transformation process, we have depicted both types of innovation, representing them using Christensen's (1997, p. xv) terminology of *Disruptive* and *Sustaining* innovations. Two separate parallel paths from creativity to innovation have been indicated in this model, one for the disruptive and the other for the sustaining innovation.

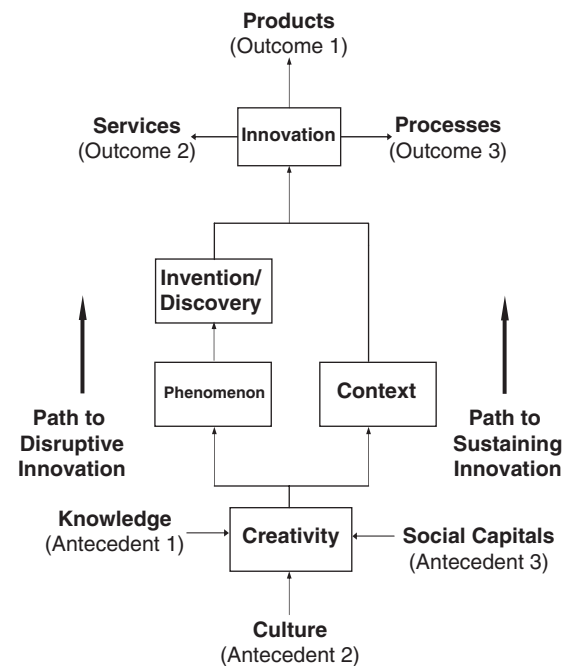


Figure 1 A model of innovation development process in organizations.

There are recognized antecedents of organizational innovation. Management, by its policy and practice, can work to increase these antecedents. Because the organization is interested only in the human creativity that is relevant to the innovation it needs, through the culture and the social capital it possesses, it brings out that particular creativity in its employees. Once nurtured, creativity generates novel and new ideas, inventions and discoveries of its own accord. This becomes the raw material that the firm can use to develop innovation (Cummings & Oldham, 1997).

### The theory supporting the antecedents of innovation in organizations

Based on our survey of the literature, we model that the foundation of innovation in organizations rests on the following three antecedents that are in management's control: (1) firm's knowledge repositories; (2) a culture that not only encourages creativity but actually buoys it; and (3) the availability of social capitals from which the employees can draw. The presence of these antecedents facilitates creativity in employees engaged in innovation work. By setting appropriate organizational goals, any organization can work to achieve these foundation antecedents and get innovation. We can safely say that organizational innovation is indeed managed. The following sections detail these antecedents and how to manage them.

## Antecedent 1: building knowledge repositories

### Knowledge pockets

Information is an input to the innovation process (Feldman, 1994). Hence, the firms need information, typically, a derivative of data, to successfully bring about innovation. The knowledge is built from information. Without knowledge, innovation is unlikely. Organizations build and manage knowledge to draw useful information that would become input to the innovation process. They turn themselves into a special type of organization, known as a knowledge organization, which is a network of individuals (or a group of individuals), each of whom is a 'pocket of knowledge' (Van den Bulte & Moenaert, 1998). Each one of these pockets builds and updates knowledge on one or more of the various tasks that the organization performs pertaining to the customers and markets it serves, the transformation and distribution processes it employs, and the technologies it deploys. All these pockets of knowledge cumulatively can be understood by the metaphor of a 'knowledge deposit' or 'knowledge repository.' According to this analogy, a knowledge organization is one such bank of knowledge. Included in it is the specific knowledge essential to buoy creativity and bring innovation to all the specialties, subspecialties, etc. that the organization needs to transact its business. The goal of the organization is to maintain a strong position in the marketplace *vis-à-vis* its rivals. Each employee in this organization, depending on the pocket of knowledge he is holding, keeps up with the developments that are taking place in his/her area. In essence, the knowledge of an organization is the contextual knowledge that its employees possess, or are capable of possessing and can process for the benefit of the organization subject to its given management system.

To be able to involve all the pockets of knowledge in the organization in getting innovation for it, the manager has to understand how to mobilize and integrate them (Souder & Moenaert, 1992). This begins with knowing what kind of knowledge would be needed by the organization to fulfill its innovation expectations and what pockets of knowledge should be developed to garner that knowledge.

