COMMERCIALIZING INTELLECTUAL PROPERTY ASSETS: EFFICIENT BOUNDARIES AND STRATEGIC NETWORKS

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ABSTRACT

Innovations based upon intellectual property rights flowing from tacit knowledge are important for a variety of industries (e.g., software development). Choice of vehicles for their commercialization is not well understood. Aspects of a theory that would predict when a network would be used to commercialize such innovations are discussed.

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One of the theories generated by transaction cost economics (TCE) is the theory of efficient boundaries (Ouchi, 1980a; Williamson, 1981). Under the transaction cost doctrine, the boundaries of the firm are determined at each production stage by selecting the most efficient manner of conducting the transaction, generally either internally (a "make" decision) or externally (a "buy" decision). TCE identifies a set of dimensions for describing transactions that can offer some explanatory power regarding the make-or-buy decision.

This paper examines the theory of efficient boundaries, but against an unusual background. Much of the empirical work that has been attempted in the area of TCE has focused predominantly on manufacturing organizations (Masten, Meehan & Snyder, 1989; Monteverde & Teece, 1982; Palmer, Friedland, Jennings & Powers, 1987; Pisano, 1990; Teece, 1981; Walker & Poppo, 1991). This paper will instead examine TCE in a less structured environment, the software development and publishing industry. This industry involves some unusual transaction-specific assets, intellectual property in the form of software programs, and thus presents important challenges for TCE.

In another departure from previous work in this area, this paper will attempt a more fine-grained examination of the "buy" decision, widening the scope to include not only true acquisitions but also the formation of complex contractual relationships. These relationships extend the theory of efficient boundaries to include strategic networks. Additional literatures such as the work on economic property rights and agency theory will also be drawn upon.

COMMERCIALIZING INTELLECTUAL PROPERTY

The commercialization of intellectual property rights is relatively straightforward conceptually. The theoretical question being examined in this research is depicted in Figure 1, with the mechanism remaining an open question. An individual or organization (hereafter referred to as the

"creator") possesses tacit knowledge that it uses to create an asset or property right. Tacit knowledge is knowledge that is embedded in an individual, knowledge that is difficult to communicate to others (Polanyi, 1962). In most cases the asset produced takes the form of an intellectual property right, usually a copyright or patent. More tangible assets are also possible, so long as the tacit knowledge makes a fundamental contribution to asset creation. Intellectual property rights assets are unique in that they cannot be consumed or used up (Liebowitz, 1987). They are capable of multiple (even simultaneous) uses, and can, like money, "be both inputs to and outputs from the business process" (Hall, 1989). The problem facing the creator of such an asset is how to convert the asset into a marketable product and deliver it to a market or markets—in other words, how to "commercialize" the asset.

Insert Figure 1 about here.

Examples of the such situations include book, music, and software publishing. Each of these industries involves individuals and organizations that create intellectual property assets (books, songs, and programs) and are then faced with the problem of delivering their creations to markets. Other products that may face this problem or a similar problem include movies, television shows, plays, audio recordings, and perhaps others exist as well.

As marketable products, these items have certain common characteristics. High upfront fixed costs are generally incurred in preparing the products for market, such as editing, printing setup, and advertising for books. Once the products are launched, however, production incurs relatively negligible variable costs, such as printing additional copies of a book or pressing additional records. The products often face an uncertain demand in the targeted market. The products are typically the result of an indeterminate development process that is non-routine and hard to replicate. The products tend to be unique although they may share physical similarities (e.g., books' content versus outward appearance). In some cases, the products are revolutionary.

Thus, products that flow from intellectual property rights based on tacit knowledge are different from those with more identifiable cost or demand curves.

EFFICIENT BOUNDARIES

We can apply the theory of efficient boundaries to the problem of commercializing intellectual property assets described above. One solution is for the creator to handle commercialization. This would correspond to vertical integration or a "make" decision in the TCE framework. This solution gives the creator complete control over all aspects of the conversion and marketing processes while maintaining undisputed ownership of the asset and protecting any trade secrets embedded in the tacit knowledge. This requires the creator to have or acquire the requisite resources and skills necessary to perform these additional tasks. Vertical integration may be beyond the capacity of some creators, especially individuals and small organizations, or in cases where parts of the commercialization process have high fixed costs (e.g., compact disc pressing plants). It may be undesirable for others, who believe that the process of commercialization could hinder future attempts at asset creation (i.e., they want to remain "pure" and apart from the business aspects and concentrate on the creative process). Teece (1986) points out that "successful commercialization of an innovation requires that the know-how in question be utilized in conjunction with other capabilities or assets" and he goes on to cite marketing and support activities specifically. Hart & Moore (1990) state that "assets that are highly complementary should be owned together," which also argues for vertical integration.

