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Organizational Strategies for Intellectual Property Rights in Technology Standardization

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ABSTRACT

The value of intellectual proprietary rights (IPRs) for technology standardization in emerging information and communications technologies has increased. The inherently closed nature of IPR seems to be in direct conflict with the openness necessary to spread a technology, but organizations are creating strategies to maneuver aspects of IPR so that they can create standards as well as protect their rights. This paper provides a brief overview of literature on strategies organizations have taken for standardization, especially in the decision to collaborate or go alone, and the role of IPR in these decisions. I propose a research question and plan to address a gap in current research to analyze IPR strategies not solely in relation to collaboration and to take into account factors such as market position, competing technologies, and product life cycle.

Keywords

Technology standard, standardization, intellectual property rights (IPR), strategy

INTRODUCTION

In the modern business environment, forces such as transformations in customer tastes, evolution of technologies, and changes in regulations are making the life cycles of products and services shorter and their markets more competitive (D'Aveni, 1994; Ilinitich, D'Aveni, and Lewin, 1996). To compete in this environment, organizations must act quickly and strategically to develop and implement the technologies for their products and services. Therefore, the ability to control or influence technology standards is becoming a critical part of organizations' product and business strategy.

Starting in the mid-1980s, organizations began to realize the strategic power of intellectual proprietary rights (IPR) in emerging information and telecommunications technologies (Kortum and Lerner, 1999). The inherently closed nature of IPR seems to be in direct conflict with the openness necessary to spread a technology and turn it into a standard, but organizations are creating strategies to maneuver aspects of IPR so that they can create standards as well as protect their rights.

This paper provides a brief overview of literature on strategies organizations have taken for standardization, especially in the decision to collaborate or go alone, and the role of IPR in these decisions. I propose a research question and plan to address a gap in current research to analyze IPR strategies not solely in relation to collaboration and to take into account factors such as market position, competing technologies, and product life cycle.

A definition of standards

A general definition of standards has been offered by many researchers. One often cited by later studies is suggested by Tassej (2000): "a set of specifications to which all elements of products, processes, formats or procedures under its jurisdiction must conform."

Tassej (2000) lays out a taxonomy of the functions of standards. First, standards can play a role in *quality or reliability*, measuring product or service performance. Second, standards can play an *information* function to evaluate technical and engineering information, such as standardized measurements used in semiconductor facilities. Third, standards for *compatibility or interoperability* functions provide technology specifications to make products work with complementary products or systems. Most studies of technology standards and standardization from an economic perspective have concentrated on the compatibility or interoperability function of standards (e.g. Bekkers, 2001; Chiesa and Toletti, 2003). This has been especially important for information and telecommunication technology products, which require an enormous

level of compatibility or interoperability within and between products and services (Shapiro et al., 2001; van Wegberg, 2004). The fourth function is that of *reducing variety* in characteristics of a product such as size in order to reach economies of scale.

Standards can also be classified by the form they take. Tassef (2000) distinguishes between product-element and non-product categories. *Product-element standards* are those that apply to one or more attributes of a product, and thus contribute to the competitiveness of the product. *Non-product standards*, on the other hand, “derive from a different technical base than that upon which the attributes of the product itself depend.” These two types of standards play different roles in the economy; the first can bring competitive advantage to the manufacturer of that technology, while the second generally does not.

This paper will follow other studies in focusing on product-element standards used for the function of compatibility or interoperability because of their visible role in economic competition. For the rest of this paper, I will use the term “standards” to refer to those used in technology products with the following definition drawn from literature (e.g. Tassef, 2000) and van Wegberg, 2004):

Technology product standard – a strictly predefined format to provide compatibility, interchangeability, and interoperability of a technology that is one of the key attributes or elements of a product

THE STANDARDIZATION PROCESS

In all standardization processes, researchers agree that certain economic factors must exist; specifically, economies of scale must be achieved at some point, leading to reduction of costs due to greater usage (Chandler, 1990; McGee and Sammut Bonnici, 2002; Sammut Bonnici and McGee, 2002). To gain economies of scale, a technology needs to reach a certain level of *installed base*, which refers to the number of installations of the technology and the number of users (Schilling, 2002). The installed base is often supported by complementary products.