### Types of knowledge

Organizational knowledge is classified by researchers into two types, *tacit (inarticulatable)* and *explicit (articulatable)* or what Polanyi calls *articulate* (Polanyi, 1967, pp. 1–4; Nonaka, 1994; Nonaka & Takeuchi, 1995, p. 59). The base of all knowledge, in particular the component that brings out innovation, is in tacit knowledge, that is, what is tacitly known to individuals. Tacit knowledge is personal. Among other items, it consists of the phenomena that one is perceptually or intellectually aware, such as those pertaining to the things and people in context of the organization. Examples of an individual's tacit knowledge will include faces and objects as *entities*. It is the

things *one knows* without knowing *how one knows* them (Polanyi, 1967, pp. 1–4), or, being able to describe them. Tacit knowledge is acquired through erudition. Scientists use it in formulating problems. In organizations, it is innate and embedded in some employees based on their personal cumulative academic and other experiences and, possibly, their traits. It is acquired by their lifetime experience, sensory perceptions, experimentation, and learning by doing (Mascitelli, 2000). It is hard to formalize and communicate, as it is personal and context specific (Nonaka & Takeuchi, 1995, pp. viii–ix). Knowledge in this form consists of *holistic* understandings and may not be amenable to reductionist analyses (Cowan *et al.*, 2000).

It is in its second form, the explicit form, that the knowledge is codified and transmitted using formal, systematic languages, mathematical expressions, and abstraction for sharing among professionals and, may be, even laypeople. Knowledge in this form is garnered through formal training and education. It is also in this form that knowledge can be manipulated using tools, such as the computer, and can be used by formal work teams in organizations. To be successful in exploiting knowledge to its benefit, the organization has to manage all of its knowledge workers so that they can collectively make use of the tacit knowledge available to the firm (typically in a small number of its employees) and convert it into explicit knowledge that resides in the organization as procedures, rules, norms, and forms (March, 1991). This can then become the firm's intellectual property, such as patents and trademarks, and can be transferred to many other members of the organization. Subsequently, through team effort, it can be incorporated into the organization's products, services, and processes.

For the success of organization, knowledge creation becomes management's first task (Nonaka & Takeuchi, 1995, p. 6). Management pursues, acquires, and harnesses new and unique knowledge. This can begin internally by recruiting and retaining employees who possess the tacit knowledge. Next, managers must create an organization that results in the conversion of tacit knowledge to explicit knowledge – into words and numbers, formulae and models, and codes and programs. It is only in its explicit form that the knowledge can be transferred or connected. Whereas tacit knowledge is best disseminated through socialization process, its *externalization* (Nonaka & Takeuchi, 1995, pp. 64–66) becomes possible only if it has been converted to an explicit form. An important part of this conversion process is the teaming up of the workers who have the tacit knowledge with those who can convert it into its explicit form – the form in which it will be transferred and shared among other network members. This explicit knowledge would thus become the most important resource of the firm which may be readily turned into innovation (Van de Ven, 1986). An insight or knowledge possessed by an individual that is not converted into explicit knowledge for its sharing and use by others for the good of the organization is of very

limited or no benefit. The element of sharing in knowledge creation adds the dimension of social capital to the organizational innovation process.

Knowledge is an important contributor to creativity. Both tacit and explicit knowledge play their part in bringing out creativity in employees. Refer to Figure 1, modeling innovation in organizations, and read *Knowledge* in this figure as an integration of its tacit and explicit components.

### **Antecedent 2: knowledge-supporting culture**

An organizational culture where creation of knowledge occurs is quite different from that of a traditional organization. In a knowledge-creating culture the opportunity to use power to operate is given to individual employees (Kanter, 1984, p. 18). This paradigm becomes part of the firm's culture and is reflected throughout its structure. The firm builds this culture which in turn supports knowledge creation. It arises from the specific needs of an organization looking to develop innovation. Since knowledge workers are typically specialists and know more about their jobs than do their bosses (Drucker, 1998), managers in this culture form a sort of work partnership with them and do not view them as their subordinates. Managers and other superiors in the work relationships in this culture consider themselves as 'seniors' and their workers as their 'juniors.' Within the dyadic relationships that managers and their knowledge workers form in a knowledge-creating culture, the managers provide the needed organizational resources and the workers provide the knowledge and the expertise essential for the 'collaborative' act. Take, for example, the case of a computer programmer; the resources that management provides are the computers, software packages, reference manual(s), tools, a work place, expert and other assistance as needed, while the programmer provides the intellectual capital or knowledge to fulfill the task. Even though the worker (with his/her intellectual capital) is the major contributor to the success, the manager does (and should), in a knowledge-creating culture, provide guidance to the worker should he or she need it (Read, 1996).

