Partnering in Nanotechnology Ventures: Critical Decision Factors

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ABSTRACT

Business executives are often faced with the decision of whether to optimize the firm's performance by partnering with another company or exploring growth alone. Although nanotechnology firms are no exception, the high level of tacit knowledge requisite in these ventures presents complicated decision factors that must be considered. This study discusses the traditional decision factors inherent in partnering decisions as well as factors specifically important to nanotechnology firm executives such as knowledge sharing, intellectual property use and protection, accelerated learning and innovation, and leveraged growth opportunities.

Keywords: interorganizational relationships, partnering, alliances, business

1 INTRODUCTION

Partnering between organizations has long been of interest to top management teams in efforts to optimize performance. Traditionally, organizations have partnered to share the costs associated with a project, tap into another organization's specific strengths including distribution, R&D, facilities, etc., and reduce overall risk. Research on interorganizational relationships has shown that they can help build legitimacy [1], support resources [2], provide access to resources [1, 3], and improve the likelihood of survival of a firm [4]. Several organizational researchers have shown that interorganizational relationships such as partnerships can improve the performance of an organization [1, 4, 5, 6, 7, 8].

Conversely, there are several disadvantages of engaging in partnerships. Working with another organization is inherently difficult. Each organization brings a differing culture, level of commitment, and set of expectations into the partnership than can either complement or conflict with the other organizations. If the partnership is based on research and development, this adds complexity to the relationship, especially since knowledge transfer is difficult to manage [9]. Additionally, the assignment of costs and benefits is often to the advantage of the more powerful entity in the relationship. In some cases, partnerships can even create a future local or even global competitor.

Operating in nanotechnology brings additional complexity to the decision to partner. Nanotechnology firms tend to be small and new or large incumbents. Partnerships can be especially beneficial to new or small firms that lack resources and legitimacy in the industry [10]. At the same time, new or small firms have less power than established incumbents and this imbalance can lead to uneven negotiations and lack of equity. The large incumbents in nanotechnology have more power and, thus, more choices when deciding if, when, and with whom to partner. Additionally, all nanotechnology firms have distinguishing characteristics that create unique decision factors when considering partnerships. These include the varying state of the technology itself, the high level of tacit knowledge required to use nanotechnology, the small size of the technology, the inter-disciplinary nature, and the need for specialized facilities. These lead to critical issues when considering partnering such as knowledge sharing, intellectual property use and protection, accelerated learning and innovation, and opportunities for leveraged growth.

2 CRITICAL ISSUES IN NANOTECHNOLOGY PARTNERING

2.1 Knowledge sharing

As mentioned, partnerships are seen as an opportunity to gain knowledge from another organization. But knowledge sharing can go beyond simply discussing domain information and innovation techniques. For example, Niosi found that the majority of 60 new Canadian biotechnology firms studied gained complementary knowledge from the strategic alliances with which they participated [11]. Complementary knowledge builds on the organizations existing domain and extends both its knowledge stocks and capabilities. Thus, knowledge sharing can lead to improved performance for both parties.

In nanotechnology, the knowledge domain tends to be much broader and well integrated than in other high-technology areas. For instance, nanotechnology is seen as a convergence of biotechnology, information technology, physics, and chemistry. For knowledge sharing to be most effective, participants must have a broad understanding of the different domains involved. With regards to nanotechnology, this understanding may be difficult to find in one person. A team of multi-disciplined individuals may best serve the organization in its knowledge sharing efforts. Therefore, the knowledge sharing dynamic of partnerships

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requires organizations to consider the type of knowledge to share and the people who will take part in the exchange.

2.2 Intellectual property protection

Intellectual property protection is often a concern in partnerships. What is different about nanotechnology is that the technology may not be patentable or ready to patent. Additionally, much of the technology is contained in tacit knowledge by the researchers in the firm. Therefore, it is not only intellectual property that is at stake, but, more importantly, trade secrets that are not patentable. Thus, the unique nature of nanotechnology creates cause for concern over intellectual property and trade secret protection.

Adding to the complexity of the situation is the fact that nanotechnology is dealing with, by definition, things not visible to the naked eye. When problems arise concerning intellectual property, it is difficult to ascertain since physical evidence is almost impossible to obtain or analyze.

