

# Mastering the Logic and Economics of Global R&D

Developing global R&D networks, which optimize access to worldwide talent, requires special partnering skills.

*Paul Wright*

The company-owned R&D department, that proud nineteenth-century invention, is rapidly transforming into a global knowledge hub. Increasingly, the R&D of a business is taking place not only inside the corporation itself but through partnerships, joint ventures, alliances, and know-how agreements with organizations in different countries, in different industries, and with different technologies.

Like any other core competency, however, developing these global networks does not occur overnight. Such networks require intimate understanding of a company's R&D requirements and capabilities, a measured and detailed examination of the potential new partners, and experience in the management of and interface with the R&D network.

Although most of the focus in recent years has been on the outsourcing and offshoring of information technology (IT) services, the internationalization of R&D services is in its infancy, and most companies are just

beginning to tap into its potential. This brings many challenges, such as overcoming cultural or language barriers and ensuring that real-time communications processes are in place, but there are many benefits for both emerging and mature biomedical companies willing to dip their toes into international R&D waters.

Indeed, the primary force driving this new business phenomenon is

simple: It offers more innovation for less R&D investment. It's a new twist on the common practice of locating R&D operations in new areas within North America. The same reasons come into play, including harnessing talent and innovations, and thus reducing time to market and lowering

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the cost of product development. Sourcing R&D internationally opens up into new sources of expertise to drive the next stage of strategic growth.

Some companies have an infrequent need for specialist product design and development services, and so it is not feasible to build and maintain in-house capabilities. Outsourcing design firms can offer better solutions than ad hoc design teams because they can tap into scale and learning economies that they have developed through their experience and longevity in the business.

For other players in the biomedical industry, the overriding need is to manage strategic risk. The biomedical device industry is undergoing structural shifts. To deal with strategic change, biomedical companies are turning to a wide variety of specialist partners as an integral part of their business plan. The result is a greater ability to adapt to the changing needs of customers and the fast pace of technological change in product markets.

This open model of innovation is overtaking the traditional internal R&D model. In product design and development, the search for competitive advantage has focused historically on those resources that reside within the corporation and within the country. In the past few years, however, there has been a growing recognition that there is talent beyond corporate and national boundaries. For every dollar spent by companies on medical R&D in the United States, another two to three dollars is now spent elsewhere.<sup>1</sup>

Alliances and partnerships aren't new, but the increasing number and variety of them is a relatively recent development. Recent reports from various studies conducted worldwide indicate that international collaborative ventures will grow by at least 40% per year over the next five years. This growth in international R&D is being driven by the benefits and availability of access to new skills and knowledge. Also key are the rising costs of bringing new products to market in the United States, Japan, and Europe.

### **The Economics of R&D Sourcing**

A relatively new branch of economics called transaction cost economics (TCE) offers a powerful framework for guiding a firm's strategic

R&D sourcing decisions. TCE's insights point the way to less dispute, lower costs of contracting, and greater value added.

So exactly what is a transaction cost? First, it's the time and effort expended to reach an agreement, and second, it's

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the difference between the value to the parties of the actual agreement reached and the value of the best possible accord. R&D transactions include these fundamental costs:

- Establishing contact and relations with the other party.
- Screening (of both the R&D services and the other party).
- Negotiating the agreement.
- Exchanging rights to the R&D being transacted.
- Monitoring and enforcing the contract.

### **Transaction Cost Drivers**

There are three kinds of transaction cost drivers that arise when organizations need to source complex services, either internally or externally:

- Performance and measurement difficulties.
- Investments in relationship-specific assets.
- Human factors.

First, there are the inevitable performance and measurement difficulties in complex product development initiatives. Although such critical factors as quality, trust, innovation, information sharing, and responsiveness are the intangible factors that can make or break any business' long-term growth objectives, these traits are equally important

in any successful product development initiative.

Second, there must be relationship-specific investments in skills and business assets for value creation to be successful, with the potential to create powerful dependencies by one partner on the other. Therefore, issues of appropriation arise in ways that are best handled through formal contracts. Indeed, almost all R&D relationships rely to some extent on formal contracting in their development agreements.

Third, such dependencies may lead to opportunism whereby one or both parties renege on commitments. There are also limitations on specifying the totality of arrangements at the outset, because neither party can foresee all possible outcomes given the uncertain nature of new product development. Both the company and the R&D provider face technical hurdles, volatility in market requirements, cost-feature trade-offs, estimates of cost-to-build, timing of completion, and so on.

Important transaction costs that are unique to international R&D include the following:

- The costs of protecting rights over valuable intellectual property in countries with significantly different protection regulations.
- The development of interorganizational systems for harmonization of design standards and metrics.
- Foreign exchange transaction risk.
- Language and cross-cultural difficulties.

Perhaps surprisingly for international R&D, physical distance between buyer and supplier is not a significant transaction cost driver. Indeed, even if the company's R&D provider is in the same building or down the street, there still must be effective channels of communication. For international partnerships, however, the availability of advanced telecommunications infrastructure is critical. Over time, technological change will drive the marginal cost of such communications to zero. In addition, communicating over distance requires a discipline that can be highly beneficial when large teams are developing complex systems.

## Alternatives for Organizing R&D

In the framework of TCE, economizing on transaction costs and maximizing transaction value are critical concepts. Accordingly, the costs and benefits of the three basic alternatives for organizing R&D need to be compared.