### **Managing knowledge workers**

Although the above given process is lucid and straightforward, its implementation is difficult because managers have to deal with those 'pockets of knowledge' (knowledge workers) who are sort of 'monopolists,' specialists, and the sole possessors of a very important resource, the knowledge, that the organization needs (Read, 1996). To be effective, knowledge organization has to know how to mobilize and integrate these pockets of knowledge (Souder & Moenaert, 1992). Since tacit knowledge, the building block of innovation, is a function of the mind, effective management of the innovation process requires managers to understand the psychology of each knowledge worker. Their management is further complicated, since, except for a few commonalities, every one of them

has his/her own unique psychology that does not allow the manager to apply the learning from one to the other. Therefore, at best there are only certain very broad guidelines that can be presented and recommended to managers for understanding their employees. Although difficult, it follows that understanding every knowledge worker is not only vital but critical to the success of the innovation process.

### **Creativity system for innovation**

Workers become more creative when their work content and contexts support novelty. Work should also offer them complexity, stimulation, and support. The latter is essential because creative ideas vanish unless there are receptive people who are going to record and implement them (Csikszentmihalyi, 1997, p. 6). The receptivity for the creative ideas comes from the organizational culture in which these receptive people and the employees with creativity work. Hence, knowledge or creativity by itself is not sufficient for innovation; the role of culture in the work environment where a creative person with knowledge operates becomes very important. The culture provides employees with the ability to think and act with clarity and concentration. In other words, creativity is not only enhanced by organizational culture, it is manifested into innovation by it. If left without the presence of such a culture, creativity will vanish.

To understand creativity and how individuals become creative, Csikszentmihalyi (1997, p. 15) conducted interviews and research over a period of decades involving many discoverers and inventors. Although his model is focused on creativity of the highest order of the three he envisioned (please refer to the earlier sections in this article), with adaptation, his research becomes applicable to organizational creativity also. Thus, creativity is an outcome of a system that consists of three elements: (i) a person who takes the initiative to bring novelty into the current or traditional ways (innovative individual); (ii) a team of supervisors, important colleagues, and other experts who encourage, recognize, and validate the innovation effort of the individual (innovation environment); and (iii) an innovation supportive culture that contains rules, policies, and traditions encouraging novelty and deviant behavior (innovation-supportive organization).

The existence of a supportive culture in which the organization operates is the best evidence of the occurrence of human creativity. All the three elements described above are essential for the generation of a creative idea and for creativity to result in invention and innovation. The organization has to provide a culture that is receptive to the novel thought and knowledge that is 'out-of-the-box.' Sweeney (2005) narrates examples of how firms hold team sessions with a clear mandate from the leader that the team members had to 'think outside the box.' The culture may not just tolerate variant behavior, but may actually encourage or promote it.

Some believe that lack of proper organizational culture is the main impediment to knowledge activities and that the manager has to play an important role in leading the organization to develop a knowledge-supporting culture (Ribiere & Sitar, 2003).

#### **Supportive reward structure**

Leadership in knowledge-supporting culture focuses on inspiration and rewards that are required for the stimulation of the mind such as the rewards *a priori* (Amar, 2002b) and entrepreneurial incentives that could potentially pay enormous dividends to the organization in the long run. This scenario also exemplifies that leadership in such a culture can be measured by the ability of a manager to mobilize the perceptions and attitudes of his knowledge workers to move in a forward direction (Pan & Scarbrough, 1999).

