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Establishing Standards

Improving your Chances in a Competitive Market

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Faculty Comments

(To be filled in by Prof. Afuah)

- Excellent treatment of a difficult topic - standards
- With the growing importance of the internet, there is a need for firms to understand how they might go about capturing the standard for their product. This paper provides some guidelines ~~for~~ for this precursor to profits.
- The paper could have given some examples from the internet.
- Great job, researching and reporting the ~~research~~ results of research.

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INTRODUCTION

In industries where technological standards are important (i.e. computer hardware and software, telecommunications, consumer electronics, etc.), successful companies are those which have the ability to establish a technology that they have sponsored as the dominant technology. Classic examples of companies that have won standards battles are Microsoft and Intel with their ownership of the Windows standard. Similarly, Matsushita won a standards battle when its VHS videocassette recorder emerged as the dominant design over Sony's Betamax format. As is evident from these examples, the ability of a firm to establish its technology as a standard is a critical determinant of its long-term success.

Most strategists agree that the main characteristic of standards is that the larger the network of users adopting a standard, the more valuable belonging to the standard usually becomes. A standard which builds up an installed base ahead of its competitors usually becomes more attractive, making the choice of standards 'path dependent', and highly influenced by a small advantage gained in the early stages.¹

WHAT ARE STANDARDS?

Standards define any common set of product features. Standards can range from a loose set of product characteristics to precise specifications for technical interfaces. Standards can be classified in two main forms - *quality standards* and *compatibility standards*. Quality standards are concerned with the features of the product itself, and can also be called a product standard. They are often incorporated in legal standards or industry codes and are often designed to protect consumers and help the market function. The PC and its components is an example of a product standard which dominates the computer industry.

A compatibility standard deals with the ability of a product to link with other products and services. Compatibility standards can also be defined as interchangeable standards dealing with dimensional, timing, electrical, or other specifications that allow two or more components to work together. For example, the socket into which most

¹ Grindley, Peter. Standards Strategy and Policy - Cases and Stories. Oxford University Press, 1995.

American households screw their lightbulbs is a standard since anyone can go to a store and buy a bulb, and it will fit into the socket. The standard socket allows a lamp from any manufacturer who complies with the standard to work with a lightbulb from any manufacturer who complies with the standard.

Compatibility standards can be further categorized into Product Scope, Market Extent, Positioning and Control, and Standardization Process.

Product Scope

The degree of standardization is the proportion of product characteristics covered by the standard. The greater the degree of standardization, the less scope remains for product differentiation. Some standards define all the relevant features while others standardize only the main interfaces. For example, direct network standards such as telephone or data networks need a high degree of standardization and therefore have very little potential for differentiation. Differentiation between competitors in this environment is concentrated on the service offering rather than technological variations. On the other hand, automobiles are partially standardized on non-strategic components such as tires, bulbs, etc., but compete on engine performance, passenger seating, and styling.

Market Extent

Standards apply to different products and firm groups. Multi-firm standards are adopted by different firms producing similar products. Multi-product standards apply across products from the same product line within the firm. Multi-vintage standards apply over different technical generations of a product, as in computers where users need to move software from earlier models to newer versions. The extent of standardization usually changes as the market develops, as in VCRs.

² Afuah, Allan. Innovation Management - Strategies, Implementation, and Profits. Oxford University Press, 1998.

Positioning and Control

A key distinction is the amount of control that a firm has over the standard. This depends on whether the standard is proprietary or open. With a proprietary standard, one firm has the rights to the standard and uses this to restrict adoption by other firms. Proprietary standards are strongly defended through patents, copyright, or firm-specific knowledge. With an open standard, no restrictions are placed on other firms adopting the standard. In fact, imitation is often encouraged. The innovator maintains a leadership position by using its firm-specific knowledge to develop complementary products, and lead technological improvements. Sun Microsystems' strategy to make its Java programming language an industry standard is one example of an open standards strategy.

Standardization process

The method by which the standard is developed is an important distinction. If a standard is set and maintained by the market it is termed a *de facto* standard. In this model, the standard is established through the interaction of customers, manufacturers, suppliers, and complementary innovators. Most standards usually evolve around the lead firm in the market, or as the outcome of a standards contest. In other cases, regulatory bodies or government agencies set standards which are termed *de jure* standards.