Another solution to the problem is for the creator to sell or lease the asset to another entity in a simple market transaction, and allow that entity (the "adaptor") to perform the conversion to a marketable product and deliver it to market. This would correspond to a "buy" decision (the creator would "buy" marketing). This solution entails the creator giving up control over the commercialization process, as well as the proprietary knowledge embedded in the asset. If the adaptor has multiple creator clients, it can enjoy economies of scale and scope, and this can lead to higher profits for both parties. This solution may be attractive to the creator who wants to

remain wholly divorced from the commercialization process. Again, this may be the best solution to the problems brought up by Teece (1986) and Hart & Moore (1990). From the adaptor's perspective, this could solve the problem of larger firms being at a comparative disadvantage when it comes to innovation, because of the costs of managing a homogeneous set of tasks (Holmstrom, 1989). The major problem with this solution is determining a transaction price that is acceptable to both parties.

These two solutions are the only offerings of most TCE theorists, but a third solution, generally not discussed in TCE theory, has evolved in practice. In several industries a more complex interaction occurs to solve the transformation problem. In these industries, the creator leases the asset to an adaptor, retaining ownership and some degree of control over the use of the asset. This relationship is set up through a contract that is sometimes brokered for the creator by an agent experienced in handling these transactions. This creates a situation in which the adaptor uses partial rights to the asset as part of its factors of production, yet the creator retains asset ownership and can exercise some control over the process of converting its asset into a marketable product, and participates in the commercialization process. This participation by the creator is one factor that distinguishes this solution from the market transaction model. We can refer to this coalition of creator, adaptor, and agent as a network (or hybrid, following Williamson (1991)). The network is what resides in the center of the theoretical model, as shown in Figure 2[1].

Insert Figure 2 about here.

Some might say that this model is simply a refinement or elaboration of the "buy" decision. However, the network, as described, can go beyond a single transaction. Creators often create more than one asset from their tacit knowledge, and adaptors and agents participate in many such transactions that are related to other transactions. Even transactions that seem discrete can have implications for other seemingly unrelated transactions. The recurrence or potential for recurrence of transactions is a second factor that causes these relationships to be a network rather

than a series of market transactions. From a property rights perspective, Alchian & Demsetz (1972) explore the idea of team production, which is similar to the relationship posited here between the creator and adaptor. Grossman & Hart (1986) define ownership as "the power to exercise control," arguing that there is no real distinction between ownership and control. In the situation as described, however, both parties retain some control over the intellectual property asset. This also distinguishes the described solution from a simple market transaction model.

NETWORKS

Because of its broad application and use in several disciplines, there can be some confusion about the term "network." The philosopher Charles Sanders Peirce stated that "*no* concept, not even those of mathematics, is absolutely precise [because] … no man's interpretation of words is based on exactly the same experience as any other man's" (Gallie, 1966). This imprecision problem can be compounded by scientists' tendency to "borrow" paradigms from other disciplines, sometimes subtly altering definitions to adapt concepts into existing structures. In so doing, others can become confused into believing they understand a concept based on their prior knowledge when in fact familiar words are being used in unfamiliar contexts. The dictionary definition of "an interconnected or interrelated chain, group, or system" (Merriam-Webster, 1989) leaves much leeway for the term to be applied in different manners in different disciplines. Such an often-used word brings along connotations from other contexts, potentially reducing precision. For example, many lay people and most journalists might assume "network" to mean a broadcast communications network, such as ABC or CBS. Computer scientists might assume "network" to mean a data communications network, such as a Local Area Network (LAN). Social scientists might associate "network" with social communication networks. Each interpretation is valid in context, and each group would accept the others' primary definitions of network as secondary definitions.

