

ABSTRACT

**NETWORK EFFECTS ON NEW VENTURE INTERNATIONALIZATION: A
NETWORK-KNOWLEDGE FRAMEWORK**

BY
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This study was designed to explore the research question: How do alliance networks of a new venture affect the venture's speed of internationalization? To address this question, this paper builds a theoretical framework, from the network perspective, to systematically examine the effects of multiple network constructs. A set of longitudinal data of new ventures in the U.S. biotechnology industry was collected and employed for data analysis. The results show that both network content (number and features of alliances and characteristics of partners) and network structure (network density) are important to new ventures' speed of internationalization.

EXECUTIVE SUMMARY

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Accelerated Internationalization

New ventures are accelerating speed in entering foreign markets. Such acceleration seems to have been occurring since the late 1980s, and evidence indicates that it is not a temporary or abnormal phenomenon, but rather a relatively common phenomenon in multiple countries and a variety of industries (McDougal, Shane, & Oviatt, 1994). Brush (1992) showed in a nationwide study that more than 10% of the small U.S. manufacturers commenced international activities during the first year of operation. Another study (Moen & Servais, 2002) of a large sample of European firms (Denmark, France, and Norway) showed that more than 30% of these firms commenced their export activities within two years of establishment.

Scholars have studied international new ventures in an effort to explain their historically accelerated internationalization and entrepreneurial behavior. Among other things, we have learned that accelerated internationalization seems to be associated with advances in technology, with international experience among the firm founders or top managers (Reuber & Fischer, 1997), with firm-level technological learning (Zahra, Ireland, & Hitt, 2000), with an aggressive entrepreneurial strategy of product innovation, and with higher venture growth (Autio, Sapienza, & Almeida, 2000).

Network Perspective

Several scholars have emphasized the influence of ventures' social networks on internationalization. In theoretical work on new venture internationalization, Oviatt and McDougall (1994) emphasized the importance of networks to overcome ventures' typical poverty of resources. A venture's social network may even explain foreign entry decisions better than a country's psychic distance (McDougall, Shane, & Oviatt, 1994). After studying the manner in which a few young software ventures internationalized, Coviello and Munro (1995) concluded that what appears to be a random and irrational pattern of foreign market entries can actually be linked to business opportunities that emerge from a network of relationships. In a multinational empirical study, Bell (1995) confirmed that studying a firm's network was an effective way to understand its internationalization process. Studies of the international networks of new ventures, however, have usually been small-sample qualitative studies. Although the general importance of networks can be identified from such work, systematic testing of the variety of possible network influences cannot be accomplished in small samples.

Fortunately, sociologists have developed a nomenclature, theory, and methodologies for large-sample studies of networks that can be, but has not previously been, applied to the study of accelerated venture internationalization. The social network approach has been used to great benefit by other business scholars investigating other research questions of interest to entrepreneurship scholars, such as Ahuja's (2000) study of innovation. Sociologists refer to actors in a social network as nodes, and the links between them are ties. Nodes may differ in a variety of ways, and they may have few or many ties to other nodes in a network. Such characteristics as their centrality, or the relative number of ties connecting a node to other nodes, may influence the behavior of

actors in a network. In addition, the density, or degree of interconnectedness among nodes in a network, may influence behavior in a network.

Applying that nomenclature to my interest in accelerated internationalization, firms are the actors, or nodes, of interest, and alliances formed between them are the ties. Overwhelming evidence shows that the world is entering an age of alliance capitalism (Dunning, 1995). By partnering with other firms, a new venture is able to leverage knowledge from others and may, therefore, accelerate its pace of internationalization (Lane & Lubatkin, 1998; Vanhaverbeke, Duysters & Noorderhaven, 2002; Yli-Renko, Autio, & Sapienza, 2001). Both market knowledge and technological knowledge can be transferred through alliance networks. For example, Yli-Renko, Autio, and Sapienza (2001) found that young technology-based firms are able to acquire market and technological knowledge through their key customer relationships. Lane and Lubatkin (1998) also point out that strategic alliances can facilitate organizational learning of industry-specific knowledge. In addition, evidence shows that knowledge can even be transmitted between indirectly connected firms through their common partners (Vanhaverbeke, Duysters & Noorderhaven, 2002). This role of networks can be especially important to new ventures whose knowledge base is normally incomplete immediately after their incorporation.

The primary research question addressed by my dissertation is: how alliance networks formed by new ventures may affect their speed of internationalization. More specific goals of this study are as follows.

