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A taxonomy of patent strategies in Taiwan's small and medium innovative enterprises

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ABSTRACT

An empirical taxonomy of patent strategies for SMEs is proposed in this paper based on a study of 238 innovative SMEs in Taiwan. The taxonomy identifies five categories of patent strategy — comprehensive, exploitative, defensive, reactive, and marginal — by using cluster analysis. This study demonstrates effective use of taxonomies to map the differences in patent strategies among SMEs by industry, firm size, R&D expenditure, and firm innovation. The results show that the larger the SMEs that developed radical innovations were, and the more they spent on R&D, the more likely they were to adopt comprehensive patent strategies. The R&D expenditure of most of the reactive and marginal strategy adopters is lower than that of adopters of the other three strategies. Among SMEs, firms' patent strategies are also correlated with firm size and R&D expenditure, which supports the findings of the existing literature. The taxonomy adds considerable value to our existing knowledge of management patents in SMEs by making our descriptions of patent strategic groups more clear and concise.

1. Introduction

In the new economy, patents are valued assets for firms (Prahalad and Hamel, 1990; Granstrand, 1999). Protecting promising technology with patents has become a necessary condition for attracting venture capital and increasing firms' value and profitability (Miele, 2001; Reitzig, 2004). Small and medium-sized enterprises (SMEs) also need to protect innovation with patents or other intellectual property rights to increase their chances of survival and growth (Sathirakul, 2006). SMEs typically represent 95 to 99% of a country's total enterprises. The types of SMEs vary substantially (e.g., high-tech oriented, service oriented, and manufacturing oriented).

No matter what the type of SMEs, when they achieve technical innovation, product renewal or process innovation, they decide whether to use patents to protect their innovation or how to manage patents to capture returns from innovation (Olsson and Mcqueen, 2000). Given the skewed size distribution of enterprises toward SMEs and their importance in the economy, it is necessary to understand how SMEs realize adequate patent management strategies and implementation.

From literature review, some studies gathered information on patent exploitation and management in Japanese SMEs by interviewing successful patent-active SMEs or large firms (Sathirakul, 2006; Eppinger and Vladova, 2013). Some studies have focused on investigating the relationship between patent management and performance, filing, patenting patterns and the factors that influence patenting (Ernst, 1995; Macdonald, 2004; Blind et al., 2009; Pitkethly, 2001). Such studies place relatively little emphasis on identifying strategic configurations and taxonomies, and have mainly focused on large firms (Granstrand, 1999; Rivette and Kline, 2000a, 2000b; Hanel, 2006). Granstrand (1999) identified seven strategic clusters of patent portfolio strategies: ad hoc blocking, inventing around,

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strategic patents, blanketing and flooding, fencing, surrounding, and portfolios. Rivette and Kline (2000a, 2000b) proposed a three-pronged patent strategy for large research and development (R&D) projects — grow, fix, and sell — which provides examples of value that can be extracted from management and exploitation of patents for large scale high-tech firms. Although these studies focused on identifying patent strategic configurations and taxonomies, their patent management modes and patent strategies are derived by using interviews in large firms, and very few attempts have been made to examine such patent management in SMEs. Those studies lack clarity on the actual process of building the framework from cases, especially regarding the central inductive process and the role of the literature. Most empirical studies indicate that SMEs do not use patents in the same way as larger firms (Eppinger and Vladova, 2013; Himmelberg and Petersen, 1994; Cohen et al., 2000; Audretsch, 2002; Blind et al., 2006; Cohen, 2010).

In addition, from 111 articles focusing on intellectual property (IP) issue studies published in the seven leading management journals during the years 1970–2009, Candelin-Palmqvist et al. (2012) indicated that although IP issue studies are a fast-growing research field in innovation management, most of the studies emphasizing patents relied on patent data and focused on North American and European contexts. There is a need to develop coherent constructs, conceptual frameworks and management patterns in patent management that would strengthen the theoretical basis of the research, and to pay more attention to firm-level analysis, as this may provide more feasible implications for innovation-management practitioners working on the organizational level (Candelin-Palmqvist et al., 2012). Though organizations such as the Japan Patent Office (JPO), European Patent Office (EPO), World Intellectual Property Organization (WIPO) and Taiwan Intellectual Property Office (TIPO) have made efforts to promote patent management for SMEs, the knowledge field in patent management also remains little known in the SME community.

