R&D intensity and commercialization orientation effects on financial performance

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Abstract

This paper investigates how technology-based firms deploy their R&D and marketing resources for commercializing their technology assets. Specifically, we examine the main effects of R&D intensity, knowledge stocks, and commercialization orientation on firm performance as well as the interaction effects among the above variables. The US patent and financial data of 258 US-based technology public firms were collected and integrated as the empirical base for testing the hypotheses. Our results suggest that firms in different technology categories should have different technology commercialization strategies. Commercialization orientation and R&D intensity complement each other. A firm’s commercialization orientation can play a more important role than R&D in the process of exploiting the value of technology assets. The commercialization of a firm’s technology assets, including knowledge flows and knowledge stocks, is a complex task and there is no single best strategy available for all firms.

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1. Introduction

Managers in technology-based firms face with three major intertwined challenges: (1) Have we invested enough in R&D expenses? (2) Have we allocated enough resources to the commercialization of the firm’s technology assets? (3) Do our investments in R&D and commercialization really pay off in terms of bottom-line finance performance? Although the performance implications of R&D expenditures and marketing expenses have attracted extensive research efforts (e.g., Chauvin and Hirschey, 1993; Griffin and Hauser, 1996; Maltz et al., 2001), the results are largely inconclusive. One of the reasons of the inconsistent findings in the literature is that the technology stocks of firms differ in their nature. Another reason for the inconsistency in the literature might be that decisions of R&D expenditures and marketing expenses are the integral subparts of the corporate strategy that firm managers must take into account simultaneously with the main and interaction effects of the two functional strategies.

Researchers in both marketing and strategy studies emphasize that corporate strategy should be an integral whole of harmonious functional strategies. However, theoretical and empirical work on how to achieve such integration is still lacking. The two functions often consider themselves as underinvested and suggest that the firm needs to increase its R&D expenditures as well as marketing expenses in order to boost its long-term performance. The appropriate financial framework for analyzing R&D expenditures and marketing expenses perplexes both decision makers and academics (White and Miles, 1996). Despite the differences, marketing, finance, and R&D personnel must work together to achieve common corporate goals. The purpose of this paper is to bridge this gap in the literature by investigating the collective effects of R&D intensity and commercialization orientation on a firm’s financial performance.
2. Commercialization of technological knowledge

R&D intensity and marketing expenses are the two major business decisions that critically affect the firm’s performance while performance implications of the two strategic decisions are still unclear and vary according to performance measures and possibly differ from industry to industry. From the dynamic capabilities perspective of the firm, continuously creating innovations is probably the only way for the firm to gain competitive advantage. Strategic initiatives for innovation result from the multi-layered recombination of firm-specific resources and competences (Teece, 1998). However, this perspective still lacks in-depth empirical investigation of the roles and interrelationships of these capabilities (Galunic and Eisenhardt, 2001). Drucker (1954) recognized that the only purpose of a firm is to create and maintain customers. He reminds us that for the sole purpose of creating value for customers, any business enterprise has two – and only these two – basic functions: marketing and innovation. These two functions are not mutually exclusive. Innovation researchers are generally concerned with issues such as R&D intensity, new product development, and discontinuous technology breakthrough, whereas customer or market orientation research generally deals with matters such as customer communication, advertising orientation, and customer focus (Atuahene-Gima, 1996). Which of these two should be the central focus of the business world remains controversial. Similarly, as Day (1994) pointed out, product innovation is a “spanning process” that integrates inside-out (e.g., R&D and new product/technology development) and outside-in (e.g., advertising, effective communication with customers and channel relationships) capabilities. R&D intensity of a firm signifies the strategic importance of innovation to the firm. Although a high level of R&D intensity does not guarantee the generation of successful innovations, firms that invest heavily in R&D are more likely to try and succeed on the basis of innovativeness and technology breakthrough (O’Brien, 2003).

Technology firms create value for customers through innovations developed from new technological knowledge. R&D is a major source of competitive advantage for firms in high-tech industries engaged in new knowledge development. However, when the low-technology companies announced an increase in R&D expenditure, it was likely that their stock prices would drop (Chan et al., 1990). Such effects of announcements to change R&D expenditure levels on stock price were measured over very short time periods prior to and after the announcements. This implies that the investors expect that the net present value of future earnings will be enhanced when a high-technology firm increases its R&D expenditures. In contrast, the R&D increase of a low-technology firm would reflect the expectation of diminished future returns from the planned research. In light of the research findings discussed regarding R&D expenditures and firm performance, we propose the following hypothesis.

H1. The R&D intensity of a technology firm positively influences the firm’s financial performance.

Many studies reported relationship between corporate commercialization orientation and market value (Morck et al., 1988; Wind, 2005), whereas some other studies find that the relationship can be negative when adding control variables to the empirical model (Erickson and Jacobson, 1992). In this study, we adopt define commercialization the process of bringing science and technology capabilities or R&D results into the marketplace (Lockett and Wright, 2005). Commercialization orientation is the tendency that a firm put efforts and resources to bring its technological capabilities and R&D results to the marketplace. Market orientation is another business function that can boost the growth and profitability of the firm (Day, 1994). Firms that can successfully bring technological innovations into the marketplace are often highly market-oriented. Marketing skills derived from marketing resources and the capabilities of conducting marketing activities are crucial for the firms’ success in developing new products. This is because the ability of a technological innovation to generate profits for the firm would be contingent on whether consumers find the innovation valuable.

Marketing strategy plays an important role in bringing technology to the marketplace (Cooper, 1994). Weerawardena and O’Cass (2004) suggested that market-focused learning capability leads to higher degrees of innovation and therefore marketing capability enables sustained competitive advantage. Commercialization orientation of a firm indicates the strategic importance of customer focus to the firm. Although a high level of commercialization orientation does not guarantee that a firm will be market-oriented, firms that invest heavily in marketing and advertising are more likely to have a high level of customer orientation and marketing knowledge (O’Brien, 2003; Griffin and Hauser, 1996). Among a firm’s marketing activities, marketing and advertising are powerful tools for achieving corporate objectives, but the soundness of the methods used by companies to determine marketing budgets is continuously questioned in the literature (Mitchell, 1993).

Research efforts paid to the determinants of commercialization orientation have been less successful on grounds of parsimony, validity and explanatory power (Lilien and Little, 1976; Balasubramanian and Kumar, 1997; Stoeelhorst and van Raaij, 2004). One possible explanation for this inconclusive result is that corporate marketing expenses are often treated as a single-period business expense, which is not congruent with the sound financial theory if advertising campaign has multi-period effects (White and Miles, 1996). In light of the research findings regarding marketing and corporate performance, we propose the following hypothesis.

H2. The commercialization orientation of a technology-based firm positively influences the firm’s performance.

Numerous studies in the marketing literature emphasize the fundamental importance of communication and integration between marketing and R&D functions (Griffin and Hauser, 1996; Maltz and Kohli, 1996). However, firms tend to structure themselves around the specialized business functions, and consequently, the management of technology and innovation tends to fall outside the domain of the conventional marketing
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