WHY STANDARDS ARE IMPORTANT

Standards provide benefits to the company that develops them, the companies which decide to adopt them, and finally to users of the products that are developed using the standards. Standards mainly add value by making it cheaper to buy components, easier to switch between products, and also easier to use products in combination with each other. According to Grindley, there are three main benefits of having compatible standards:³

Complementary markets

Standards enlarge the market for complementary goods and services thereby increasing the scale of production and making complements easier to produce. The acceptance of Windows™ as a standard operating system greatly increased the number of software products that were developed for users. This network externality accelerated the demise of the Macintosh operating system as a popular standard because the demand for Mac-compatible software dropped dramatically.

Portability

Standards make it easier to move complements from one core product to another, increasing the value of the complements to the user. This reduces switching costs of conversion and retraining, thus protecting a user's investment. If the standard applies across different suppliers, users are less wedded to a particular vendor, and can shop around for the best price. In 1997, Intel Corp. released a series of standards designed to make it easier for digital cameras to exchange information with personal computers. Eastman Kodak Co., Microsoft Corp. and Hewlett-Packard Co. supported the standards, which aimed to create a set of rules for the way that the devices store, record and share information with PC hardware and software. The intent of all players (including hardware, software, and peripheral producers) in this market was to make the digital

³ Grindley, Peter. Standards Strategy and Policy - Cases and Stories. Oxford University Press, 1995.

cameras more popular by establishing standards and making information more portable.

Connectivity

Standards allow core products to be joined together in networks, with the direct benefit of having more users and shared components. The establishing of CDMA and TDMA standards in wireless communications, as well as the development of Ethernet or packet-switching technology in wireline communications allowed products to communicate over networks using standard protocol. This greatly increased the functionality of the networks, and rapidly expanded the user base, thus realizing profits for all players in the industry. In the communications industry, the larger the coverage of the network, the more places the handset can be used and therefore the greater its value to the user.

The effect of standards is to make core products cheaper and more convenient to use. The net effect is to increase the value of the product and expand market demand. Open standards increase the power of the user because they increase the number of suppliers in the market and reduce the amount of power that each supplier holds. There are also other benefits to suppliers of products who can share learning from manufacturing and distribution processes, reduce development costs, and see reduction in costs of inputs. Standards also lead to higher customer information and improve product reputation effects, thereby reducing search costs and risks. The development of wireless standards has given service providers and producers of wireless telephones easier access to market information, thus allowing them to segment the market and charge premium rents for specialized services. The cost of acquiring a wireless customer has dropped, as have the costs of educating the market about the benefits of the product. Further, standardization has helped allay fears that customers had about the feasibility and value of the technology or product.

Disadvantages of Standards

Although standards provide great benefits by rapidly increasing the penetration of a technology, there are also several disadvantages to establishing or adopting a standard.

- For standards that are agreed upon, there is the high cost of negotiation, both for the initial standard as well as for maintaining compatibility as the standard develops. Further, as many people adopt a standard, there may be an increased demand for a limited resource, raising costs as firms scramble to meet demand for the standardized product.
- There is also an inherent risk in adopting a standard that may become obsolete. Software firms that developed applications for the Macintosh OS saw a steady drop in the demand for their products as increasing numbers of consumers began using software developed for the Windows OS.
- Over-standardization can cause excessive reduction in product variety. This can also stifle innovation because the incumbent standard acts as a barrier to newer and superior technologies or products from being successfully introduced.
- Perhaps the greatest drawback of standardization in fast moving industries is that of premature standardization whereby a standard may be established around a design before the technological development of the product has reached its full potential.

How to establish standards

Given the advantages of establishing and defending a standard, firms see great benefits in being able to win the standards war. One method of ensuring victory is to use the government to tip the balance in favor of a certain group. In 1949, the U.S. Federal Communications Commission (FCC) chose the CBS color television configuration as the standard. While this strategy has been successful in a few isolated instances, it is more common for an industry to let the market decide on a *de facto* standard. The emergence of the IBM PC as a standard is an example of the establishing of *de facto* standards.

The establishing of standards requires a firm to take strategic steps to ensure success. Work by Brian Arthur suggests that in markets where two or more incompatible increasing return technologies compete, small changes in initial conditions, whether the result of chance or strategy, can result in one technology gaining the advantage and eventually becoming the *de facto* standard.⁴

This can happen even when the dominant technology is clearly inferior to other designs. A classic example of the adoption of an inferior technology is the QWERTY format for typewriter and computer keyboards. The QWERTY format was originally developed by trial and error in the 1860s to reduce the tendency of type bars to jam when keys were struck in rapid succession, a chronic problem with early typewriters. In less than three decades, the mechanical problems with the typewriter had been overcome with better engineering and when superior keyboard formats appeared on the market. However, these keyboards failed to capture the loyalty of the users because the initial base of touch-typists was trained on the QWERTY format and developed a preference for the inferior, but familiar format. The skills of touch-typists were the complementary product whose availability locked the market into the QWERTY standard.⁵

