Journal of Business Research 63 (2010) 490–496

Contents lists available at ScienceDirect

Journal of Business Research

Corporate motivation and performance in R&D alliances

Wen-Hsiang Lai [a,*], Pao-Long Chang [b]

[a] Graduate Institute of Management of Technology, Feng Chia University, Taiwan
[b] Department of Business Administration, Feng Chia University, Taiwan

ARTICLE INFO

Article history:
Received 1 April 2008
Received in revised form 1 March 2009
Accepted 1 April 2009

Keywords:
R&D alliances
Transaction-cost economics (TCE)
Resource-based theory (RBT)
Machinery industry
Taiwan

ABSTRACT

In the face of the global challenges of rapid transitions in technologies and markets, R&D activity has become one of the main ways for companies to engage in innovation. In addition, minimizing transaction cost is no longer sufficient to ensure a company's survival; therefore, companies must investigate and acquire resources to facilitate innovation within the organization. This study investigates corporate motivation and the performance of R&D alliances among machinery manufacturers in Taiwan. To explore the relationships between motivation and performance, this study adopts two distinct but complementary perspectives on R&D alliances: transaction-cost economics (TCE) and resource-based theory (RBT). This study includes the administration of a survey to explore the issues of motivation of companies participating in R&D alliances, types of governance structure in alliances, relationships between governance structure and performance, and relationships between motivation and performance of an R&D alliance in Taiwan's machinery industry (the TMI). The results in this study assert that corporate motivation as derived from both TCE and RBT perspectives has a significant positive relationship with the performance of R&D alliances; however, the other moderating variables, such as types of governance structure and corporate attributes, do not have a significant impact on the performance of R&D alliances in the TMI.

1. Introduction

Energizing R&D activities not only develop a company's capacity for innovation, but such energizing is also essential to help a company use its limited resources and capabilities to deal with today's competitive and turbulent environment (Barney, 1991; Chen and Li, 1999; Das and Teng, 2000; Rindfleisch and Moorman, 2001). In order to deal with the impact of company's performance of innovativeness, the key antecedents, such as market orientation, entrepreneurial orientation, and learning orientation, should be taken into account (Hult et al., 2004). Based on Hult et al.'s (2004) study, Woodside (2004) presents a dynamic and balancing model of innovativeness of firm orientation, market turbulence, and business performance. The external environment forces companies to enhance core competencies and know-how by exploring external resources and complementary expertise (Rindfleisch and Moorman, 2001). To obtain these resources and expertise, seeking external partners and forming R&D alliances has been a growing trend since the 1960s (Hagedoorn, 2002). Dyer and Singh (1998) report that the R&D alliance is not only a necessary strategy to take action, but also a way to sustain a company's competitive advantage. However, R&D alliances present challenges for both parent and partner companies, especially for those R&D activities that need multidisciplinary teams drawn from external organizations with different cultures (Hagedoorn, 2002).

Since the 1970s, over 70% of Taiwan's machinery products have been exported, and the TMI has come to play an important role on the global stage as an exporter of high-quality machinery at low prices. According to Gartner's published export-value statistics in 2004, Taiwan's machinery industry is ranked fourth largest in the world, behind those of Germany, Japan, and Italy. In the face of the emerging Chinese market, Taiwan's machinery companies must confront three issues: (1) due to the high degree of similarity of machines made in Taiwan, Taiwan's machinery companies are confront with difficult situations of price wars; (2) competitors are emerging, such as South Korea and China, which possess a low-cost advantage and which are quickly catching up both in quality and in market position; (3) Taiwan's machinery manufacturers are heavily dependent on Japan and Germany for key components such as controllers and ball screws. Since the net cost of a key component is usually more than 30% of the total manufacturing cost, the key components determine not only the performance of the machine, but also the total cost of the machine. Therefore, if the TMI is to sustain its competitive advantage, TMI must acquire resources outside its own organization. In order to facilitate Taiwan's R&D activity and innovation, the government of Taiwan also formulates industrial policies to encourage machinery manufacturers to form alliances with each other. Therefore, forming R&D alliances is becoming an important approach to enhancing core competencies for the TMI.

* Corresponding author. Feng Chia University, Graduate Institute of Management of Technology, 100, Wenhwa Rd., Seatwen, Taichung, 40724, Taiwan.
E-mail address: whlai@fcu.edu.tw (W.-H. Lai).

0148-2963/$ – see front matter © 2009 Elsevier Inc. All rights reserved.
doi:10.1016/j.jbusres.2009.04.007

To identify the actual relationships between initial intentions and ultimate performance of R&D alliances in the TMI, this study investigates the motivations which lead companies to participate in R&D alliances from the perspectives of TCE and RBT.

