CONTRACTING FOR INNOVATION

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Abstract

In order to compete successfully, companies are finding that it is increasingly important to capitalize on innovations generated outside the organization. Creating and capturing value from outside innovations is often difficult, however, because it involves the challenge of managing potentially hazardous contractual relationships with outside organizations, whether they be universities, firms, research institutes, etc. In this chapter, I discuss three approaches to managing these relationships: contract design, relational governance and tournaments. I discuss the relative importance of these three approaches, interactions between them, and situations in which they might substitute for, or complement, one another.
Introduction

For many decades, it was thought that innovation was a dish best cooked at home; companies were reluctant to seek out innovations generated outside of their organizational boundaries. There were many reasons for this. For most of the 20th century, advanced economies were less competitive than they are now. There were therefore fewer outside sources of innovation available to tap. There were fewer small firms selling technology and innovative solutions, for example, and universities were less interested in transferring their innovations to the private sector. Less developed countries produced little innovation.

Another set of reasons for companies’ reluctance to embrace outside innovations is rooted in organizational inertia. Large companies with comfortable market positions often had little incentive to innovate at all, much less seek out the innovations of others. Managers developing innovations inside the company often saw outside innovations as threats to their own careers. Psychological biases against others’ innovations produced the proverbial “Not Invented Here” syndrome.

Much of that has changed. Innovation now flows from a universe of companies and institutions throughout the world. Faced with more vigorous competition, companies have stronger incentives tap into these sources though partnerships, acquisitions, special agreements, and other means. Henry Chesbrough (2005, 2006) has described this new business landscape in popular books on what he calls “open innovation.”

Capitalizing on innovations from outside the organization can be quite difficult, however, even after a company has identified the outside innovations it would like to pursue. Creating and capturing value from outside innovations often involves contractual relationships with outside organizations, whether they be universities, firms, research institutes, etc. In this chapter, I discuss some of the important challenges in contracting for innovation, and describe some of the approaches companies take to address them effectively. I focus particularly on contracting scenarios in which a supplier is engaged to provide an innovative product or service to the buyer. So I have in mind contracts for R&D, product development, specialized engineering or information technology services, and the like. Such contracts are common in sectors such as aerospace, electronics, chemicals, pharmaceuticals, consumer products, transportation, etc.

Contracting Hazards

A fundamental challenge in contracting for innovation stems from Nobel Laureate Kenneth Arrow’s “Information Paradox”: Buyers are unwilling to pay for a new idea unless they’ve heard it first (Arrow 1971). But once a supplier has communicated her idea to a buyer, the buyer remains unwilling to pay since he has now received the good. Of course, most nations have patent systems that aim to resolve
this paradox. By first obtaining patent protection for her idea, the supplier gains legal recourse should a buyer “take the idea and run.”

Patent protection, however, is often highly imperfect, and patent systems are often ineffective. When innovators are working in a “crowded” technological space, often they can secure only narrow rights to their innovation. Narrow patents are those that are easy for imitators to “invent around.” Obtaining strong patent protection is particularly difficult for technologies that rely on multiple components, such as those in electronics, computer software, and telecommunications. Of course, it is often the case that an economically valuable innovation is not novel enough to earn any patent protection at all.

Even if an innovator can win a broad patent on her innovation, in some countries it is difficult and costly to enforce those rights. Developing country governments, for example, often refuse to enforce patents held by foreign companies if the imitators are domestic firms. The reason, of course, is that these governments wish to quickly stimulate economic growth in their own countries, with less concern for the longer term effects of such policies. Even in developed countries, however, it can be difficult to enforce patents because legal costs can be high.

A second type of hazard that can arise in contracting for innovation is what Nobel Laureate Oliver Williamson (1985) calls “asset specificity”. An innovation contains asset specificity if it is custom-tailored to one particular buyer, so that its value to other buyers is much lower. The contracting hazard caused by asset specificity is that once the investment to develop the asset-specific innovation has been sunk, the buyer has an incentive to re-negotiate the deal to win better terms, knowing that the supplier’s outside options are limited.