Various technological aspects of the standard itself can contribute to or detract from gaining the necessary installed base. Katz and Shapiro (1994) introduce two types of compatibilities: *horizontal compatibility*, between two competing systems, and *vertical compatibility*, between successive generations of a similar system. Horizontal compatibility can instigate *externality*, because firms are less reluctant to produce complementary products when competing systems are compatible with each other. Externality is the impact of one’s participation on others without compensation (David and Steinmueller, 1994; Katz and Shapiro 1985; Liebowitz and Margolis, 1994). For example, as a network grows, the more useful it is to its users. A *bandwagon effect* can then occur, where many organizations adopt a standard in a rapid and cumulative way (Frohlich and Westbrook, 2002; Lee and Chan, 2003; Tsiriktsis, Lanzolla, and Frohlich, 2004). Vertical compatibility has a lock-in effect because of *path dependence*, which refers to whether the decision to pursue a standard is dependent on earlier decisions (Arthur, 1996; David, 1985, 1997; Liebowitz and Margolis, 1990).

These factors are often mutually reinforcing. Farrell and Saloner (1986) introduce the concept of installed base effects in their technological competition model, which leads to lock-in effects and path dependence. Katz and Shapiro (1985) illustrate how network externalities influence compatible standards-setting. Other studies introduce additional factors, such as organizational learning orientation and timing of market entry (Shilling, 2002).

These factors can happen deliberately, whether mandated by government or driven by one or more organizations, or they can occur through non-deliberate market forces. David and Greenstein (1990) survey the work of economists studying compatibility standards and standards-setting processes in the 1970s and 1980s, and suggest a typology of four different kinds of standardization processes: (1) *un-sponsored* standards – those that become standards without an identified originator or sponsoring agency with a proprietary interest, (2) *sponsored* standards – those that are sponsored by one or more entities having a direct or indirect proprietary interest, (3) standards agreements within *voluntary standards-writing organizations* and, (4) *mandated* standards by government agencies. The second and third categories – sponsored standards and voluntary standards-writing organizations – are those most discussed in the research on standardization since they involve organizational strategy. While an organization can lobby the government to mandate its technology as a standard, the first and fourth categories are less relevant to understanding organizational competition for standards.

Other studies explore further subdivisions and hybrids of sponsored and voluntary organization processes (e.g. Chiesa and Toletti, 2003; Shapiro et al., 2001). One major subdivision is in the sponsored standard category between stand-alone standards, promulgated by a single organization, or collaborations. Chiesa and Toletti (2003) point out the difficulties faced by a single firm in standardizing its technologies, and introduce three types of collaborations that organizations may seek instead. The first is a *developing collaboration*, when two or more firms develop a technology and pursue its standardization together, sharing costs for development and intellectual proprietary rights. A *sponsoring collaboration* is when a technology has already been developed, and organizations work together to increase the installed base and make it into the standard.

Standard development organization refers to collaboration that comprises the majority of organizations in an industry that have voluntarily come together to agree on a standard. Chiesa and Toletti (2003) point out that even in this case, some organizations may have an interest in not agreeing on a standard and will deliberately delay the process. For each type of collaboration, the researchers discuss the motivations leading organizations to choose it, and the critical factors leading to success of the establishment of a standard.

Besen and Farrell (1994) offer a typology of organizational strategy, analyzing organizations' decision to pursue a standard alone or with others based on their market and technology position. First, when organizations have similarly dominant market and technology positions, they may choose to insist on their own, mutually incompatible technologies, which leads to inter-technology competition. Sometimes, in order to increase their market position, they will form coalitions with other organizations to pursue their standard. Second, even when two organizations have similar market and technology positions, they may recognize some benefit to compatibility and settle on one standard, which might be the technology of one of the organizations, a technology created by the government or a third party, or a compatible interface. Third, when there are one dominant and many minor players, a dominant player will often instigate inter-technology competition by declaring intellectual property rights or altering technologies frequently, while minor players try to make their products at least partially compatible. The authors draw on game theory to explain how organizations weigh the payoffs between collaboration and sole sponsorship of a standard in each case.

Other studies follow Besen and Farrell's approach in focusing on organizational strategies in a competitive market, looking at competition and cooperation between organizations (Oshri and Weeber, 2006). van Wegberg (2004) discusses hybrid standardization processes where organizations will both compete and cooperate in standard-setting, for example, by sponsoring competing technologies as they jointly develop a compromise, and asserts that hybrid processes can combine the advantages of both market selection and negotiated decision-making. He provides a framework for identifying the factors underlying the decision to go it alone, collaborate, or some hybrid of both, and argues that the main consideration is the degree of modularity in the system technology involved.

