

Research on Innovation-Generating and Innovation-Transferring

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Abstract: The existing studies of innovation focus on the combination of innovation-generating type and innovation-transferring type, which generates inconsistent empirical results. In this paper, we assume that the difference between these two types of innovation can be clarified. We first define the conception of these two types of innovation: innovation-generating refers to the supplier of new technology, services or products, whereas innovation-transferring refers to assimilation of existing technology, services or products. Based on the difference between these two types of innovation, we propose three factors that may affect the choice of innovation type in management world.

Keywords: innovation-generating, innovation-transferring, management

I. Introduction

Innovation is a concept of great importance to economic growth. A creative firm holds innovative technology to sustain their competitive advantage. Thus, gaining a good understanding of the concept—innovation can contribute to the practice of management in real life. To the managers, innovation means changes in firms which eventually create new opportunities for their employees. Thus, how to acquire innovation is still be a challenging work for business managers and a hot topic of academic research.

Previous studies on innovation focus on factors that influence firms R&D activities and its consequences. Due to different understanding, their results are not consistent. Downs and Mohr (1976) and Wolfe (1994) found that the variation of results is extreme and can hardly be interoperated. To boil down, there are no agreements on innovation theories that can guide the actual management.

Adopting a micro view, researchers have distinguished types of innovation-- product and process innovations, technical and administrative innovations, radical and incremental innovations. Using empirical studies, they were trying to explore the relationship between those types. However, the results still could not find any evidence of those innovation types.

To better understand of innovation behavior of firms, we adopt an organizational perspective to distinguish different types of innovation. We proposes that there are big gap between firms that generating innovation and firms transferring innovation. As will be discussed below, different organizational conditions make firms choose

different innovation types or innovation strategies. The firms adopting Innovation-Generating strategies depend more on its R&D activities while firms adopt innovations-transferring relies more on its managerial skills and capital investment. As Fiol indicates, innovation-generating firms need capability of creation while innovation-transferring need capability of absorption (Fiol, 1996). Because the two firms evolve in two ways, a more informative theory needs to develop to explain such situation.

II. Generation and transferring of innovation

2.1. Definition

Innovation is defined differently due to different view. Here, we use an organizational perspective. In this area, scholars defined innovation as the creative ideas or behaviors that help to generate opportunities in organizations. The new idea refers to new technology to produce new product, a new access to market, a new structure in administrative system. This paper mainly discusses innovation in terms of technology. Technology is a hot research area often left to empirical studies such as total factor productivity.

New technology can be adapted to firms, an industry, even the whole world. To be a technology leader or to be a technology follower is a critical question for executives. On one hand, a technology leader generates a product, service, or technology that is at least new to an organizational population. On another hand, a technology follower adopts this innovation by transferring it or by imitating. In this way, a technology follower means that technology is generated outside the firm (Angle and Van de Ven, 2000).till now; we could not find research on innovation that distinguished the concept between innovation-generation process and innovation-transferring process. In line with influential and widely utilized definition of innovation, this paper studies the two processes.

We define the innovation-generation as the effort to enhance the organization's effectiveness and competitiveness by creating a new opportunity or by making use of an existing opportunity in novel ways (Drucker, 1985). Most researchers focus on terms "generation of innovation." Afuah (2003) emphasizes that innovation is a development of technology or invention and its great value to transfer. That is to say, innovation is "invention plus exploitation". We do not fail to notice, this combines the creation of an idea and its commercial use. Dougherty and Hardy, 1996 assumes innovation-generating firms have access to new technologies and new markets.

Turing to innovation-transfer firms, the firms are trying to adapt itself to the changing environment due to new technologies. The very purpose of this behavior is to maintain its effectiveness and competitiveness. Change happens if firms intend to evolve from methods and old behaviors (Nadler and Tushman, 1997). Firms intend to fill the gap between the current situation and future states using new technology generated by others. From this perspective, we can see innovation-transferring emphasizes adoption a new products, services, or technologies that are new to the adopting organization (Meyer and Goes, 1988 and Klein and Sorra, 1996).