A third category of contractual hazards is uncertainty. Uncertainty can stem from many sources, but regardless of the source, it complicates the contracting process. One source of uncertainty is the nature of the contractual partner with whom a buyer or supplier is dealing. If a firm does not have a long track record of business dealings, or otherwise lacks a strong reputation for integrity, buyers or suppliers may shy away from contracting with that firm, or demand terms that are uneconomical for it. Uncertainty about the enforceability of patents or the effectiveness of the legal system can also chill efforts to contract for innovation. Contracting for innovation also typically involves technological uncertainty: uncertainty about the feasibility of innovation projects, about how technology will change during the course of the project, and about the precise nature of the buyer’s needs.

In view of all these hazards of contracting for innovation, it is not surprising that for so many decades managers believed that innovation is a dish best cooked at home. Internal innovation is of course also fraught with technological uncertainty. But the hazards of dealing with a partner at arm’s length, without the benefit of a hierarchical structure (i.e., a CEO) to prevent and resolve disputes that might arise, are arguably much greater than simply innovating internally.

Focusing exclusively on internal innovation, however, is no longer feasible for many industrial companies. Firms now compete fiercely to gain access to source of innovation wherever they may be located. Companies that fail to find ways to mitigate the hazards of contracting for innovation will fall prey to rivals who have cracked this nut.
Contract design

So how do companies crack the nut? How do they mitigate the hazards in contracting for innovation? In the remainder of this chapter, I discuss three approaches to hazard mitigation, none of which are mutually exclusive: contract design, relational governance, and tournaments.

A fundamental assumption made by most economists who study contracts is that contracts are unavoidably incomplete. By “incomplete” they mean that contracts inevitably leave out contingencies that the parties did not or could not anticipate beforehand, so that were that contingency to actually occur and a dispute about it arise, a court or arbiter would not know how to rule. Economists have argued that if parties to a contract could anticipate all possible contingencies and describe them unambiguously, all contractual hazards could be handled in contracts. In this kind of world, all economic activity could occur through contracts, leaving no reason to have large hierarchical firms that guide economic activity using what Alfred Chandler called “the visible hand” of administrative directive (Chandler 1977). This idea forms the basis for Oliver Williamson’s Nobel Prize-winning research, as well as to influential work by Oliver Hart, Sanford Grossman and John Moore (Grossman & Hart 1986; Hart & Moore 1988).

While this idea is indeed a fundamental insight, it doesn’t address the important reality that contacts differ in their degree of completeness. It tells us that all contracts are incomplete and that’s why hazardous exchanges are managed within firms, but why are some more complete than others? More importantly for managers facing the imperative to contract for innovation, can contracts be made more complete in order to mitigate the hazards of contracting for innovation?

We actually know very little about how incomplete are contracts, why they are as incomplete as they are, and whether highly incomplete contracts are for some reason optimal for some kinds of exchanges. Some progress has been made, however. In a study of high technology defense contracts, Keith Crocker and Scott Reynolds found that projects featuring greater technological uncertainty tended to be managed under more incomplete contracts, using cost-plus contracting, whereas projects with less such uncertainty were governed by more complete contracts using fixed price or cost-plus-incentive-fee arrangements. This result is not terribly surprising, but it does show that the nature of the project can have an impact on the incompleteness of the contracts. It therefore suggests that contracting partners invest less in contract development when technological uncertainty is so high that foreseeing many contingencies is extremely difficult.

A second study offers some theoretical reasons for why contracting parties might decide not to develop more complete contracts even if they could. Douglas Bernheim and Michael Whinston developed a model of a contractual relationship with mutual obligations (Bernheim & Whinston 1998). They showed that if performance by Party A is less measurable than performance by Party B, further specifying B’s obligations would put Party A at a disadvantage if the parties were to end up in court. This is because Party B would have an easier time demonstrating that he fulfilled his obligations than Party A would. Party A therefore prefers a more incomplete contract, and will get its way as long as it has a bit of bargaining power.
The Bernheim and Whinston model is intriguing. However, it has not been tested empirically, and suffers from at least two drawbacks as a general explanation for contract incompleteness. First, in many contracts for innovation, the major obligations lie on the supplier’s side. The buyer may have obligations too, but they are not significant enough to create the kinds of problems in the model. Second, contracting for innovation often involves multiple highly technical, hard-to-measure tasks, so much so that courts could not adjudicate them efficiently were they to come into dispute. In these cases, the parties are not able to anticipate a court’s responses to different contract designs. Indeed, in a recent study of high technology contracts in telecommunications industries, Michael Ryall and Rachelle Sampson (2009) found that firms developed and relied on contracts that they knew were unenforceable in court. This finding is a bit of a puzzle in itself, but also points to some limitations of the Bernheim and Whinston theory.