There is, however, a commonality among the three perspectives. In each, communication is an integral part of a network's functions. The transfer of information is a key aspect of all three types of networks, and the network in each case is primarily a medium for information transfer. The broadcast communications networks exist for information transfer, primarily the delivery of advertising materials to target audiences. Data networks, too, are dedicated to information transfer. Data networks can also be viewed as a vehicle for social communication networks (machines don't talk to machines; rather, people talk to people with machine intermediaries). Social communications networks, however, can have other functions besides pure information transfer, and merit further discussion.

Social communication network research is an outgrowth of communications research. It builds partly on the linear communication models of Shannon and Weaver (1949) and Berlo (1960), which are classic models of communications, but it is based also on the newer convergence models of Schramm (1973) and Kincaid (1979). Rogers and Kincaid (1981) and Burt (1983) have developed network analysis techniques that can help elucidate the communications flows in social communication networks, such as in diffusion of innovation studies. Social communication research has been well accepted, and questions involving social networks have been included in the General Social Survey, as described in Burt (1984). Social network theory has also been applied to the study of organizations and managers (Carroll & Teo, 1991).

Strategic management and organization theory researchers have started to investigate a fourth kind of network, a network of firms. Strategy researchers propose networking as a strategy, something that organizations do to give them a competitive advantage (Dimancescu & Botkin, 1987; Doz, Hamel & Prahalad, 1986; Jarillo, 1988; Kaneko & Imai, 1987; Pennings, 1981; Perlmutter & Heenan, 1986). Some organizational theorists view such a strategic network as an organization itself (Miles & Snow, 1986; Powell, 1987). Resolution of the question of whether networks are an organizational form is beyond the scope of this paper, nor is it necessary since the arguments here would not be substantially altered either way.

STRATEGIC NETWORKS

Neoclassical economists focus on profit-maximizing firms competing in perfect markets. Williamson (1975; 1981), building on the earlier work of Commons (1934) and Coase (1937), developed a detailed theory based on transaction costs that added the assumptions of bounded rationality (Simon, 1976) and opportunism, and focused on asset specificity. Williamson's transaction cost approach offered an explanation for why some transactions take place in a market and others inside a firm (hierarchy). But the transaction cost concept also creates an interstice between markets and hierarchies. Firms attempting to reduce transaction costs can create alliances between firms but stop short of merger into a single hierarchy.

This interstice between markets and hierarchies has the potential to be a vast chasm, which is perhaps why Williamson chose not to address it directly in his original formulations. Laumann, Galaskiewicz, and Marsden (1978), though, proposed networks as forms of interorganizational linkages, and described both competitive and cooperative modes of networking. Williamson did offer a classification of such networks as autonomous, cooperative, and strategic (Williamson, 1981), although he did not integrate the network concept into his transaction cost model. Recently, Williamson (1991) extended his transaction cost theories to include hybrid organizations between markets and hierarchies, capturing much of the network concept as it is being used in this paper, although his analysis focuses almost exclusively on asset specificity.

Strategic management researchers have also examined the concept of networks, although with slightly different perspectives. Thorelli (1986) focused on power and politics, adapting some concepts from political science to sketch out a high-level outline of a network theory. He addressed positioning (from a power perspective), linking, and some network dynamics, including entry and exit. Jarillo (1988) followed up some of Thorelli's ideas, including the concept of trust as an important element of a network (countering Williamson's (1975) opportunism) that allows strategic networks to form and sustain itself, and suggested networks as "the method entrepreneurs use to get access to external resources." Jarillo and Ricart (1987) focused on

cooperation between network members, using game theory to explain cooperation, although echoing some of the sentiments earlier expressed by Astley (1984) on cooperative strategies. Johanson and Mattsson (1987) took a different approach, viewing the network approach as an alternative to the transaction cost model. They also used trust as a replacement for opportunism, although much of the rest of the transaction cost model can also be applied, making their network approach more of a complement to than a replacement for the transaction cost model. Borys and Jemison (1989) examined hybrid organizational arrangements and proposed a theory of hybrids (note that Williamson (1991) also chose to look at "hybrids" rather than networks) based on purpose, boundary definition, and value creation.

Organizational theorists also have made contributions in this area, although from another perspective. Networks can be looked at as organizations with shifting boundaries (Ouchi, 1980b). Miles and Snow (1986) propose the network as a new organizational form, although others have proposed that it may only be a transitional form (Powell, 1987). Economists have also considered this point of view. Cheung (1983) proposes that a firm that subcontracts major parts of a job is equivalent to a firm that uses only its own employees, which is essentially the same argument that Miles and Snow (1986) make.