2.2. Process

Innovation process has usually included: identify a potential problem, decision to develop, try to commercialize, transfer, implementation, and consequences (Rogers, 1995). This process perspective of innovation is clear to most analysis. Table 1 shows the term” innovation”process described by existing studies. As it indicates, many researchers define innovation process in general terms and did not distinguish between generation and adoption (e.g., Rogers, 1995 and Angle and Van de Ven, 2000). Only Klein and Sorra (1996) distinguished between development and use. They define what “source-based” technologies are and “user-based” technologies process models. The he former type of innovation is used by technology-sourcing firms while the latter means a strategy of technology-exploration firms. The two types evolve in a different way to make new product, service, or technology.

Table 1. Process of Innovation

Study	Generation	Adoption
Hage and Aiken (1970)	–	Evaluation → initiation → implementation → routinization
Kanter (1988)	Idea generation → coalition building → idea realization →	→transfer or diffusion
Klein and Sorra (1996)	Research → development → testing → manufacturing → packaging → dissemination	Awareness → selection → adoption → implementation → routinization
Robert (1988)	Recognition of opportunity → idea formulation → problem solving → prototype	→Technology utilization and/or diffusion

	solution → commercial development →	
Rogers (1995)	Needs/problems → research(basic and applied) → development → commercialization →	→Diffusion and adoption
	–	Agenda-setting → matching → redefining/restructuring → clarifying → routinizing
Rothwell and Robertson (1973)	Idea generation → project definition → problem solving → design and development → production → marketing	–
Tornatzky and Fleischer (1990)	Research → development → deployment	Adoption → implementation → routinization
Angle and Van de Ven (2000)	Initiation → development →	→Implementation/termination
Zaltman et al. (1973)	–	Knowledge awareness → attitudes formation → (adoption) decision → initial implementation → continued -sustained implementation

We have to admit that, actually, the two types of innovation processes are remarkably different. All efforts and activities which aimed at creating new ideas and getting them to work includes the process of recognition of opportunity, research, design, commercial development, and marketing and distribution ((Roberts, 1988)Tornatzky and Fleischer, 1990 and Roberts, 1988). The adoption process is conceived to include two main sub-processes: initiation and implementation (Duncan, 1976, Rogers, 1995 and Zaltman et al., 1973). First, recognition of opportunity includes all activities that lead to aware of a possible innovation opportunity, and evaluates it to make a decision (Duncan, 1976 and Rogers, 1995). Second, the implementation process includes all actions that aimed at modifying the innovation and the adopting organization, using the innovation initially, and continuing to use the innovation until it becomes a routine feature of the organization (Duncan, 1976 and Glynn, 1996). The existing literature seldom pays attention to these two processes in detail.

Generation process is a creative way to combine new idea with current conditions to generate a novel way to produce an invention that was previously unknown (Duncan, 1976). Transferring, on the other hand, is a process that an existing idea from outsiders is transferred to meet the needs of adopting firms. Nonaka (1990) argues that, the former process evokes new ideas, and creates technology and information, whereas the latter process transfers the existing ideas and information. March(1991) argues:“ Like exploration, the generation process is more emergent and can be characterized by variation, search, experimentation, and discovery; like exploitation, the adoption process is more planned, and can be characterized by selection, refinement, choice, and execution”. The generation process is usually slower and costly while innovation transferring process takes shorter time to complete. The differences between the processes of generation and transferring of innovation lie in the very different purpose of firms’ strategy. In general case, firms with sufficient resources are more inclined to invest in R&D activities while small firms rely more on transferring technology.

Tornatzky and Fleischer(1990) argues that, the generation process focuses the distinctiveness features from other existing products, services, or technologies, while the transfer process pay more attention to the adopting areas. Thus, a firm that involved in generation process focuses on critical innovation issue, and transfer process focuses more on adoption issue (Daft, 1982). The critical innovation issue refers to manage a innovation program effectively to create a new product, service or technology; while the transferring innovation program is managed by firms to produce desirable changes. Innovation-generation firms struggle to invent something new, and innovation-transfer firms’ aims at using the technologies available in the market. Therefore, in the life cycle, innovation-generation firms are at the end of innovation, while innovation-transferring firms are located in the middle of a innovation chain.

