

Virtual Innovation Environment



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INTRODUCTION

Major new trends of our era emerge from the spread of information society and the increasing role of innovation as source of competitive advantage, development, and wealth. Innovation, however, is a tricky issue. We do not dispose adequate theories for predicting innovation in different sectors of industry and services, though we have plenty of tools and methods which assist and facilitate innovation in product development, process reorganization, and quality improvement. We tend to compensate the lack of theory about radical innovation (none can tell what the next big thing will be in an industry sector) with environments of innovation enabling the use of tools, instruments, and methods: financial tools, institutional tools, communication and information tools, creativity tools, and others.

The rise of the information society opened new possibilities in the creation of environments of innovation. Digital tools and virtual (digital) innovation environments may assist organizations in learning and practicing innovation. They offer new forms of government (digital this time), online or offline, for mastering the complex processes of technological development and innovation. These virtual environments are important for companies, research institutions, technology intermediary organizations, and the public administration involved in innovation and research and development (R&D) management as well.

BACKGROUND: ENVIRONMENTS OF INNOVATION

Newer theories of innovation attribute an important role to the external environment of innovation embedded in networks and systems, communities, clusters, and regions, affecting the processes of innovation. Interactions within communities and regional or national innovation systems, combinations of roles and skills, communication channels, functional and spatial bonds bridging separate knowledge fields, are ingredients of participatory processes that result in new products and technologies (Cooke & Morgan, 1997).

Brokering theories assert that innovation derives from the synthesis of various fields of research and technology. Hargadon (2003) argues that innovation is a collaborative process in which knowledge and insights from different fields of science and technology are combined and create something new. A critical factor in achieving a new combination of unrelated knowledge is the human community in which different skills and competences are pooled together.

Nonaka and Takeuchi (1995) describe innovation as tacit knowledge being transformed into explicit knowledge. They place great emphasis on this transformation of knowledge and explain the enormous organizational effort which is needed for this conversion of atypical and personalized knowledge into explicit, modeled know-how, and engineering. Dealing with innovation and tacit knowledge, Morgan (2001) goes one step further arguing that tacit knowledge is embedded in individuals and organizational routines which have location-specific dimensions and tend to cluster. Tacit knowledge is spatially “sticky” and despite the growth of knowledge management tools, is not easily communicated other than through personal interaction. Clustering becomes inevitable in innovative practices, not from the viewpoint of minimizing transaction costs, but in order to materialize the innovative behavior.

Evolutionary theories also assert that innovation springs from externalities, knowledge asymmetries, market imperfections, and institutions that select and manage the flow of knowledge. Learning, both as acquisition and use of existing knowledge and creation of new knowledge, is the key process. A different cognitive space is created in each organization composed of nodes and networks. The external environment has a decisive role also. Nelson and Winters (1982) explain that genetic processes to innovation are regulated by a “selection environment” which switches on-off the flow between ideas and products. Nations and regions through systems of innovation provide this selection and regulatory environment, bridging knowledge, competences, and resources from different actors, and screening of ideas and technologies through competent or funding organizations (Nelson, 1993).

A common understanding has been achieved, which attributes a major role to the environment of innovation,

pointing out at an “open innovation” paradigm (Chesbrough, 2003) in which valuable ideas, knowledge, and skills come from outside the organization. Innovation is an “environmental condition” (Komninos, 2002); it is less an individual achievement than the joint effort of communities of people working together, interacting, and sharing common goals and visions.

THE FUTURE: VIRTUAL ENVIRONMENT OF INNOVATION

Human ingenuity recently added a new dimension to the physical and institutional environments of innovation: a digital or virtual dimension. The rise of the information society and the Internet brought into existence various fora for digital gathering, communication, and interaction, which strengthen the contribution of agglomerations and communities to innovation processes (Table 1). Henceforth innovative environments are constituted by more complex combinations among physical, institutional, and digital spaces.

A series of IT applications, systems, and digital tools are used to create virtual environments. Most are based on conventional information technologies and Internet based communication platforms. The core of solutions is on knowledge management and guidance of the innovation process rather than sophisticated telecommunications; services and knowledge management tools pre-

dominate over bandwidth. Some major categories are the following.

- **Business and Regional Intelligence:** For every organization attempting to develop a new product, it is important to know how potential customers evaluate this product, what the expected customer behaviour trends are, what similar products already exist, what their features are, which companies produce them, at which prices, for which markets, and what opportunities spring from emerging technologies. Gathering, organizing and utilizing this information can be made both easier and can be supported by using cutting-edge IT tools and employing information available on the Internet (Pawar & Sharda, 1997). Applications developed for business and regional intelligence purposes seek to facilitate information management. Their architecture combines targeted information collection, processing tools, and information dissemination to the end user (Back, 2002)
- **Virtual Communities and Clusters:** Virtual communities play a role in innovation similar to physical communities in terms of communication, socialization, and learning (Henri & Pudelko, 2003). The usual way for a virtual community to be created is with respect to a network of people sharing the same ideas or objectives. Two situations are possible. A physical-virtual situation in which the virtual extends the cooperation bonds of a physical commu-

Table 1. Components of virtual innovation environment

Objective	Type of function	Type of online tool
Information	Learn about	Web pages; e-learning; online libraries; online databases; portals; online newsletters; blogs; digital cities
	Search/find	Search engines; semantic Web tools
	Consulting	Online technology transfer; online R&D; virtual brokering; market and technology watch; observatories
Communication	Communication	Electronic mail; telepresence; alerts
	Discussion	Discussion forum; e-communities
	Make a demand; give an order	Electronic exchange; e-auctions; e-commerce; virtual clusters
Problem-solving	Knowledge processing	Online creativity tools; online mind tools
	Guide a process	Digital roadmaps; online innovation management tools
	Turn knowledge into product	Product innovation and design tools; virtual engineering; online survey tools; virtual customer applications

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