An arguably more powerful explanation for why contracts for innovation are incomplete has been developed in recent work on the topic of “learning to contract.” The very definition of contracting for innovation implies contracting for something new; something that has not been previously contracted for in the exactly the same way. For these transactions, standard form, boilerplate-type contracts are of limited use. Major sections of the contract must be custom-designed to the transaction. In many cases of contracting for innovation, it is not obvious to the parties how this should be done.

In recent work with Kyle Mayer, I described a case in which two firms in an emerging industry (personal computers in the 1980s) required several years before arriving at a contractual structure that adequately addressed the contractual hazards discussed above (Mayer & Argyres 2004). This occurred largely because it took a long time for the parties to understand what the hazards were in their particular context, and how to address them with appropriate contractual provisions. Moreover, the firms seemed to make different kinds of mistakes in contract design that they only recognized after the fact. Follow-on work with Mayer and Janet Bercovitz shows evidence of learning to contract over time in a larger sample of contracts from information technology services (Argyres, Bercovitz & Mayer 2007).

This research on learning to contract suggests, then, that contract design can be an important way in which firms safeguard transactions for innovation, but that firms may need time and resources to learn how to design contracts adequately. This is especially the case in new industries, or when the innovations under contract are quite novel. Firms in more established industries contracting for less novel innovations —product or service upgrades, for example — are less likely to face a steep learning curve for contract design. For these firms contract design will be more straightforward.

The next logical question for managers interested in contracting for highly novel innovation is, “How can we speed up the process of learning to contract?” This is a question that has barely been addressed in management research. In my work with Mayer, we suggest that firms can use their own past contracts as a repository of knowledge of best and worst contracting practices. Managers can study these contracts with those who developed them with the aim of gleaning insights into problematic areas. Often, for example, firms tend to focus on issues like payment terms, protection of property rights to the innovation and the like, all of which are of course very important. There is often less attention, however, to matters such as how the two parties are to communicate with each others as events unfold.
during contract execution. Disputes sometimes arise not because parties’ needs have changed in ways that are fundamentally irreconcilable, but because the contract did not adequately specific how and when communication of those changes in needs is to occur. Contracts can thus be viewed not only as documents for protecting the parties’ interests and investments, but also as guides for how the two parties will work together over the course of the project. In that sense, contracts are as much managerial tools as they are legal safeguards. Indeed, this view of contracts helps explain the puzzle mentioned earlier about why firms sometimes design legally unenforceable contracts. Even if unenforceable, the process of designing contracts may help the parties to better understand the hazards and challenges of managing the kind transaction they desire.

This emphasis on the managerial functions of contracts (as opposed to the legal functions only) immediately implies that speeding up the process of learning to contract requires the active participation of managers and engineers in contract design. Many managers, and perhaps more engineers, are reluctant to spend much time on contract design. Both groups often have other pressing priorities. Engineers are often pushing to meet product development deadlines. Managers are busy “putting out fires” and do not feel they have the luxury of planning exchanges and imagining contingencies that may or may not occur in the future. “Leave it to the lawyers,” they think.

My work with Kyle Mayer suggests, however, that inadequate participation by managers and engineers in the contract design process jeopardizes the effectiveness of contracting for innovation (Argyres & Mayer 2007). That participation is sorely needed to develop the task descriptions, contingency plans, and communication protocols that are so central to high performance contracting. Lawyers of course also play important roles in contract design, but their expertise usually lies in different areas, such as design of rights to intellectual property developed in the relationship and design of dispute resolution procedures. Developing effective contract designs thus involves ensuring the participation of managers and engineers, and allocating tasks to designers to take advantage of specialization of knowledge.

Contract design, then, is an important way in which companies seek to protect themselves from the various kinds of hazards that could arise when contracting for innovation. The process of designing contracts, however, can also stimulate processes in which managers learn about the exchanges they are engaging in, which is important when those exchanges involve a significant amount of novel activity. Contracts should therefore be seen not only as providing safeguards, but more broadly as providing a framework for planning collaborative innovation effort.