#### **Antecedent 3: social capitals**

Quoting Michael Polanyi, Kalamaras (1994, p. 64) states that the making of knowledge is a participatory enterprise. Teaming, sharing, and socialization build and give context to organizational knowledge. Socialization can convert tacit knowledge to explicit knowledge and can prove useful in an organization since knowledge workers are specialists and possess unique valuable knowledge (Tovstiga, 1999). Support of a social capital theory for the good of organizations is justly extendable to the social capital that is collected by the employees, called the individual social capital. Individual social capital comes from individual network relationships and can be distinguished from the organizational social capital. Social capital plays a significant positive role in influencing the development of both incremental and radical innovation (Subramaniam & Youndt, 2005). Although some researchers believed that individual social capital may be for the private good of the individual (Useem & Karabel, 1986; Belliveau *et al.*, 1996; Burt, 1997), a recent study gives an important result stating that the firm's social capital may very much be the individual social capital its employees possess (Inkpen & Tsang, 2005). For instance, through one's own social relationships, a knowledge worker can help one's organization in setting up joint ventures. Albrecht & Ropp (1984) suggest that the occurrence of other types of discussions, common in socialization activities, facilitates the discussion of innovation, and that discussion of work and social/personal topics aids innovation in organizations. *Socialization*, one of the four modes of the SECI dynamic model of knowledge conversion (Nonaka & Takeuchi, 1995, pp. 62–70), is essential for the management of tacit knowledge. It causes the transference of tacit knowledge from one individual to another individual without its conversion to an explicit form. By socialization, knowledge workers share their intricate technical experiences and mental models of common interest with each other through observation, practice, and imitation. Socialization outside the workplace and with members of other

organizations is also beneficial. It increases the trust, opportunity, and the motivation to engage in knowledge sharing (Oh *et al.*, 2004). Losada & Heaphy (2004) find that individuals who experience a high degree of connectivity with others develop an emotional space that enhances their creativity and lets them try new things. The argument is that a potential for knowledge acquisition is created through the repeated and enduring exchange relationships that workers develop through their memberships in networks (Inkpen & Tsang, 2005). It is through these relationships that groups generate sets of knowledge resources upon which they can draw during their times of need. For organizations, it becomes social capital that resides in the relationships of individual actors of the organization (Nahapiet & Ghoshal, 1998).

The general finding of social capital is that networks of relationships are a valuable resource for the individual and the organization (Inkpen & Tsang, 2005). In an earlier study, Monge *et al.* (1992) reported that higher levels of communications in groups and the increased levels of information caused subsequently higher levels of innovation. Four of the five firms in their study showed statistically significant positive causal relationships existed for one or the both, the level of communication, and the level of information. They also stated that this is particularly applicable to knowledge workers such as the scientists and engineers (Allen, 1977). Nevertheless, the creation and sharing of knowledge is typically increasingly challenging to management (Kogut & Zander, 1992). However, the management should know that research (Allen, 1977; Keller, 1986) has shown that face-to-face communication with colleagues, even those not working on the same projects, increased R&D performance in the form of new product development.

Success in bringing and sharing the right knowledge at the right time depends on the position that knowledge workers hold in the network of their social exchanges (Portes, 1998; Burt, 2000). It is suggested that intensive social interactions of knowledge workers facilitate the transfer of knowledge (Lane & Lubatkin, 1998; Zahra *et al.*, 2000; Yli-Renko *et al.*, 2001). Human exchange of information takes a special significance here, as it has been known that people prefer to turn to people for answers to their problems in preference over documents and, even in this age of the internet, databases (Pelz & Andrews, 1967; Mintzberg, 1973; Allen, 1977; Cross & Sproull, 2004). To be effective, organizations need to manage their employees' relationships with internal and external members and other groups in order to bring information and other resources into the system (Gladstein, 1984; Ancona & Caldwell, 1992).

#### **The empirical evidence on the antecedents of creativity and innovation**

In addition to the citation of the applied research given in previous sections, this section contains a collection of empirical works in support of the theme of this paper. The evidence is plentiful and available across the globe.



We present here relevant research from Japan, New Zealand, Russia, Taiwan, and the U.K., in addition to the U.S.A. Owing to the increase in knowledge work and the rise of knowledge workers in organizations, tremendous research effort is going into the understanding of how to use knowledge in organizations, and hence get innovation from the workers. We have surveyed and compiled the applications research into the following paragraphs to understand what works and what does not in getting innovation and higher productivity from the workers.

### Evidence on knowledge pockets

The evidence from computer, biotechnology, and ceramic industries and small technology firms shows that the presence of knowledge pockets possessing tacit knowledge, which is communicated through personal interaction, plays an important role in innovation (Koskinen & Vanharanta, 2002; Senker, 1993). The importance of knowledge for innovation is given in a study of the U.K. telecom industry that shows that when gaps between available knowledge (knowledge repository) and required knowledge (contextual knowledge) occur, it becomes important for the firm to identify those gaps and to bridge them for the innovation to take place (Hall & Andriani, 2002).