For the purposes of this paper, a network can be defined as a group of organizations and/or individuals who have formed associations, either explicit (contract) or implicit (practice and/or informal agreement), in order to perform a task or set of tasks. In the theoretical model under discussion, the set of tasks involve the commercialization of the intellectual property right. While some consider networks to be an organizational form, we will treat them as a strategy, with strategic networks falling "between markets and hierarchies" (Thorelli, 1986).

PROPOSITIONS

A central issue that emerges from these arguments is the value of a theory that will predict the use of a network to commercialize an innovation that is based upon an intellectual property right flowing from tacit knowledge. In particular, a theory that would predict when a creator would be inclined to use a network rather than develop an innovation internally would be an important step in further understanding the strategic significance and consequences of the network form as we have discussed it.

To further this theoretical development, we present a series of propositions that are linked to key variables that are theoretically salient to the formation of networks: timing and asset specificity, relative size, institutionalization, and network success.

Timing and Asset Specificity

Williamson describes asset specificity as "both the most important dimension and the most neglected attribute in prior studies of organization" (1981). The problem addressed here centers on one asset, the intellectual property right, based on an unusual attribute, tacit knowledge. In most of the discussions of asset specificity, human asset specificity is viewed in terms of skill acquisition or learning by doing; in other words, humans are viewed as a means of production. But in this model, human assets are not only the means of production but the source of the raw materials as well. This implies a large amount of human asset specificity vis-a-vis the creation process, which gives the creator great power. But after the tacit knowledge is transformed into a tangible property right which can be brought to market, as in the books, software, and music examples, the asset is no longer specific to the particular transaction. Fully-formed intellectual property rights that are ready to market would therefore have low asset specificity, which would indicate a market transaction. Property rights that require significant additional resources to make them marketable would have a high level of asset specificity, and transaction cost theory would favor a hierarchy.

Proposition 1: The earlier in the development process the product was acquired, the less likely the product was cleanly acquired (a pure market transaction) and the more likely a network relationship was established.

Adaptor/Creator Preference

Most theoretical and empirical work on efficient boundaries concentrates on single focal organizations, and the boundaries of that focal organization (Perrow, 1977). But when examining efficient boundaries, there is the question of efficient for whom? When viewed from the point of view of a focal organization, the decision is essentially seen as unilateral, and if the other party doesn't agree the focal organization finds another trading partner. In this study, we are examining unique assets, and the option to find another trading partner rarely exists. Consequently we have to consider both sides of the efficient boundary decision, and consider the possibility that the goals and preferences of the two organizations may conflict. We posit that creators are loathe to give up control over their asset unless there is no alternative.

Proposition 2: Organizations that act as the adaptors of the product are more likely to favor a clean acquisition, while organizations that act as the creators of the product are more likely to favor a network relationship.

Size

Because size has been argued to have potentially opposite effects on the make-or-buy decision, the actual effect on the decision to network may depend on which side of the transaction is being examined, creator or adaptor. Extending the argument leading to Proposition 2, we could

argue that creators with more resources (larger in size) will have increased power to determine the nature of the transaction, and since they will tend toward networks, size will lead to a greater likelihood of a network relationship. Adaptors, on the other hand, will prefer pure acquisitions, and if they are the more powerful party (again measured by size), the transaction will tend to be a clean acquisition.

Proposition 3a: For creators, size will be positively associated with the probability of forming a network relationship.

Proposition 3b: For adaptors, size will be negatively associated with the probability of forming a network relationship.

Institutionalization

Institutional theory and the theory of legitimation might predict that in the early days of the software industry, the probability of organizations forming long-term relationships was low, but that after more and more companies adopt the network strategy it will become legitimized and institutionalized and other organizations will be more likely to adopt the network strategy through mimetic processes. Since the software industry is relatively young, this can possibly be captured by examining the age of the product in question. More recent products would be more likely to be involved in network relationships.

Proposition 4a: The age of the product will be negatively associated with the probability of the formation of network relationships.

One of the characteristics of the commercialization process discussed is its high uncertainty. Institutionalizing (or routinizing) the process should reduce uncertainty. Since the adaptor (as well as the agent) is more likely to participate in more networks than the creator, any advantage to be accrued from routinization would likely accrue to the adaptor. Any routinization

of the process makes the network behave more like a hierarchy, and since we have stated that parts of the transaction cost profile favor a hierarchy, this should be an advantage. The creator can indirectly benefit since some of the advantages of the adaptor would flow through to the network. However, the routinization of establishing networks would benefit only the adaptor, since creators participate in fewer networks.