The purpose of this research is to review the current state of empirical research into patent management in SMEs, and to investigate how innovative SMEs manage patents to protect innovation, and what are the patent strategy patterns among innovative SMEs by firm size, firm characteristics or industries. This study focuses on patent management of innovative SMEs. Innovative SMEs are here defined as SMEs that base their businesses on new or improved technologies, processes and products (Holgersson, 2013). The paper begins with a theoretical discussion of dimensions and types of patent strategy, addressing both empirical and theoretical aspects, and develops a classification system to examine patent strategy patterns based on innovative SMEs. The patent value chain perspective is used to elucidate the structure of the patent management activities of firms to better grasp their strategies. In Section 3, the methodological issues arising in the development of a classification system using cluster analysis are discussed. Section 4 describes the results of the analysis, including the taxonomy of firms' patent strategies from cluster analysis and their relationships with the characteristics of the respective firms. Limitations, managerial implications, and suggestions for future research are presented at the end of the paper.

2. Framework of firms' patent strategies

A review of related patent management or patent strategy literature demonstrates no general consensus on a definition of patent strategy. Strategies can be viewed as being composed of process and content concerns (Ansoff, 1965); scope and resource deployments (Hofer and Schendel, 1978); or corporate, business, and functional-level issues (Andrews, 1971). Motohashi (2008) defined patent strategy as a firm's management of its technology pool or capacity, based on in-house R&D or acquired technology from external sources, which is used for innovation outputs such as new products and processes. Patent strategies are traditionally characterized by filing strategies according to subject matter (quality vs. quantity), regional filing decisions (e.g. national, multinational, global), and general filing and enforcement practices (defensive vs. aggressive) (Gassmann and Bader, 2007). Some studies focus on identifying patent strategy types through case studies. For example, Granstrand (1999) offered a detailed discussion of patenting strategies, completed with flow charts and operational details based on interviews. He proposed seven patent portfolio strategies: ad hoc blocking, inventing around, strategic patents, blanketing and flooding, fencing, surrounding, and portfolios. Rivette and Kline (2000a, 2000b) proposed a three-pronged patent strategy — grow, fix, and sell — taking examples from large high-tech firms in information technology industries. Davis and Harrison (2001) developed the IP value hierarchy with a focus on patent value from studies of worldwide companies, which included five types of patent value: defensive, cost center, profit center, integrated, and visionary. At each patent value level, firms establish different patent management mechanisms to extract value. The five patent value types could also be viewed as five patent-value-extraction strategies.

From discussing the process and content of patent strategy, Sathirakul (2006) derived a best-practices model of patent exploitation and management for Japanese SMEs and venture companies based on the best practices of large companies and successful patent-active SMEs. The model involved patent strategic planning, patent creation, protection, and exploitation, known as the “patent cycle” or “patent creation cycle.” The vision of top management for patents, IP's function in the organization, and patent reward mechanisms are three key management mechanisms that need to support the patent creation cycle. Reitzig (2007) proposed an IP strategy framework that theoretically encompassed the entire IP value chain — from generating intangible assets in R&D departments to the protection of IP in patent and legal departments through 34 questionnaire data points and in-depth interviews with leaders of two companies. He defined the dimension of IP strategy as one that includes IP acquisition and generation, IP protection, and IP exploitation and enforcement, and that involves corporate, business, and functional levels of the organization.

The aforementioned studies (Sathirakul, 2006; Davis and Harrison, 2001; Reitzig, 2007) state that patent management activities include patent pool management and extraction of patent value. Thus, to better understand the activities in which a firm develops a patent competitive advantage, it is useful to categorize the patent management system into a series of value-generating activities, referred to as the “value chain,” as