While it is not sure if the volume of knowledge is associated with innovation, empirical evidence shows that innovation is dependent on knowledge pockets (employees who possess knowledge). In an empirical study of patent citations of 115 U.S. biotechnology firms, Gittelman & Kogut (2003) report that high-impact innovations are made by people who do research and invent based heavily on scientific knowledge. Another empirical study by Read & Sarasvathy (2005) reports that task performance is consistently associated with experts who possess scientific knowledge. This study also finds that experts solve problems quickly, easily and accurately than those who do not possess knowledge, that is, novices.

### Evidence on culture

Empirical evidence on the role of knowledge in innovation, in essence, shows that while it is essential to have knowledge to move through the innovation process (see Figure 1), however, the presence of knowledge in itself is not sufficient to get innovation. It needs other antecedents also. A number of applications studies support encouraging knowledge-supporting culture in organizations, a culture where there is trust and comfort, lack of bureaucracy, ethical teams, symbiosis, and sharing in the success and failure of the organization (Pan & Scarbrough, 1999; Amar, 2001; Kubo & Saka, 2002; Drucker, 2003; Ferlie *et al.*, 2005). Creating a climate of trust is very important for the formation of a knowledge-supporting culture (Pan & Scarbrough, 1999). Trust is one characteristic associated with the formation of a symbiosis (Amar, 2001). In a climate of trust and comfort,

all members work for the success of their collective endeavors. In this culture, there is no rigid hierarchy or bureaucracy that must be dealt with to complete a task, since regimentation and bureaucratic leadership structures manage nothing in knowledge organization. Bureaucracy merely creates more confusion between the top and the bottom of the hierarchy of a knowledge organization (Drucker, 2003).

Synthesizing Read (1996), Ruggles (1998), Drucker (1999), Guthrie (2001), Amar (2002a, b), Kubo & Saka (2002), Linz (2002) and Horwitz *et al.* (2003), we have identified five constructs of an organizational culture that would enhance creativity and innovation in organizations. These five constructs are: (1) environment of partnership, (2) high involvement work practices, (3) organization of learning and training, (4) separation of knowledge work and management work, and (5) non-traditional performance measures and reward system.

### An environment of partnership

An innovation supportive organizational culture provides an environment of partnership: partnership between management and workers, workers and workers, and workers and others. A partnership environment in organizations forms a work symbiosis (Amar, 2001) where all workers function and contribute as equals. Management in this environment facilitates the functioning of workers by giving them the information and tools they need. Organizations that have a knowledge-supporting culture encourage partnerships in order to facilitate optimal functioning in the absence of the typical organizational environment (Amar, 2002a), such as the structured methods, close supervision, and bureaucracy. The work environment is limited to providing a forum to the employees so that they bring together their abilities to work together through self-formed and autonomous teams or networks (Ruggles, 1998). In most cases, managers give their knowledge workers discretion in choosing other members of their teams. Where the manager knows who are the best employees for a particular job, he may act as a catalyst in forming teams of those whom he believes to be most likely acceptable to other team members. However, ethical teams (Amar, 2001) are formed mostly by workers themselves, as they are most knowledgeable of both the work and the workers in the area, and want to work for the good of the organization. One possible advantage in allowing workers to form teams at their own discretion is that it allows the creation of an environment that promulgates trust and comfort.

Trust in a partnership environment allows all members collectively to take credit for the success or accept responsibility for the failure of an initiative. All members in this group or organization are equal and operate as if there is no one set leader, unlike a traditional organization.

### High-involvement work practices

A study, conducted in New Zealand, provides evidence of a strong positive correlation between the high-involvement work practices and employee retention and productivity (Guthrie, 2001). The study reports that retention is very important in the context of innovation as it is closely related to motivation; as employee retention increases, productivity and innovation increase.

High-involvement work practices include giving employees an increased responsibility for the organization's operations and the success and failure of the outcomes. These practices increase the firm's reliance on employees' tacit or specialized knowledge, thus making the workers feel more confident and secure in their assignments and less easily replaceable. Other aspects of high-involvement work practices include a challenging work environment, frequent communication with top management, and access to leading-edge technology. Regular communication with top management implies shared decision-making, a concept central to the worker and management partnership. High-involvement work practices allow the workers job autonomy, challenging work, and the ability to form their work groups and select characteristics of their work environment.