> *Proposition 4b: The higher the percentage of products participating in networks, the more likely additional products will be acquired (or "sold") via networks.*

Network Success

When the unit of analysis is an individual economic actor, success can be measured by financial returns. Each actor is examined individually, so success is a monolithic concept and is independent between actors. In a network, however, success is harder to determine. Not all gains can be measured in financial terms, and gains for one member of a network at the expense of another may not be considered successes for the network (and may lead to failure of the network if the behavior continues).

In the model of the problem we are considering, success is determined by transformation of the tacit knowledge into a tangible property right and by its delivery to market. It is possible for the creator to have a success (the property right is created) yet for the network to fail (the product doesn't get to market) since there are often up-front fees paid by the adaptor. On the other hand, it is usually difficult for the adaptor to succeed yet have the network fail, since there is often some sort of royalty arrangement (only in cases where the creator agreed to a percentage of the net could this happen—cf. the Hollywood studios and all the big movies that "lost" money). In most cases the deal should be structured so that for one party to win big, all parties have to win big. This is the essence of the network agreement, and both dampens opportunism and encourages trust. When success for the network means success for all parties, opportunistic behavior may be counterproductive, since cooperation has larger payoffs.

Proposition 5: Royalties will not vary greatly from product to product, either within organizations or within networks.

Experience

While the above propositions are congruent with TCE, there is the separate issue of experience. Whether viewed as deeply ingrained repertoires (Simon, 1976), search rules (Cyert & March, 1963), operating procedures (Allison, 1971), or routines (Nelson & Winter, 1982), historical patterns of organizational behavior tend to be repeated (Pisano, 1990).

Proposition 6: Organizations already involved in networks will be more likely to form networks.

IMPLICATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Earlier research on strategic networks has suffered from a dearth of empirical work. This lack of empiricism is understandable considering the complexity of the issues involved and the difficulty of achieving a sufficient sample size when the unit of analysis is the network. The model and propositions presented in this paper lend themselves to the possibility of empirical follow-up. In the example industries, many creators, adaptors, and agents all participate in multiple networks, creating a pool of networks potentially large enough for sound sampling.

This paper has identified some research questions of interest. Empirical work in this area could determine whether the model depicted in Figure 2 is valid. Additional questions that could be addressed, in addition to those specified in this paper, include:

- How do creators select adaptors?
- How do adaptors seek out creators?

• How important is the role of the agent?

• Is network stability related to network success?

• Is opportunism or trust predominant in a network? Or is it both? Do mechanisms exist to temper either or both?

• Does the network facilitate risk-spreading? Is the form of the relationship related to risk propensity among the actors?

While empirical work holds promise, opportunities exist for additional theory development as well. Early empirical efforts could involve as much or more theory building than they do theory testing.

FOOTNOTES

[1] There is a form of hybrid organization, the joint venture, which is often jointly considered with networks. This model does not directly apply to joint ventures, which are sometimes formed specifically because the tacit knowledge required is in two firms or individuals, or in order to share ownership of the asset to be created (cf. the Apple/IBM joint venture). A special-case model for joint ventures would look something like this:

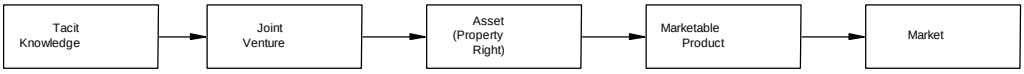

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FIGURE 1

THEORETICAL MODEL

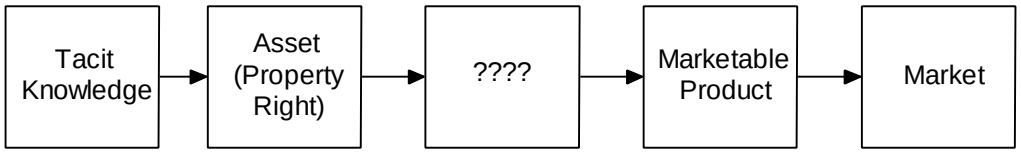

FIGURE 2

THEORETICAL NETWORK MODEL