Relational Governance

A thoughtful contract design is of course no guarantee that things will go smoothly. Divisive contingencies that the parties could not have anticipated, or only could have anticipated with great investment, can always arise. Such events pose few serious problems if the parties are not dependent upon each other, but in most cases of contracting for innovation, dependency is a given.

Companies therefore sometimes seek to support their contractual design efforts by developing long term relationships with their partners. The idea is to foster a relationship of mutual trust, so that if contingencies not addressed in the contract do arise, the parties can still “work things out” based on
their trust in each other’s desire to continue the relationship into the future. The hope is that this “shadow of the future” will cement the relationship as it experiences “the slings and arrows of fortune.” This approach to managing interfirm exchanges is called “relational governance.”

There is great controversy among organizational scholars about just how important is the role of relational governance in contracting for innovation. On one extreme are sociology-oriented scholars who argue that because of the uncertainty in these kinds of exchanges, trust is indispensable. They argue there is often enough trust that detailed contracts are, or at least become, unimportant. Indeed, contracts can even be detrimental in this view; they destroy trust by transforming the exchange from relational to “transactional.” If the parties treat an exchange as merely transactional, they are more likely to try to take advantage of their partner if the opportunity arises. In this way, the thinking goes, detailed contracts end up producing the behavior they are designed to prevent.

On the other extreme are economics-oriented scholars who believe that trust plays a minor role in most commercial transactions. In their view, companies are hard-nosed, sophisticated entities that understand that their contractual partners are not altruistic charities, but are in business to make money. To the extent companies occasionally transact for products or services without detailed contracts, they do so based on the calculation that the partner’s concern for its reputation in the market will deter it from taking advantage of unanticipated contingencies. Oliver Williamson, for example, argued that if “trust” comes down to “trust in a reputation”, then one might as well speak of reputation and not a murky concept like “trust” (Williamson 1996).

Between these two extremes are those who see companies as mostly sophisticated and forward-looking, but also as managed by human beings whose decisions are often influenced by emotions. With this perspective, neither blind trust nor contracts alone are sufficient to cement exchange relationships in the uncertain environments in which companies contract for innovation. On one hand, an overemphasis on contractual detail without attention to the development of trust can poison the atmosphere in a relationship. On the other hand, relying solely on efforts to develop trust leaves one or both parties unduly exposed. Companies are reluctant to leave themselves so vulnerable, and if they do, they are likely to get burned sooner or later.

This middle-of-the-road perspective implies that in most contracting situations, companies ought to invest in developing detailed contractual designs while also fostering trust with the partner. Striking this balance involves placing heavy emphasis on those aspects of the contracts that involve communication between the parties and contingency planning. Protections and safeguards are not ignored in the contract design, but are not treated as more important as the provisions aimed at outlining the framework for collaboration.

Strategy researchers have produced evidence supporting both the trust-based view and the middle-of-the-road view. Much of the research supporting the trust-based view is problematic, however, because trust is often not careful and consistently defined within and across the studies (as distinct from reputation, for example), because studies often measure trust using naïve survey questions, and alternative mechanisms that may be in place (such as contracts) are often unaccounted for. Another
problem is that most of the studies address relationships in which trust is already present (or not), rather than how trust is developed. There are, however, a few studies of the latter, and some carefully conducted experimental studies suggesting that an emphasis on contracts can drive out trust.

There is also evidence, however, that relational governance and detailed contracts reinforce each other rather than operate at cross-purposes. A few empirical studies suggest that the contract design process, if focused sufficiently on establishing communication protocols and outlined the roles and responsibilities of the parties, can actually enhance trust rather than detract from it. They suggest that contracts may be necessary before trust has developed, and that over time, they are used increasingly as a framework for managing the exchange, as concerns for safeguarding assets diminishes somewhat. The issue is by no means settled, however. More research is needed into when relational governance and contracting are substitutes for each other, and when they are complementary.

**Tournaments**

The third approach I will discuss for contracting for innovation is what I will label “tournaments”. By “tournaments” I have in mind arrangements in which a buyer of innovative products or services ensures supplier performance not so much by detailed contracts or relational governance, but by structuring competition between suppliers over time. This approach is used when the buyer requires a flow of innovative products or services from a supplier over time: where the transaction involves more than one-time delivery.