Table2. Features of Innovation-generating and Innovation-adopting Organizations

Feature	Innovation-generating organization	Innovation-adopting organization
Definition of innovation	A new product, service, or technology created by the organization for the market	A product, service, or technology assimilated by the organization and used by its members for the first time

Phases of innovation process	Recognition of opportunity, R&D, testing, production, marketing and distribution	Recognition of need, search/awareness, evaluation, selection, adaptation, implementation and routinization
Critical innovation issue	To manage the innovation project in order to create a new product, service or technology	To manage the assimilation of innovation—products, services or technologies that are new to the organization, but available elsewhere—in order to achieve an adaptive organizational change
Role of innovation as end or means	A primary goal of the organization is to create new products, services, or technologies . Innovation is a valued end in itself	Innovation by itself is not a primary goal of the organization. Innovation is a means to facilitate and contribute to the achievement of the organization's primary goals
Managerial challenge	Matching the organization's technological capabilities with existing and new market opportunities	Matching the organization's strategic requirements with capabilities and potentials of the innovations existing in the market
Critical success factor	Generating innovative outcome is the primary success factor	Innovation adoption contributes to organizational success but is not necessarily the primary success factor
Research focus	The innovation or innovation project, study of one or few innovations	The organization or organizational change, study of many innovations
Tornatzky and Fleischer (1990)	Research → development → deployment	Adoption → implementation → routinization
Angle and	Initiation →	→Implementation/termination

Van de Ven (2000)	development →	n
Zaltman et al. (1973)	–	Knowledge awareness → attitudes formation → (adoption) decision → initial implementation → continued -sustained implementation

A case study of innovation-generation firm can be traced to the Brown and Sharpe Company, which created key technologies to the sewing machine industry and developed related methods. Especially, this firm generated a series of grinding machines, thus having the ability to make variety of metal-using machines (cf. Rosenberg, 1963: 431–432). Turning to the example of innovation-transferring firms, it comes to Dell. This company first identified the profitable opportunities to incorporate components and software components to reduce total cost, and successfully adopt a standard pattern.

These examples illustrate our earlier statements about how to identify innovation-generation firms and innovation-transferring firms. We infer that innovation-generation firms are supplier of technologies and innovation-transfer firms are customers in the technology market. Moreover, the standard factors set to distinguish these two types of innovation process are established by Frambach, 1993.) These factors include business-project fit, R&D, the benefits of innovation, patent protection, and competition in the market. On other hand, factors that influence innovation-transferring include organizational skills, process of decision-making, flexibility of organizational members, and access to internal and external communication, absorb ability, and the complexity of the innovation (Frambach, 1993 and Frambach and Schillewaert, 2002).

Given the above discussion, we find that innovation-generation firms differ considerable to innovation-transferring firms in terms of these factors. Thus, it helps to clarify certain problems that have identified by researchers. In the following sections, we discuss the difference between these innovation types in detail: differences such as organizational size, innovation model, and speed of innovation.

3.1. Organizational size

A key factor that influences innovation activities is its size (Camison-Zornoza et al., 2004). On the one hand, in line with firm level perspective, middle-small firms are more inclined to creative new products, services and technologies due to their pressure to survive and their flexibility. (Nord and Tucker, 1987). On the other hand, consistent with corporate view, large firms are expected to be more creative due to their rich resources and diverse facilities (Hitt et al., 1990 and Nord and Tucker, 1987). Both statements are reasonable and have been supported by empirical studies.

When there are visible opportunities, both big and small firms will pursue them to maximize their income (Shane and Venkataraman, 2000). To this end, small firms seize these important opportunities by invent something new and big

firms seize these opportunities by creating organizational units or alliances. It is hard to infer big or small firm is more inclined to success in innovation market. It depends on the relative cost and profit of new opportunity. When innovation is smaller in term of cost, flexible small firms have advantage over large organizations to realize such innovation. If innovation needs huge resources to develop, big companies have a higher like hood of success (Arrow, 1983).

Innovation opportunities are associated with discovery, exploration, and experimentation, and can be adopted by other firms to progress, change, and profit (Shane and Venkataraman, 2000). Innovation-transferring firms basically seize opportunities to improve their current knowledge, systems, and resources available in the marketplace. Firms with absorb capabilities can select the proper technologies and skills to develop transfer strategies to succeed. To this end, taking advantages of huge resources and economies of scale, bigger companies are more likely to succeed in this set of opportunities.

