Exploring the Frontier of E-Innovation

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ABSTRACT

This article aims to examine the changes to innovation brought about by the Internet. Based on a systematic survey on the current efforts made by industry and academia in expanding the frontier of innovation, it found that E-innovation—innovations closely tied to a digital platform— is expanding traditional innovation in three aspects: having an obvious tendency to software development, requiring a dual-effort delivery, and deploying different managing/operating toolkits. These expansions are leading E-innovation to become a new paradigm for carrying out creative activities.

INTRODUCTION

Innovation is playing an increasing role in our society. Yet, an asymmetry exists at the current stage. We have a quite clear idea about how innovation has been playing an important role in forging the New Economy. However, we do not have a satisfactory picture of how innovation itself has been or is being transformed in the Digital-business environment, although some efforts on the part of both industry and academia have been made during the last several years to deal with the Open Source Software Movement and to promote Online Innovation or E-innovation or Distributed Innovation or Connected Innovation (Lan 2002). Given the fact that role of the new innovation is expanding rapidly, this article aims to check the changes to innovation brought about by the Internet through analyzing the current efforts made by industry and academia in expanding the frontier of innovation

Following the above design, this paper is divided into the following sections. Section one focuses on examining the changes of innovation in its underlying media. It finds that differing from traditional innovation which uses diversified media to change the combinations of production factors, E-innovation shows a convergence and is bias towards software innovation.

Section two concentrates on checking the changes of innovation in its delivery. It argues that one distinguishable feature of E-innovation is its dual-effort delivering, which means that an innovation is conducted or completed through both internal and external efforts.

Section three mainly deals with the changes of innovation managing/ supporting tools. It displays that different rules and new tools such as "groupware" are bundling E-innovation to mainstream business closely with both internal and external environments.

CHANGES OF INNOVATION IN ITS UNDERLYING MEDIA

Although Schumpeter defines innovation as a change of a production function, or a new combination of production factors; highlights the importance of entrepreneurs in this process, and points out the trigger effect created by the increasing purchasing power of innovators, he does not get into the black box to discuss the innovation mechanism. Many studies have been trying to expand Schumpeter's study in this area. However, before the wide spread of IT and Internet technology, there is not a common underlying media for changing a production function or creating a new factor combination. It means that in the traditional innovation paradigm, each innovation uses different medium to carrying out its tasks.

Differing from traditional innovation in which innovators use diversified media to change the combinations of production factors, current innovation shows a convergence in its underlying media and is bias towards software innovation. As pointed out by Quinn et al (1996) that most innovation occurs first in software, and software is the primary element in all aspects of innovation from basic research through product introduction.

This digital form tendency means that E-innovation could greatly share coded knowledge and deal with mainly digital objects. The task, the process and the delivery of the creation activities in E-innovation are related or transformed to information flows, which can be finally converted to the flows of digital signals. The digital form of E-innovation does not mean that E-innovation cannot be involved in physical jobs such as having physical experiment, or introducing physical products/functionalities. However, it does suggest that E-innovation focuses on the information and its flows companied with these physical works.

The software-based innovation also brings changes to innovation in its usage. In this area, E-innovation shows a feature of bi-focus instead of the single focus possessed by traditional innovation. Single-focus innovation means that the purpose of innovation is to provide or introduce a new product or service with a new functionality. Bi-focus innovation means that while it provides or introduces a new product or service with a new functionality, it also creates a new channel or environment for delivering or upgrading a traditional or a new functionality. In pursuing the bi-focus innovation, "solutions" oriented innovators lie at the customer-supplier interface. They are working with related stakeholders to uncover, or better define problems for which a total solution can be developed. In this manner, E-innovation realizes freedom-generation opportunities based on the Network Intelligence, since combining product and channel innovation could greatly facilitate process-automation, operation-simplification, input/output-realization, and system-synchronization. The bi-focus feature of E-innovation results from and also results in the following phenomena: digitization of traditional physical activities/processes, the convergence of different activities, and creation of new value chains or threads.

CHANGES OF INNOVATION IN ITS DELIVERY

In terms of the delivery of innovation, Schumpeter's model shows a linear routine. Innovation starts at exogenous science and invention; then followed by entrepreneurial activities and innovation investment, which leads to new production pattern and changing market structure; after that it enters the period of reaping profits or diffusing innovation.