**Vertical Integration or Hierarchy.** Vertically integrated firms do product development in-house and maintain control over both the sourcing unit and the buying unit. At the extreme, such a firm would produce all of its R&D internally.

**Arm's-Length Relationships or Markets.** Other firms only use short-term suppliers and shop around for the best price each time R&D is required.

**Partnerships or Alliance Networks.** Partnership-focused firms buy from a small number of suppliers and build long-term, cooperative relationships with those few suppliers.

In today's fast-moving biomedical device industry, vertical integration can be a liability because of its reduced potential for innovation, low-powered incentives for task completion, and potentially small-scale, high-cost structure. By contrast, the arm's-length model of supplier management is also becoming obsolete, especially in complex-product industries. The problem with the arm's-length model is that suppliers will not make the dedicated investments or share the knowledge necessary to produce a differentiated, complex product.

In place of arm's-length relationships and vertical integration, new organizational models are emerging that rely increasingly on commercial relationships that are neither arm's-length in character nor governed by hierarchy. These international alliances, partnerships, or networks offer sustainable advantages for development of new products. For example, the process of contracting with an external R&D provider can impose a higher degree of discipline on the product development process.

## Building Blocks of Successful Collaboration

The evidence for the competitive advantage of a network of firms was gathered by American economist Jeffrey Dyer over the last decade.<sup>2,3</sup> He

concluded that the nature of the relationships between a company and its strategic supplier firms is an important contributor to profitability and sustainable competitive advantage. Dyer identified three building blocks of successful collaboration.

First, investments in dedicated assets need to be made. These are investments in skills or equipment made by one firm in the value chain for the specialized use and benefit of recipient firms in the chain. The greater the partners' investment is in relation to specific assets, the greater the potential will be for increased value added. Moreover, an increased volume of exchange and longer contracts have the potential to generate more value through relationship-specific assets.

Second, there must be knowledge-sharing practices between buyers and suppliers. These practices facilitate more-effective R&D and ultimately lead to better products for the end customer. Again, the greater the partners' investment is in interfirm knowledge-sharing routines, the greater the potential for increased value added.

Third, this exchange of know-how requires a relational contracting approach. Trust and mutual respect are more effective than legal contracts alone at minimizing transaction costs for many reasons. Not surprisingly, when suppliers trust their customers, they are more likely to share information with regard to product designs, technology costs, manufacturing processes, and so forth.

To deal with these realities, R&D contracts must be accompanied by long-term relationships between the parties. Such relationships are characterized by repeated partnering that generates goodwill. They are based on a partnership basis that provides beneficial outcomes for all parties. Hence, relational contracts supplement formal contracts.

Relational contracts work in the sense that the parties cannot reduce important terms of the arrangement to well-defined obligations. Such definitive obligations may be impractical in R&D because of the inability to identify uncertain future conditions and to describe adequately the complex adaptations that might be required. Relational contracting facilitates the im-

plementation of adjustments to the initial arrangements over time.

## Culture Drives a Successful Relationship

Given the importance of knowledge sharing and trust building, organizational culture is a key driver in establishing a successful relationship. Indeed, where physical distance may at one time have been the most significant hurdle to overcome, cultural distance is most certainly the most critical factor standing in the way of successful international innovation networks.

Historically, physical proximity was regarded as important to collaboration because of high communication barriers. Now with communication barriers falling rapidly, cultural compatibility between partners is the most important factor in the success of a global partnership. The evidence indicates that similarity of cultural values reduces misunderstanding between the partners. Likewise, culturally distant partners often experience difficulties in their interactions.

The chemistry and compatibility between two organizations play a vital role in the ongoing management of the arrangements. Important issues between partners include the speed and clarity of their decision making, their goals and priorities, the effectiveness of their interventions when problems arise, and how each party defines and delivers its contributions.

## Conclusion

Biomedical companies need to focus on the few things at which they undoubtedly excel and need to hand over everything else to equally focused specialists. Increasingly, the most efficient way of creating a biomedical device is through cross-border transactions: creating the design in one place, the electronics in another, the packaging somewhere else, and integrating and assembling the end product for distribution.

Forward-looking companies work on overcoming the home bias within their own organizations. Internationalizing R&D does not signal a hollowing out of the corporation, nor is it a sign of short-term thinking. Looking beyond the home shores is a natural

extension of the common business practice of keeping up with the best. In the long run, having an internationally competitive business model preserves jobs at home.

Companies should, therefore, treat international R&D as no different than local R&D. Its goal is to increase competitiveness by lowering the cost structure of R&D and offering new products to customers more quickly and efficiently.

Successful international partnering requires flexibility in the new product development process. All R&D contracts have an element of incompleteness, and this means that a company needs work with a partner to design governance arrangements to deal with change and adaptation as the future unfolds.

Companies must therefore be prepared to adapt organizational systems, processes, and culture to maximize the benefits of international design expertise. To reap the benefits, a device company must understand the cross-cultural dimension. To suc-

ceed, a culture of networking and collaboration is critical. Flexibility, openness, mutual respect, and communication are also key components.

Business imperatives and technology change are shifting the balance of advantage toward international networks. They are the next platforms for strategic competition in biomedical devices. For those companies that embark on a path of international R&D collaboration, the journey can be very rewarding.

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