In this approach, the buyer relies heavily on the promise of future business to motivate the supplier to innovate. The approach is often used in conjunction with contracts and/or relational contracting, but the heavy lifting is done by the “tournament” structure of the arrangements. With tournaments, contracts can be less detailed than otherwise, and trust need not run as deep.

Tournaments typically involve the buyer establishing a hierarchy of suppliers, in which the higher tiers enjoy more profitable contracts from the buyer, and/or stronger guarantees of future business, and the lower tiers featuring lower-profit contracts and no guarantees of future business. Suppliers starting at lower tiers have the opportunity to move to higher tiers should they innovate in ways that the buyer deems valuable. Those that fail move down the hierarchy, or out completely.

To make this kind of system work, the buyer must invest heavily in systems for monitoring supplier performance. The buyer must usually invest not only in inspecting and measuring supplier outputs, but in inspecting and supplier processes. Only with careful measurement can the buyer reliably compare the performances of different supplier for purposes of placement in the supplier hierarchy. The buyer may also invest in helping suppliers meet the buyers requirements for innovation by sharing technology, management knowhow, and the like. Susan Helper, John Paul MacDuffie, Charles Sabel, Ronald Gilson and others have studied such tournament-like arrangements in the Japanese auto and electronics industries, where firms such as Honda and Toyota (until recently) had success (Helper, MacDuffie & Sabel 2000; Gilson, Sabel & Scott 2009).
An interesting aspect of tournaments arrangements is that suppliers are usually more dependent on the buyer than vice versa. While the buyer may make some investments in supplier monitoring and education that cannot be reused for other suppliers, these investments are usually a far smaller fraction of the buyer's total investments than the proportion of the supplier’s total investments that are totally dedicated to meeting the buyer’s specific requirements. Suppliers at various tiers in a tournament often sell a very high proportion of their output to the buyer. The question is, why would a supplier be willing to enter a relationship of great dependency, when the buyer is not nearly as dependent?

One reason might be that supplier that already make sunk investments that cannot be re-used in other industries, and the buyer is one of the “only games in town” in that industry. In this case, the buyer has what economists call “monopsony power”: i.e., bargaining power that allows the buyer to set many of terms under which it deals with suppliers. Because suppliers have few good alternatives, they accept the tournament system and try to make the best of it. The buyer ensures just enough profit for the supplier to remain in the hierarchy (if it meets minimum standards for innovation), but no more.

A second reason why suppliers may be willing to become dependent on the buyer is that a culture of community solidarity and conformism in business, and in society more broadly, provides assurance that the buyer will not take advantage of the supplier. Japanese society is thought to have these kinds of characteristics, for example.

These two conditions, however, -- monopsony power and societal-level trust – suggest that tournament models for contracting for innovation may be limited in the breadth of their applicability. Significant monopsony power is present in only a fraction of industries, and where it is present, suppliers face strong incentives to redirect future investments towards other buyers in other industries or industry segments. Similarly, while high levels of trust may prevail in Japanese society, they are not present in many other societies in the same way. Thus, while tournament arrangements may be well-suited for certain specific industry settings, they are not likely to provide a general model for contracting for innovation.

Putting the Framework into Practice

The three-approach framework I outlined in this chapter contains a number of implications for managers. First, it suggests that because contracting for innovation is a hazardous exercise, it requires investment in contract design capabilities within the firm. These capabilities should reside in teams of managers, engineers and inhouse attorneys. Second, it suggests that while relational governance may be a useful complement to contracts enforcing contracts for innovation, it is unlikely to be a good substitute. Finally, tournaments among supplier are an attractive way to achieve efficient contracting for innovation, but to work well they may require special conditions that are not present in most industries.

Conclusion
Contracting for innovation is fraught with hazards. Yet it is a competitive imperative in many industries. Indeed, as the sources of innovation continue to proliferate worldwide, a firm’s competitive advantage will increasingly come to rest on its ability to mitigate these hazards. In this chapter, I discussed three approaches to hazard mitigation: contract design, relational contracting and tournaments. I suggested that contract design is perhaps the most generally-applicable approach, and for that reason deserves special attention from managers. However, in some particular settings, relational contracting or tournaments may be important mechanisms as well. Still, developing a better understanding about how each of these mechanisms work, and when they effectively substitute and/or complement each other, is critical for academics and practitioners alike.

Further Reading