3.2. Model of innovation

Another considerable difference between innovation-generation and innovation-transferring lies in its source. The source of innovation is referred as the models that a firm chooses in generating or transferring innovation (Zahra and Covin, 1994). There are two ways to acquire innovation in term of these two types of innovation: inceptive source and acquisitive source. The former one indicates firms create innovation through its own alliances, while the latter one reflects the firm's disposition to obtain technologies through licensing, acquisition, or merger (Zahra and Covin, 1994). The young firm is likely to create innovation, that is, become a inventor of inventor of innovation Kimberly's (1986). In addition to incubate source, firms also depend on acquisitive source of transferring innovation by other firms. For example, a big firm may purchase an innovation of new drug or subsequently market the new product. Through assimilating the new product into its product line, big firms create values. (Hoskisson and Busenitz, 2002) argues: "Because acquisition requires significant resources, it is a strategy pursued mostly by resource-rich, established organizations, but not by small, entrepreneurial organizations"

3.3. Measurement of innovation

The factors that affect these two types of innovation are interesting area to most researchers. (Kimberly, 1986). As inferred above, the critical issue for innovation-generation and innovation-transferring differ considerable, implying that these two types of innovation can not be measured by same method.

Innovation has been computed by many ways such as TFP, TP, and R&D or by other proxy. This is trying to measure rate or speed of the innovation process. In this paper, we discuss the standard way of measuring innovation that is R&D activities. This variable is a independent variable to

measure rate and speed of innovation (Barnett, 1990 and Wade, 1996).

Existing literatures have already studied innovation of farmers, teachers, or health professionals with their time for a creative project (Rogers, 1995). These measures of timeliness of innovation assume that these time invested in innovation process are eventually beneficial to a firm due to first-mover advantages. The speed of creation refers to how fast innovation is created. One way to compute it is the length of time gap between idea of a new product, service or technology and its adoption to the market (Kessler and Chakrabarti, 1996). It reflects the efficiency of the innovation process (Ali et al., 1995). Time schedule is critical to a innovation project (Cooper and Kleinschmidt, 1994). The impact of innovation on marketplace is also a common measurement to reflect innovation success (Nohira and Gulati, 1996).

Turin to the innovation-transferring, it refers to the time invested in adoption the product within a company. Lawless and Anderson (1996) computed time consumed by a firm's adoption new technology created outside. Subramanian and Nilakanta (1996) found the average time length of each firm to transfer innovation in the sample.

The prevalence of this measurement of innovation can be attributed to data available to researchers in terms of time length of decision-making (Downs and Mohr, 1976). However, measuring innovation-transferring process is difficult due to lack of crucial data to compute effectiveness and adoption. In this paper, we assume that innovation-transferring process can also be computed by speed of transferring. This measure focuses on the extent rather than the time length of innovation. The speed of transferring measures how fast is a firm's transferring activities over time. There technical skills can be used to measure such speed. First, it can be computed by number of innovation projects covering a period. Second, a relative way to compute is the percentage of innovation projects in the total projects pool given a period. Third, the mean number of innovations transferred during the period of the first and the last innovation projects (Nystrom et al., 2002, Damanpour and Gopalakrishnan, 2001).

III. Conclusion

In the area of innovation, researchers have already adopted a unitary perspective of innovation. In general, and creative firms is considered as one that have high R&D level and successfully transferring new technology. This combined perspective of innovation-generation and innovation-transferring, however, leads to inconsistent results.

This paper contributes to this area by further distinguish between innovation-generation and innovation-transferring and its determinative factors. These two types of innovation differ considerable in many ways. The conception of innovation-generation refers to produce a new product, service or technology in order to enter or create a new

market or industry; while innovation-transferring refers to absorb an existing product, service or technology in order to sustain competitiveness. Innovation-generation heavily depends on creating something new and innovation-transferring relies more on the ability to absorb technology. Managers make decisions in terms of innovation-generation process need to pay attention to the environment that promotes and rewards creativity, whereas consider an environment that assimilate and transfer technology in innovation-transferring process.

Given the considerable difference between organizational innovations, we develop a specific innovation theory. In this way, we are able to solve the problem of inconsistent empirical research results. Our studies also help to shed light on factors that affect these two types of innovation, namely, firm size, model of innovation, speed of innovation. Research on these issues would deliver more reliable theories of innovation, which in turn contributes to the managers' effective practice in organizations. Especially, identifying these two types of innovation and its determinative factors will be useful for firms in the dynamic business world.

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