INTELLECTUAL PROPERTY RIGHTS (IPR) AND STANDARDIZATION

The decision to collaborate becomes particularly tricky when the situation involves intellectual property rights (IPR). Intellectual property rights include patents, copyrights, design rights, trademarks, and trade secrets (Bekkers, 2001). IPR is generally thought to provide incentive for innovation, thus leading to economic growth and increased investment (Field, 2006). From an organization's perspective, IPR provides monopoly power of a product or technology, protects distribution of the product, increases the organization's value, and creates a better bargaining position (Blind and Thumm, 2004; Cohen, Goto, Nagata, Nelson, and Walsh, 2002; Rivette and Kline, 2000). In the patenting process, many organizations choose to trade off the disadvantage of eventual disclosure of the details of their technology with the guarantee of monopoly for even a limited time (Scherer and Ross, 1990).

The desire to protect IPR often seems to be in direct conflict with the goal of standardization (Carlsson and Stankiewicz, 1999; Grindley, 1995; Lea and Hall, 2004). Examining case studies, Grindley (1995) argues that the objectives of an organizational strategy for standardization are to develop a common and broadly accepted standard, to maximize revenues, and to compete effectively once standards are set. To maximize revenues, an organization should charge high license fees, yet in order to make its technology widely accepted, it should charge low license fees.

Organizations with IPR must make some hard decisions about the tradeoffs involved in working with others. Lemley (2002) finds that standard-setting organizations actually have diverse policies regarding IPRs of members, ranging from giving up IPRs entirely to the group, to keeping them wholly in the individual organization's control. Lea and Hall (2004) examine the factors affecting an IPR holder's decision to join a group, starting from the assumption that three factors affect any organization's decision to join a group for promulgating a standard: "(1) technological capacity and capability, (2) potential availability of network externalities, and (3) expected ability to appropriate rewards from a standard if successfully set." They find that the greater the reward expected by an IPR-holding organization, the less likely it is to join a standard-setting organization or otherwise compromise its IPR. However, they find that going it alone can make an organization vulnerable to anti-trust action from competitors or the government. Blind and Thumm (2004) look specifically at patents as a factor affecting the decision to join collaborations or not. Their findings confirm those of Lea and Hall; they find that the more patents held by an organization, the less likely it is to join a standard-setting organization. IPR and the competitive advantage accrued are more important to organizations than seeking externality effects.

RESEARCH QUESTION AND PLAN

What's not so clear from currently existing literature is how organizations manipulate properties of IPR itself to make their technology into standards. What are organizations' strategic decisions about IPR in the pursuit of standardization? The decision to collaborate with others might be one result of a strategy to manipulate IPR, but the strategy could also lead to other results such as lower licensing fees and incentives for manufacturers of complementary products.

It also seems likely that organizations in different situations might choose different IPR strategies for standardization. For example, Besen and Farrell (1994) base their analysis on factors of market and technology position, which seem to play a role here: a dominant player might choose not to open its technology as much as a minor player; if there are competing technologies, all competing organizations might make more concessions in order to increase their installed base. Shilling (2002) and van Wegberg (2004) discuss the factor of timing of market entry, which also seems important here: a new entrant in the industry might choose to forego royalties for a period of time, while an incumbent player might not. Organizations seem to take different strategies in different situations based on market positions, competitive technologies, and product life cycle stage.

My research project is to identify organizational strategies manipulating IPR in standardization, and categorize them according to factors such as market position, competing technology, and product life cycle stage. The proposed methodology for this research is case study research. Benbasat, Goldstein, and Mead (1987) define a case study as follows, drawing from Bonoma (1985), Eisenhardt (1989), Lee (1989), Stone (1978), and Yin (1994),

A case study examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organizations).

Data for case studies will be collected through primary sources such as interviews and secondary sources such as litigation records, company announcements, and newspaper articles. Litigation records related to IPR and anti-trust lawsuits are one of the most important and interesting sources; these rich data have been used by researchers from the legal field, but they also reveal important aspects of organizational strategies and actions for IPR. Case studies will focus on the memory chip industry, a significant sector of the larger information and telecommunications field.

CONCLUSION

Because of the seeming contradiction between the goals of IPR and standardization, this research can spotlight organizational strategy and decision-making processes. My hope is that this research will contribute to broadening the growing body of work on standards and standardization as well as organizational strategy.

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