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Remaining innovative without sacrificing stability: an analysis of strategies in the Japanese pharmaceutical industry that enable firms to overcome inertia resulting from successful market penetration of new product development

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Abstract

Firms competing in increasingly technologically sophisticated markets have encountered a new set of challenges. Often as a firm becomes successful in technology development, inertia enters into the process. Successful co-evolution of technology often stimulates this inertia as a preference to just refine and market the same product, which ensures stability for the firm. Unfortunately, this tendency stifles innovation. We can observe this phenomenon by analyzing product changes in the pharmaceutical industry, which is a typical high intensive R&D industry. As an inevitable result of too much strengthening of a specific core field, one failure often observed is the inability to quickly move into complementary or different product areas. One survival solution is co-evolution of technology products developed in such a way that external and internal firm circumstances that affect the customer are constantly considered. The question this analysis addresses is, "How do we construct an interface between core and new products in order to simultaneously maximize core competence and yet at the same time remain flexible?" Institutional elasticity is one mechanism for creating such a trade-off between stability and ongoing new product development. Flexibility at the edge of product development could keep a firm from falling into a dangerous equilibrium position, thereby enabling it to remain innovative without sacrificing stability

Keywords: Co-evolution; Trade-off; Flexibility; Institutional elasticity; Innovation; New product development

1. Introduction

Firms competing in increasingly sophisticated technology markets have encountered a new set of challenges. Responding to customer needs is crucial for survival, while for society as a whole, there are requirements for expanding the reach of technological benefits to larger numbers of individuals.

At the firm level, maximizing customer satisfaction by providing an efficient internal manufacturing system and simultaneously securing flexibility corresponding to dynamic and rapid change have become important aspects of any competitive survival strategy. It is well known that incremental product innovation is well managed by cooperation between marketing knowledge and technology knowledge (Allen, 1966; von Hippel, 1979, 1980, 1982, 1988; Clerk and Fujimoto, 1991; Ohno, 1988; Fujimoto, 1993; von Hippel et al., 1999). The innovator has the dilemma of constantly changing and consequently often fails to survive (Bower and Christensen, 1995; Christensen, 1997). Firms very often fail to seize opportunities to master the dynamics of innovation in the face of technological change (Utterback, 1994).

Knowledge creation theorists suggest that organizations that can control the chaos between rapid technology and market change recognized will survive (Nonaka, 1991; Nonaka and Takeuchi, 1995; Nonaka et al., 1997; von Krogh et al., 2000). To maintain a core competence,

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it is important to bring both technical and managerial branches of an organization together to ensure that future changes are appropriately made. Recent study has in particular recognized the importance of the search for management-driven marketing opportunities (Hamel, 2000). The competitive innovator typically succeeds in bringing new technologies to market, but this ultimately leads to failure as firm inertia encourages the innovator to over depend on technology already in place instead of exploring new technology opportunities.

As an inevitable result of too much strengthening of a specific core field, one failure often observed is an inability to quickly move into complementary or different product areas. One survival solution is co-evolution of technology products developed in such a way that external and internal firm circumstances affecting the customer are constantly considered. The question this analysis addresses is, "How do we construct an interface between core and new products in order to simultaneously maximize core competence and yet at the same time remain flexible?" Institutional elasticity is one mechanism for creating such a trade-off between stability and ongoing new product development.

Intriguing in-depth recent case studies on Sears Roebuck, Monsanto, Royal Dutch Shell, the US Army, British Petroleum, Hewlett Packard and Sun Microsystems (Pascale et al., 2000), demonstrate that in business, as in nature, there are no permanent winners. There are just firms that either react to change and evolve, or those that get left behind and become extinct. Equilibrium is a very dangerous position for survival, and innovation usually takes place on the edge of chaos. Self-organization and emergence occur naturally. Organizations are generally more turbulent than directed.

Monsanto has successfully remained on the edge of the new business front managing the trade-offs in technology co-evolution. However, although it has leading core competence for technology in the bio- and life-industry, it could not move beyond its core products and merged with Pharmacia Upjohn in 2000 due to a systemic disconnect between management, technology and market signals. This clearly shows that core competence for technology is not sufficient for successive survival.

At the society level, serving the needs of those in society who do not have full access to the market is an equally important goal. What are the aspects, in the notion of co-evolution of technology, which can affect the lives of those who cannot yet participate in the market? Can co-evolution of technology increase accessibility for the treatment of diseases common to the poor? Can it increase the availability of public goods such as a clean environment or wider public health coverage? Is it possible for this market-based mechanism to provide greater access to the basic amenities of life? This article attempts to address these possibilities, which confront firms and society in the 21st century.

Section 2 outlines the successful co-evolution of technology in a high intensity R&D industry. Section 3 examines the concept of overcoming the inertia of having a successful product in the marketplace and yet remaining flexible. Section 4 evaluates strategic alliance as a key mechanism of technology spillover which continuously stimulates flexible technology development and Section 5 briefly summarizes concluding remarks and implications.

2. Successful technology co-evolution in the high intensity R&D industry

For successful industrial growth, the most crucial issue is the successful development and marketing of innovative products. Successful co-evolution is embodied in continuous product development that moves technology to the marketplace. Fig. 1 shows 18 new products and the number of years from major technology discovery to first market launch in the 20th century. Surprisingly, the period from technology development to market is much shorter after World War II. In the post-war era, all major technologies were launched within 4 years from first discovery. One characteristic of this time period is a high R&D intensity.

Fig. 2 compares R&D intensity among industries in Japan. The R&D intensity of the pharmaceutical industry is outstanding. This is because medical supplies are purely based on R&D (Dimasi et al., 1991; Cockburn and Henderson, 1994; Henderson and Cockburn, 1994). R&D intensity (the ratio between R&D expenditure and sales) in Japan's pharmaceutical industry was 8.1% in 1998, which is the highest across all industries. Even Japan's well-known manufacturing industry's average R&D intensity is only 3.9%. The high R&D intensity of the pharmaceutical industry is universal in all leading countries because new medicines require intensive R&D activities, including huge investments in R&D resources. Therefore, the pharmaceutical industry must be a technology driven industry. Huge amounts of R&D resources are required for generating new products. However, these resources are generally a large burden for smaller pharmaceutical firms as well as larger pharmaceutical firms, compelling them to depend on effective utilization of technologies and research developed by their competitors. How to best utilize these technologies depends on assimilation capacity. Firms with a well-developed assimilation capacity succeed in effectively utilizing technology spillover resulting in a very productive R&D structure.

One myth of technology development in Japan is that it is widely believed that Japanese companies are not good at new product innovation, but rather rely on improving existing products. In fact, Japan's pharmaceutical industry produces globally innovative products.