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Formation of strategic alliances in high-technology industries: comparative study of the resource-based theory and the transaction-cost theory

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Abstract

In this paper, the resource-based theory and the transaction-cost theory are compared in their suitability to explain firms' formation of strategic alliances under high-technology business environments. Four forms of technology-driven strategic alliances, such as (a) technology license (b) joint R&D (c) sourcing agreement and (d) joint venture, are explained based on the above two theories. Empirical analysis is performed with cases from the semiconductor industry by evaluating the feasibility to use either the resource-based theory or the transaction-cost theory for the explanation of alliance formation. It is recognized that primary motivation of strategic alliances is the access to resources, followed by the shortening of time required for development or marketing. Because the issue of time is rephrased by the issue of resources, it is concluded that the resource-based theory prevails over the transaction-cost theory to explain alliance activities in high-technology industries.

Keywords: Strategic alliances; Resource-based theory; Transaction-cost theory

1. Introduction

Strategic alliances have become central to competitive success in fast changing global markets (Doz and Hamel, 1998). The dramatic increase of importance for firms to form strategic alliances in their business activities has been attributed to the strategic responses to rapid environmental changes, such as intensification of competition, acceleration of technology advancements, enlargement of required investment, and globalization of markets. This is especially true in high-technology industries, in which the pace of new technology and product development is remarkably high and its lifecycle is accordingly short (Vilkamo and Keil, 2003). Reflecting these circumstances, the number of strategic alliances has increased in the past decade, with tens of thousands of strategic alliances reported worldwide in recent years (Anand and Khanna, 2000).

Firms enter into strategic alliances for various reasons, and the formation of strategic alliances is one of main research subjects in this field. Current theories provide at least two main explanations for alliances, the resource-based theory and the transaction-cost theory (Hoffmann and Schlosser, 2001). The resource-based theory views firms as bundles of resources, and alliances arise when firms need additional resources that cannot be purchased via market transactions. On the other hand, the transaction-cost theory recommends choosing the organization model that minimizes the sum of fixed and continual transaction costs, and firms form alliances if this minimization is achieved through them. Although there are other economic theories to explain alliances, such as agency theory, relational contracting theory, political economy theory, etc. (Sorensen and Reve, 1998), the above two theories are the most influential explanations viewing alliances from two different angles.

There have been many works and analysis on strategic alliances using the resource-based theory and the transaction-cost theory as shown in Section 2. They are related to either one of these theories, trying to construct theoretical frameworks to explain firms' alliance activities, such as, motivation, formation, structure, performance, learning, etc. Some papers also compare these two theories and identify the difference in explaining various aspects of alliances. However, most of these works discuss alliances in their generic nature, not taking account of specific business environmental factors in which alliance activities are created. This is a limitation of previous works, because

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firms select a strategy that best exploits their capabilities relative to external opportunities (Grant, 1991) and environmental factors constitute the key element of alliance strategies. Considering that a firm's motivation for alliances differs according to industries, business characteristics and competitive situations, the appropriate theory for alliances may also differ depending on these environmental conditions. In consideration of this, the missing element in current research is that characteristics of business environments have not been taken into consideration in comparing these alliance theories.

In order to fill this research gap, the resource-based theory and the transaction-cost theory are compared in their suitability to explain firms' alliance formation in high technology business environments. In this study, emphasis is put on the empirical analysis with certain case studies in the semiconductor industry. This is for the purpose of providing the theoretical framework with higher confidence level, by validating the theory using actual case analysis. The semiconductor industry is selected in the case analysis because this industry is well characterized with features typical of high-technology industries. This industry is subject to extreme price and product feature competition, in which the ability to develop new technologies is central and all firms that hope to remain competitive must undertake substantial R&D efforts (West and Iansiti, 2002).

Because strategic alliances play a central role for most firms in high-technology industries, it is quite important for them to have a solid theoretical base for planning and analyzing various aspects of alliance activities. If this comparative analysis clarifies the suitability of a certain theory to explain firms' formation of strategic alliances, it would be appropriate to apply such theory for evaluation of other aspects of alliance activities such as governance structure, performance, dynamic process and so on. This provides useful guidance for the selection of a specific theory, among other alternative theories proposed, in the analysis of strategic alliances in high-technology industries.

Including the introduction, this paper has six sections. Section 2 reviews previous research on the resource-based theory and the transaction-cost theory. Section 3 describes several kinds of alliance forms and explains how each of such alliance forms is explained by the above two theories. Section 4 compares the two theories by evaluating their appropriateness to explain actual cases for each alliance form. Section 5 discusses research results and managerial implications of this study. Finally, the paper ends with some general conclusions and suggestions for future research.

2. Research review

The resource-based theory is utilized to discuss various aspects of strategic alliances. Das and Teng (2000) analyze rational, formation, structure and performance aspects of alliances with resource characteristics as influencing factors. For example, inducement of alliance formation is influenced by the mobility, imitability, and substitutability of resources, and the alliance structure is selected on the basis of whether resources are property-based or knowledge-based. Das and Teng (2003) further analyze the relationship between alliance performance and interpartner resource alignments. Resource alignments between partners are classified as supplementary, complementary, surplus and wasteful, and those alignments are related to factors that influence alliance performance. Miotti and Sachwald (2003) develop an integrated framework to examine the determinants of choice of partners with whom firms cooperate on R&D. This resource-based perspective underscores the interactions between three major questions: why co-operate; who does; and with whom. Peng (2001) focuses on the aspect of organizational learning from the resource-based view and shows that learning from partners represents a primary motivation for firms to enter into alliances. Andersen and Kheam (1998) discuss firms' international growth strategies using the resource-based theory and predict the rate and direction of their growth.

The transaction-cost theory is another perspective to explain firms' activities in strategic alliances, joint ventures and outsourcing. Hennart (1988) shows that the transaction-cost framework can provide a unifying paradigm that accounts for the common element among seemingly dissimilar joint ventures and provide new insights into their complex phenomena. Kogut (1988) discusses the motivation of joint ventures from the perspective of transaction-cost theory, and explains why this particular mode of transaction is chosen over such alternatives as acquisition, supply contract, licensing or spot market purchase. Based on the perspective of transaction-cost theory, Aubert et al. (1996) identify a few key attributes of transaction for outsourcing and strategic alliances, which are the specificities of required assets, the level of uncertainty, the difficulty of performance assessment, and the frequency of transaction. They argue that outsourcing or strategic alliance dominates other governance mechanism for the transaction with low-frequency, low-level of uncertainty and high asset specificities, and test these explanations with empirical analysis of outsourcing in information system activities.

There are several studies which compare the above two theories to explain strategic alliances. Das and Teng (2000) identify the rational for entering into alliances based on the two theories. Based on the resource-based theory, the alliance rational is value maximization of firms through pooling and utilizing valuable resources. Firms consider strategic alliances as strategies used to access other firms' resources, for the purpose of garnering otherwise unavailable competitive advantages. On the other hand, based on the transaction-cost theory, firms' ownership decision centers on minimizing the sum of transaction costs plus production costs. Alliance will be preferred when the transaction cost associated with an exchange are