Unsatisfying with this closed linear model, many research and business application are trying different models. The departure of innovation from Schumpeter's closed linear model is a continuous process. Although different people use different terms to describe the changes of innovation, one aspect is common that all they agree that current innovation shows distributed nature. Distributed nature means that E-innovation is open and decentralized in a much higher degree. This nature is inherited from the basic nature of the Internet, which enables E-innovation to act in two distinguishable ways as mentioned in some academic research. Firstly, it allows E-innovation to accommodate creative efforts in a larger scale, no matter these efforts reside inside an organization or outside the boundary of the organization. Secondly, it allows E-innovation to progress in a non-linear way, which offers more interface opportunities. Due to the distributed nature, E-innovation is horizontal oriented instead of vertical oriented

The distributed nature is reflected in innovations' delivery. Current E-innovation shows a feature of dual-effort instead of uni-effort as traditional innovation does. Uni-effort means an innovation is conducted or completed within a firm. The assets used to deliver the innovation usually are limited to what the firm owns. As suggested by Sawhney and Prandelli (2000) that uni-effort innovation has difficulty to renew itself in a knowledge economy although it is effective in minimizing disturbances, perturbations, and change. Clearly, in a highly complex environment, it will be unlikely that any single organization will possess, or wish to possess, all the necessary skills and technological collateral to meet the broad, enterprise-wide needs of its customers.

Dual-effort means that an innovation is conducted or completed through both internal and external efforts of an enterprise. The assets used to deliver an innovation can come somewhere out of its control. This expansion of E-innovation with regard delivery makes E-innovation a new catalyst and a new channel for organizing innovation activities. In pursuing a dual-effort innovation, a synergy is required to build not only a strong knowledge base, and a solutions-based portfolio, but also a mechanism for coordinating co-creation. By doing so, the horizon of an innovation is enlarged from within the boundary of a firm to the boundary of a reachable or manageable network. At the same time, the delivery channel of an innovation is increased from a linear path to a non-linear net. The dual-effort feature of E-innovation results from both distributed networking and the E-business culture. The former enables the synergy of both internal and external creation through the Internet. The latter is accelerating or driving the transform of firms.

Linux, the pioneer of open source movement, started from the operating system. In its development, Linux resembles a free "knowledge market," completely open and unstructured. It does not limit participation of any interested individual. In fact, it benefits from the creativity and collaborative efforts of a large number of developers. Individual developer can freely download Linux for further development. As a condition, all the developers should clearly specify every change they made in a file. In this process, intellectual property rights are not controlled by any single entity.

CHANGES OF INNOVATION IN ITS MANAGING/ SUPPORTING TOOLKITS

As mentioned earlier, one missing component in Schumpeter's framework is how to conduct innovation in a targeted environment. The development of IT and Internet technology is greatly enriching innovation in this area. It has only been less than a decade since companies started using the Web to share information and streamline purchasing. Now, enterprises have begun using new Web software tools to help employees and business partners work together to make products faster and more cheaply.

Collaboration software lets dispersed engineers send, view, and mark up drawings, and even share the controls of a solid modeler while they simultaneously design a product. The upshot is that tasks that took days in past workflows now shrink, in some cases, to minutes. (Dvorak 2001). The software's key capabilities—chat, discussion forums and resource-allocation features—overcome the problems that arise when teams consist of people in different physical locations and when workers simultaneously juggle several projects. Once, software tools for programming teams meant a code repository and a bug-tracking database. But as companies find themselves hiring distributed project teams and juggling multiple simultaneous projects, they are turning to tools that provide the communication and resource-allocation features that traditional programming utilities lack. All of them rely on the Internet and intranets to provide a foundation for collaboration. People are just starting to realize the benefits of the Web as an interactive medium (Johnson 1999).

The burgeoning of innovation tools and the changes of innovation delivery, are undoubtedly changing the organization or management of innovation. The major changes can be observed from the following aspects. Firstly, E-innovation is decoupling innovation activities, which means that E-innovation has smaller basic building block for carrying out creative activities. The combination of digital form of objects and powerful computing and networking technologies make individuals to become free agents in certain degree. They can undertake different activities without much limitations of time-and-space. This freedom in fact "chops" a typical innovation-activities-chain into many pieces spatially and temporally.

Secondly, e-innovation is deploying new rules, which means that E-innovation is changing the practices of organization structure, incentive mechanism, and intellectual rights protection in innovation governess. Differing from traditional innovation management, in which inward-oriented innovation process was surrounded by an absolute monopoly firewall and suffers an asynchronous technology transfer, E-innovation aims to balance "copyright" and "copyleft" by sharing creative fruits, to make "inward-oriented-process outward" (Fingar et al. 2000) by absorbing or leveraging external innovation efforts, and to synchronize technology development and adaptation by dismantling barriers of knowledge flows.

Summarizing the above analysis on E-innovation, it is apparent that much attention has been paid to identify and take the advantages of new innovation, or changes to innovation. By using the Internet to plan, initiate, conduct, run, facilitate, and/or promote innovation for operating on a digital platform, innovators and related stakeholders have to aware the difference between E-innovation and traditional innovation, so that they are maximize their efforts.

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