- To examine how the characteristics of alliance partners (technological capabilities and international experience) can be related to a new venture's speed of internationalization

- To examine how the quantity of specific types of alliances (technological alliances and marketing alliances) can be related to a new venture's speed of internationalization
- To examine the impact of partner centrality on a new venture's speed of internationalization
- To examine how network density may accelerate or retard a new venture's speed of internationalization

I developed a model and theory about how the technological and market knowledge available in the alliance networks of new ventures effects on the speed of venture internationalization. Relatively strong technological capabilities among a venture's alliance partners and a relatively large number of technological alliances are likely to provide a venture with multinational competitive advantages that speed sales into foreign markets (Dunning, 1988). Alliance partners with the greater foreign market knowledge and more marketing alliances will also likely increase the speed of ventures' moves in foreign markets. Alliance partners with greater centrality, that is, more ties to other network partners, will likely increase the knowledge indirectly available to new ventures and may help accelerate internationalization due to their greater technological knowledge and understanding of foreign markets.

I propose that the effect of network density on internationalization is more complex, however. Density, or the degree interconnection among the nodes (i.e., firms) of a new venture alliance network may interact with technological knowledge in the network to slow venture internationalization, while it interacts with foreign market knowledge to accelerate venture internationalization. A priori, it is impossible to determine, but worth empirically testing, the effect on the speed of venture

internationalization of the interaction among network density and alliance partner centrality.

Data Collection

Given of the purpose of this study, I chose the U.S. biotechnology industry for empirical test. There are several reasons for this choice. First, in this initial large-sample study on this topic, it seems of value to focus on a single industry to control for extraneous variables. Second, focusing only on the international behavior of ventures headquartered in the United States controls for cultural and legal issues that are difficult to understand and that may affect the behavior of new ventures headquartered in other countries. Third, a large number of biotechnology new ventures have been incorporated in the U.S. for the last few decades, and alliance activities, both foreign and domestic, have long been identified as popular among them (Decarolis & Deeds, 1999; Liebeskind, Oliver, Zucker, & Brewer, 1996). Evidence shows that over one thousand formal research and marketing alliances were initiated by new biotechnology startups in the 1990s (Plunkett, 2001). Therefore, a sufficient number of venture alliances are available for study. Fourth, like other high-tech firms, biotechnology firms are under the pressure to explore the foreign market soon after their inception due to the high development costs and a relatively short product life cycle in the industry (Mowery, Oxley, & Silverman, 1996). That fact ensures that internationalization is not a rare event in the industry. Finally, the study depends entirely on secondary data in order to identify and validate a large sample. Fortunately, multiple data sources about alliance information among biotechnology firms as well as other required variables are available for this industry. All these facts make the U.S. biotechnology industry an ideal choice for this research.

I searched ReCap, SDC Platinum, and BioScan for a comprehensive list of U.S. biotechnology new ventures that undertook IPO during the period of 1990 ~ 2000. This approach helps minimize survivor bias caused by bankruptcy, and by merger or acquisition after firms' initial public offerings. The inclusion of the time period of the 1990s makes this study comparable to earlier network studies on biotechnology firms (Owen-Smith & Powell, 2004; Powell, White, Koput, & Owen-Smith, 2005). To ensure that sample firms are IPO new ventures, I checked the background of all firms in the United States Securities and Exchange Commission filings. I dropped from my analysis firms that were founded as spin-offs, in merger and acquisition, or as subsidiaries of established firms. The major data sources are as follows: The Recombinant Capital Biotechnology (ReCap) Database, Mergent Online, COMPUSTAT, Lexis-Nexis, the U.S. patent office, and the Securities and Exchange Commission (SEC) filings in EDGAR.

Findings

The data analysis reveals some interesting findings. First, in support of the prediction of the network perspective, networks of biotech new ventures have a substantial impact on their pace of selling abroad. However, networks do not seem to have much impact on how fast a new venture is able to set up its initial foreign subsidiary. Second, both the characteristics of the nodes and the features of the lines are relevant to speed of a new venture's initial foreign sale. Third, network density plays a complicated role in new venture internationalization. The signs of the interaction terms associated with network density seem to change with numbers and features of ties and characteristics of nodes. In addition, this study confirms that industry plays a role in the

speed of foreign sale; speed of foreign subsidiary establishment is more likely to be an outcome of the size of the new venture and its domestic governmental connections.