### Organization of learning and training

We have found that learning and training are essential parts of a culture in which creativity and innovation buoy. Learning new things, the opportunity to develop skills and abilities, and the significance of tasks performed motivate all knowledge workers as deduced from a study by Linz (2002). Such is a knowledge-supporting culture that appreciates knowledge and encourages workers to acquire and update new knowledge on a continuous basis. It also provides greater opportunity for training and education. This culture, in order to maximize continuous innovation, builds continuous learning, and continuous teaching into every knowledge job (Drucker, 1999). The 'universities' operated at Intel and Motorola exemplify this concept of the culture of learning and training (Read, 1996).

### Separating knowledge work and management work

A knowledge-supporting culture does not impose administrative requirements or paperwork on knowledge workers. It provides them the opportunity to do the work they enjoy doing. In fact, this culture allows workers the freedom to plan their work (Horwitz *et al.*, 2003). Separating knowledge work from management work is the key to enhancing innovation. Knowledge workers have an expertise and skill level that is very different from that of a manager's. The culture should permit them to focus on what they do best and enjoy the most. Do not give them paperwork; they do not like to do paperwork (Read, 1996). Similar results are also reported by the research on Japanese knowledge workers conducted by Kubo & Saka (2002). The study found that these workers

were self-driven and motivated by the work they did. They were motivated when their organizations did not assign them administrative tasks. They derive motivation from their work and, consequently, are self-driven in their area of expertise (Read, 1996).

### Non-traditional performance measures and reward system

A knowledge-supporting culture rejects most of the performance measures and reward structures of the traditional organizations. Horwitz *et al.* (2003) found that although financial compensation (e.g., incentive bonuses) was the most popular way to retain workers, it did not prove to be a highly effective motivational strategy for knowledge workers. For getting innovation and knowledge work, a knowledge-supporting culture has to find intrinsic rewards that come from the job itself. The job could be the source of biggest reward to the worker.

Similar results echo in a study conducted in Russia to understand what improves worker innovation and productivity (Linz, 2002). Its author believes that the findings of the study could be extended to organizations in other countries, such as the United States. This study exemplifies how reward structure affected productivity and innovation in the workplaces of three Russian cities: Moscow, Saratov, and Tagonrog. Arguing in favor of increasing productivity from its historic levels, the paper states that providing an appropriate incentive structure is essential to motivate workers. According to this study, a culture where workers become more creative should provide three major categories of incentives: monetary rewards, personal growth, and task achievement.

In a knowledge-supporting culture, performance measurement does not just relate to the financial outcomes from workers but also relates to the skills and competencies acquired and imparted by them. This encourages the worker to work smarter and therefore more productively. Performance should be maximized by capitalizing on the strengths and knowledge of the workers (Drucker, 1998).

### Evidence on social capital

Findings from the social capital theory regarding socializing, networking, and sharing are also supported by empirical research. Nohria *et al.* (2003) found that promoting cooperation and knowledge sharing throughout the organization was the key to success in getting innovation from workers. Knowledge sharing within a knowledge-intensive organization opens the door to creating new knowledge through knowledge conversion between its two forms (explicit and tacit; see Nonaka & Takeuchi, 1995; Polanyi, 1967). Socialization can convert tacit knowledge to explicit knowledge and can prove useful in an organization since knowledge workers are specialists and possess unique valuable knowledge (Tovstiga, 1999). If several specialists in different areas of an organization are encouraged to share their expertise

across the organization, a proliferation of knowledge will take place and result in innovation for the organization. Managers can also achieve this through, among other attributes, creating and maintaining top-of-the-line training and development programs (Nohria *et al.*, 2003).

Studies conducted in the U.K. healthcare industry substantiate the social capital theory by its converse. They show that strong boundaries between professional groups at the micro-level of practice slow the spread of innovation (Ferlie *et al.*, 2005).

### Sharing and socially constructed communities

Even though tacit knowledge, the critical input of any innovation, resides in individuals (and we can safely say is a consequence of individual human creativity), most contemporary knowledge tasks are too complex for an individual to complete by oneself. What is interesting, however, is that in most firms, individual knowledge workers and the specialist teams they create have immense knowledge embedded in them; nevertheless, it can only become a source of value to the organization if it is shared (Nonaka & Takeuchi, 1995). Organizations, because of their practices and disruptive structures, fail to avail of this knowledge (Lewis, 2004). Socially constructed communities are mechanisms that are instrumental in getting the work done. They create an excellent medium for sharing and multiplying knowledge.