1.1. Research background

Two or more companies in the same field usually form R&D alliances to constitute a new entity for R&D activities or technology development while continuing to compete with each other in the existing market. R&D alliances are also considered as a platform for exchanging and sharing knowledge and for accessing specific technologies (Browning et al., 1995; Sakakibara, 1997; Teece, 1992). Some collaborative mechanisms, such as building central laboratories and setting up funding pools to outsource R&D activities, can support R&D alliances, and the so-called university–industry–government (UIG) linkage (the Triple Helix) also plays an important role in R&D alliances. Members of R&D alliances can amass a variety of resources, including capitals, talents, equipments, technologies, locations, and management skills. Moreover, members of these R&D alliances can share the huge expenses, operational costs, and risks associated with R&D activities (Bayona et al., 2001; Lambe and Spekman, 1997; Mowery, 1988). Das and Teng (2000) argue that different resource profiles determine the various types of R&D alliances and classified R&D alliances into four types: equity joint venture, minority equity alliance, bilateral contract-based alliance, and unilateral contract-based alliance. Most researchers agree to classify R&D alliances into two categories: equity-based and non-equity-based alliances (Das and Teng, 2000; Dyer and Singh, 1998; Gulati, 1995; Hagedoorn, 2002; Tallman and Shenkar, 1990). Hagedoorn (2002) notes that since the early 1980s, the original mainstream trend of equity-based R&D alliances, such as joint ventures, is gradually being replaced by non-equity contractual agreements. By the late 1980s, non-equity contractual agreements had become the primary type of R&D alliance due to the increasing costs and failure rates of joint ventures, the risk of inappropriate use of intellectual property, and incompatibilities in strategic goals. Compared with the equity-based alliance, the non-equity alliance offers a more flexible and independent way to achieve greater commitment (Hagedoorn, 2002).

1.2. Transaction-cost economics (TCE)

Coase's (1937) rudimentary concept of transaction cost points that due to environmental uncertainty and limited human rationality, the exchange process is imperfect, and therefore a transaction cost is inevitably generated. Even in a free market, resources usually cannot be well utilized; meanwhile, companies have taken on an important role in maximizing resource utilization, replacing the market in this role (Coase, 1937). The main idea of TCE is to economize on transaction cost. Williamson (1975) indicates that the uncertainty, frequency, and asset specificity are three key characteristics of affecting the amount of transaction cost. Williamson (1975) also expresses that the parametric uncertainty originates from the unpredictable economic changes, and the behavioral uncertainty indicates the individual's opportunistic behavior. Williamson (1985, p. 262) further argues that transaction cost stems from "incomplete contracting," and Williamson divides the transaction cost into two types, "ex ante cost" and "ex post cost." "Ex ante cost" represents the costs of drafting, negotiating, and safeguarding an agreement, and "ex post cost" includes maladaption cost, haggling cost, setup and running cost, and bonding cost. TCE emphasizes on the perspective of economizing transaction cost, and some researchers address that due to R&D alliances, firms can share the fixed cost of R&D activities, mitigate possible risks, access desired or potential markets, realize the economics of scale, ease the fierce competitions (Katz, 1986), and obtain subsidies from the government (D'Aspremont and Jacquemin, 1988; Sakakibara, 2002).

According to the studies of Henderson and Clark (1990) and Pisano (1990), the imperfection of TCE is that TCE does not consider internal resources, including technology capabilities, human resources, accumulated experiences, and organizational cultures. Hence, to compensate for this essential imperfection of TCE, this study uses resource-based theory (RBT) to complement the deficiencies of TCE.

1.3. Resource-based theory (RBT)

Penrose's book, "The Theory of the Growth of the Firm" (1959), discusses a company's growth from the viewpoint of inherited resources. In Penrose's view, a company's inherited and heterogeneous resources shape its uniqueness and exert a determining influence on its profits. Wernerfelt (1984) further argues that companies should make their strategic decisions from the resource side rather than from the product side, and he illustrates how companies can garner competitive advantages by building resource-position barriers by combining ownership of resources with acquisitions. Corporate resources include all assets, capabilities, organizational processes, company attributes, information, and knowledge that are able to improve the company's efficiency and effectiveness (Barney, 1991). However, nowadays the nature of competition is changing from a "war of position" to a "war of movement." Even though companies have competitive advantage, companies cannot sustain the competition for a long time due to the dynamic environment which involves both external competition and changing internal behaviors (Stalk et al., 1992). Teece (1992) notes that to cope with the dynamic environment, companies should exploit existing resources to build their dynamic capabilities, thus extending companies' competitive advantage over a longer period of time.

Wade and Hulland (2004) argue that the attributes of resources determine whether a company can sustain its competitive advantage, and valuable, rare, and appropriate resources give companies short-term competitive advantage; however, sustained competitive advantage depends on whether resources are imitable, sustainable, and mobile. RBT emphasizes the value-added perspective. Based on RBT, firms seek R&D alliances for implementing value-creation strategy by acquiring complementary resources, taking full advantage of existing resources, entering new markets, developing new products, and possessing innovation capabilities (Dickson and Weaver, 2005; Sakakibara, 2002). Furthermore, Das and Teng (2000) argue that the characteristics of resource essentially affect the formation and performance of R&D alliances.

1.4. Empirical influence of research-alliance governance structures

Hagedoorn (2002) addresses that since the early 1980s, equity-based alliances have become less attractive than non-equity-based alliances for three main reasons: (1) high cost of forming equity-based alliances (Kogut, 1988), (2) high risk of knowledge misappropriation, and (3) incompatibility of strategic goals between companies (Harrigan, 1985). Hagedoorn also indicates that high-tech industries tend to use contractual agreements (i.e., non-equity-based alliances), whereas low-tech and medium-tech industries tend to use joint-venture alliances (i.e., equity-based alliances). In Tallmans and Shenkar's (1990) empirical study, Tallman and Shenkar indicate that companies tend to use non-equity contractual forms if the resource in question consists of a specific technology (e.g., specialized machinery). On the other hand, if the resource in question consists of an implicit technology (e.g., know-how), companies tend to use equity-based alliance forms. From the TCE perspective, if the transaction objective is a needed complementary resource or if the transaction has a higher transaction cost, the company is more likely to use an equity-based alliance; if the transaction objective is a high possibility that the resource will be incidentally transferred (i.e., it cannot be well protected against misappropriation) or if the transaction objective might affect the company's brand image, the company is more likely