Contributions

There are some important contributions of this study to organizational theory. First, this study extends research on international entrepreneurship by proposing a network perspective on new venture internationalization. Although prior research efforts have focused on how new ventures are able to quickly expand to the foreign markets (Autio, Sapienza, & Almeida, 2000; Shrader, Oviatt, & McDougall, 2000; Westhead, Wright, & Uchasaran, 2001; Zahra, Ireland, & Hitt, 2000), most extant studies explore this phenomenon from an economics perspective. For example, extant studies propose that a new venture's internationalization decision is oriented by its existing knowledge base and employed for the purpose of technology development. What is neglected in these studies is the impact of social environments. Coviello and Munro (1995) appealed, more than ten years ago, for the application of a social network perspective to examine the internationalization process of entrepreneurial firms. However, except a few case studies, little progress has been made so far in this direction. This study makes the first attempt to empirically test the effect of network constructs on the speed of new venture internationalization among a relatively large sample. The results support the belief that network constructs are important to the speed of new venture internationalization even after controlling for organizational factors such as organizational size, managerial experience, and organizational technological capabilities. Hence, this study complements prior research.

Second, this study advances understanding of the effects of network density by distinguishing between different types of knowledge transferred in alliance networks. Competing arguments of network perspectives such as the network cohesion perspective (Coleman, 1988) and the structural hole perspective (Burt, 1992) have led to different implications. On the one hand, the network cohesion perspective suggests that a dense network can enhance partner commitment and allow firms to cross-evaluate information reliability. On the other hand, the structural hole perspective proposes that a sparse network can improve organizational mobility and provide opportunities for obtaining novel information. This study extends the network literature by integrating these perspectives. I propose that network density can either positively or negatively affect knowledge transfer, depending on the nature of knowledge transferred in the network. The results of the study are consistent with my theoretical framework. Recently, some scholars point out that the effect of a cohesive network is “contingent on the conditions under which cooperation must take place” (Gargiulo & Benassi, 2000:193). Complementary to this argument, the results of this study suggest that the effect of network density is also contingent on the type of knowledge transferred.

Third, the study can enrich the international alliance literature. International business (IB) researchers have long recognized the role of strategic alliances in foreign market exploration. Some of the alliances examined are alliances between a multinational enterprise (MNE) and a local firm (Reuber & Fischer, 1997) and alliances between two MNEs (Pan & Tse, 1996) in foreign markets. The fundamental research question answered by these IB studies is how alliances can facilitate internationalization after firms enter the foreign market. However, these studies fail to explain how alliances can

initiate internationalization. Some international theories, for example, Eclectic theory, have been blamed for neglecting how firms start internationalization. Theoretically, it is not a trivial issue. As firms' international behaviors can normally be traced back to their earlier behaviors, it is important to understand what drives firms to enter the foreign market. This study is the first to explore the unresolved question. By doing so, this study opens a new dimension to the international alliance literature.

In addition, from a more balanced approach, this study examines the effect of both network content and network structure. Constructs about network structure such as network density and network centrality have been widely examined in the social network literature. However, much less attention has been paid to network content. Some scholars (Rodan & Galunic, 2004) note that network content would be at least equally important as network structure. In support of this argument, the results of this study show that both network content and network structure are relevant to new venture internationalization. Hence, this study provides insight for future network studies as to what network constructs need to be incorporated.

The study has some practical implications for new ventures. Recent studies suggest that new ventures can improve performance by quickly tapping opportunities overseas (Autio, Sapienza, & Almeida, 2000). There is also evidence that new ventures have been entering foreign markets at a much faster pace since the early 1990s. This indicates that how fast new ventures should enter foreign markets deserves great attention from managers in these ventures. The results of this study can provide insight to new ventures on what factors associated with alliance networks may affect their speed of internationalization. Some of the factors that appear to be relevant are number of

technological and marketing alliances, international experience of partners, and network density. However, managers in new ventures are cautioned against overstating the implications. They should be aware that a fast internationalization may also expose the ventures to more risks than they can afford. Hence, managers should balance the benefits and risks when deciding whether to enter foreign markets quickly or not.

The findings of this study may also provide insight to managers in new ventures as to factors that may help them open subsidiaries overseas. The findings suggest that connections with domestic governmental institutions are important for new ventures to establish foreign subsidiaries. Possibly, unlike other connections, governmental ties may provide the specific support that new ventures need. The findings suggest that managers should take account of available resources when deciding to open foreign subsidiaries. Unlike exporting or licensing, establishing foreign subsidiaries requires more resource commitment and, thus, exposes new ventures to a higher risk. Without the backing of sufficient resources, a rash decision to initiate foreign subsidiaries may be detrimental to a new venture's chance of survival. Moreover, the results indicate how fast a new venture is able to set up an initial foreign subsidiary depends on managers' international experience. To more quickly set up foreign subsidiaries, founders of new ventures need to find the best group of managers with international experience.

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