The information that is useful in knowledge work rarely flows through the formal channels. It resides within the worker or, based on his personal relationships, is obtained through someone whom the worker knows and relies on, based on his personal relationships (Powell, 1990). A study of Taiwanese finance and security firm employees revealed that the employees were more willing to share knowledge with other colleagues if they enjoyed good relationships with them (Liao *et al.*, 2004). Socialization and social communities play an important role in building relationships and, thus, are an essential part of the knowledge–creativity–innovation process. Tampoe & Taylor (1996) suggests that the manager may empower his knowledge workers to share knowledge by providing the tools to support and boost their knowledge-sharing skills. Managers can encourage knowledge sharing – giving and taking – within the firm by establishing non-financial rewards for engaging in such activities. Some companies reward individual members for sharing their knowledge within the firm. Robertson and O'Malley-Hammersley (2000) report in their study that, in deciding whom to include in the next project, certain managers gave favorable treatment to those who shared their knowledge base and the potential contributions they could make to the project. Managers allocated some percentage of revenue from the project to individual members based on the amount of usable knowledge that was shared by each of them with others in the team.

Thus, empowering employees by providing them with tools and policies for knowledge sharing, encouraging social interactions, and professional and non-profes-

sional networking will result in employee creativity and organizational innovation. The benefits of socialization that may turn into just simple leisure time are also substantial to the organization; the use of leisure time to improve the skills and knowledge of workers has been long known (Schultz, 1961).

### Summary and conclusion

The research shows that the success of any organization is dependent on its resources, such as the knowledge, and how the organization utilizes its resources to turn them into innovation. The preceding statement is particularly applicable to knowledge organizations because they depend more on innovation than on any other resource, such as a capital asset, that they possess or can acquire. Thus, for them, managing knowledge workers is recognized both as a challenge and an important factor of success because the main product of these firms, innovation, is a product of the mind of these workers. This new paradigm of management has made knowledge workers the most important input to these organizations. However, in spite of their importance and the research going into the understanding of how to manage them, there is not enough grounded theory guiding managers on how to manage knowledge workers. There are no set principles on how to make them more creative or increase their output, or, in other words, how to get enhanced innovation in organizations.

From our survey of the research, we find that because knowledge workers are the 'pockets of knowledge' that organizations must possess to get innovation, the first step for organizations, depending on their knowledge requirements, is to build a 'knowledge repository' by attracting and retaining groups of individuals who possess pockets of knowledge in the fields of the firm's requirements. Second, because innovation is an outcome of explicit knowledge which is derived from tacit knowledge that, typically in organizations, is an outcome of team effort, the firm will have to build a knowledge-creating culture that encourages free thinking and sharing of knowledge. Third, to tap into the immense sources of knowledge from within and outside, the organization will have to invest in social capitals – individual and organizational. Affirmation of these findings from applications research tells us that increased creativity in employees can improve innovation development in organizations.

Because creativity and innovation involve the human mind, it is very difficult to make theoretical generalizations or universal practical recommendations with certainty. The results reported in this work are not an exception to this fact. Managers will have to observe workers and situations and then wisely select a particular technique to manage each worker as an individual.

We also would like to note here that given the specific situations of individual organizations, there may be other factors that may equally or better enhance creativity and innovation. Firms should remain open to all factors and

use them to achieve the improvement. There is less harm in having more innovation-enhancing factors, even the ones that may seem to be less applicable, than not having the ones that may become appropriate for the situation. It only increases options for the manager.

Since the results of this work are based on a synthesis of the published theoretical research with practical applications, it can provide a ripe ground for further theoretical or empirical research on the reported practice from the industry. Nevertheless, this work provides sufficient material to managers to apply in their practice to enhance creativity and innovation from their employees.

Many researchers believe that when it comes to understanding knowledge worker productivity, we are

like a decade behind our time; however, when it comes to understanding how to improve it we are a full century behind (Davenport *et al.*, 2002). In summary, we are certain that many more advancements and research publications are yet to come in the field of creativity and innovation in organizations. In the meanwhile, this work should serve as a step towards the goal.

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