Nanotechnology includes innovations in both products and processes. Product innovations are those that directly lead to marketable goods and are relatively easy to identify. On the other hand, process innovations are not visible outside of the firm and are often more important than products because processes underlie the development and production of key competencies, and goods. When entering a partnership, it is often expected that some knowledge will be transferred. What causes difficulty is distinguishing between what is included in the purview of the partnership and how to separate and exclude knowledge outside this relationship. For example, if you are sharing product technology regarding thin layer deposition products you may inadvertently disclose your process technology.

Conversely, partnerships offer an opportunity to share intellectual property and trade secrets outside of market transactions. Traditionally, when intellectual property is exchanged between organizations, very specific contracts are written to "protect" each party from misuse. Partnerships allow a relationship to form around a specific issue or opportunity, and each organization can apply the knowledge it deems appropriate to the issue. This knowledge is not predetermined and therefore allows more flexibility and creativity.

When creating a partnership, first you must weight the possibility of losing some of your intellectual property or trade secret advantages. Second, you should examine the potential for the creative use of your IP or trade secrets that benefit both parties.

2.3 Accelerated learning and innovation

In addition to sharing knowledge, nanotechnology partnerships provide an opportunity to accelerate the learning and innovation. Interorganizational teams from each firm represent a variety of knowledge and resources. When talented individuals with a greater diversity of experience and perspectives are brought together and anchored on a specific issue, learning can take place at a much faster pace [12]. Powell, Koput, and Smith-Doerr argue that knowledge sharing in the biotechnology industry occurs in interorganizational collaborations which lead to learning outside of individual firms [13]. A partnership can accelerate learning when interorganizational teams take the opportunity to advance beyond the simple exchange of knowledge stocks. For example by comparing problems, simultaneous parallel problem solving can occur to which both parties can benefit.

Partnership opportunities to accelerate learning outside of the organization are attractive for several reasons. First, there are few places in the world that offer clear and consistent education for nanotechnology. Nanotechnology organizations wishing to obtain a particular talent or knowledge domain have few choices from which to hire talented individuals. Second, organizations that endeavor to teach employees on the job are constrained by the time, talent, and facilities that this requires which often come at the expense of product and process innovation. Third, partnerships enable learning based on the organizations existing products, processes, innovations, and problems. Therefore, partnerships offer a valuable opportunity for accelerated learning and innovation.

2.4 Leveraged growth opportunities

Partnerships provide access not only to resources outside of an organization including knowledge, physical assets, and talent, but also to growth opportunities by leveraging the resources of the partner's resources and network. By using the assets, knowledge, and other resources of the other organization to support your own organization's strategy, you can achieve what John Hagel calls "leveraged growth" [14]. Leveraged growth is the mobilization of resources outside the organization to expand. For example, this allows you to move into new markets without purchasing or owning assets specific to the expansion. Leveraged growth allows both organizations to focus on their respective capabilities, which leads to further growth, improved efficiency, and potentially, higher profits.

Nanotechnology is inherently expensive. Opportunities to leverage the resources outside the organization must be well considered. Often this takes the form of partnering with educational facilities or nanotechnology incubation organizations with access to the expensive equipment necessary to perform experiments and product development. In the consideration of partnerships, an organization must weigh the opportunity for leveraged growth through the resources of the partnering organization.

3 IMPLICATIONS AND DISCUSSION

This article discusses non-traditional benefits of partnerships and some of the decision factors that are associated. A partnership allows organizations to exchange

ideas, and knowledge in a more creative forum. While intellectual property and trade secrets are often heavily protected, sharing some of this information in a partnership may lead to faster and better use of that IP. The opportunity to accelerate learning and innovation offered by certain partnerships may prove more valuable than the drawbacks. And lastly, partnerships provide access to a wider range of resources that may lead to leveraged growth opportunities.

When considering a partnership, each of these benefits must be weighed carefully. While it is useful to determine which of these benefits is most useful and likely, one must also examine the potential partner's resources and capability of enabling these benefits to be realized. All potential partners are not created equal. First, one must evaluate the potential partner's resources or access to resources that would prove useful for your organization. Second, while large firms may have the resources necessary, they may not be willing to share these resources. Third, the partnering organization's level of commitment will vary. Fourth, the culture of the potential partner will dictate your interactions. Make sure that it is compatible with your own team's culture and study. Fifth, if you decide to enter the partnership, make the sure that the goals and expectations of the union are well conveyed and documented.

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