The dynamics of establishing standards are therefore very important, with a firm's future often hinging on the standardization process adopted and conditions in the early

⁴ Arthur, B. "Competing technologies, increasing returns, and lock-in by historic events." Economic Journal. 1989: 116-131

⁵ Hill, Charles W.L. "Establishing a standard: Competitive strategy, and technological standards in winner-take-all industries." Academy of Executive Management, 11 (1997):9-10

stages. The larger the installed base of users, the more complementary products are developed from the standard. A larger base also increases the credibility of the standard. Together, these make the standard more attractive to new users. This brings in more adoptions, further increasing the size of the installed base and accelerating growth.

Benefits to winners of a standard

If a firm is able to win a standard and decides to make it proprietary, it often has the ability to collect monopoly rents from the market. Additional advantages are from being able to extract rents by licensing the proprietary standard to competitors. In addition to being able to charge its competitors, the standard holder can monitor its competitors' use of the technology and stay ahead of the market. Even if the standard is open and available to competitors without repercussions, the innovator can often make money by building complementary products better than the competition. If a firm controls a standard, it can, all else being equal, introduce complementary products faster. Microsoft was able to gain market share from Lotus Corp. in spreadsheet applications after it introduced a Windows version of a spreadsheet program well before Lotus. As the innovator of the Windows OS, Microsoft had better access to the critical information need to develop the software.

There are however some drawbacks to being the innovator and owner of a standard. If a new generation of the standard has to be compatible with the older ones, performance may have to be sacrificed. For example, the Windows 95 OS contains a large amount of programming code just to ensure compatibility with DOS and its applications. Firms also face the risk of getting wedded to their standard, often due to the group-think in the organization. When this happens, firms run the risk of not recognizing the potential of a radical new product or technology.

⁶ Afuah, Allan. Innovation Management - Strategies, Implementation, and Profits. Oxford University Press, 1998.

A Case for Open Standards

The Internet revolution in the recent years has ignited debate over the role of standards in the development of an electronic marketplace. In the U.S., the federal government has been instrumental in ensuring that Internet standards are 'open' and accessible to all. In large part due to this effort, a web page written anywhere in the world using open standards can be viewed anywhere else in the world. Further, since no one company holds patents on the standard that controls Internet content, the market is the true determinant of the evolution of a standard. As the digital world converges and the potential for profit expands, the stakes get higher for large firms in controlling the standards for digital data.

Just a few years ago, large firms such as AOL and Microsoft envisioned an Internet where each firm would run proprietary systems, with 'toll roads' connecting them. Microsoft was betting on that vision of the world when it introduced its Microsoft Network with internal proprietary standards and proprietary content. However, Microsoft soon admitted defeat and instead turned to the Internet standards. A large part of this push away from proprietary systems was because consumers were not interested in being confined to a proprietary system. The Internet was an open system that encouraged cooperation and information exchange between a diverse array of computer users.

The Internet was originally created to allow the free exchange of research information between Universities and government labs. As use of the system expanded over the years, the overall value of the network expanded exponentially along with each site added. Non-proprietary standards not only allowed a diverse array of computers onto the emerging Internet, but also assured that new software created in one site could quickly be used on similar systems across the world.

Proprietary corporate systems could not compete with the combined creativity of users across the globe creating and exchanging software over

the Internet. Subsidies of universities across the country encouraged a steady stream of free, powerful software that could instantly be accessed across the Internet. Furthermore, government-organized scientific committees helped shape electronic protocols that made sure that electronic traffic flowed smoothly on government-leased lines. It was only when that public system reached a critical mass of users that the diverse private marketplace for information goods came into existence. Without the public investment and publicly regulated open system, proprietary systems would have competed incessantly and lacked the potential for exponential growth seen in an open system.

⁷ Newman, Nathan. "Digital Video Disc Vs. The Internet: Why Corporations Shouldn't Create Technology Standards." Internet. (1996) Available: <http://www.igc.apc.org/e-node/1996/enode0104n.htm>

IMPROVING A FIRM'S CHANCES OF WINNING A STANDARD

As Afuah has shown in *Innovation Management*, there are four critical components in a firm's bid to win a standard. They are listed below in greater detail.

Capabilities

A firm's capabilities in terms of size, its installed base of compatible products, and its reputation can greatly enhance its ability to establish its design as a standard. IBM had the capabilities to establish its PC as the *de facto* standard in the personal computer market when it entered the arena in 1981. IBM legitimized personal computing by introducing a personal computer of its own. Once the market was convinced that IBM was serious about its PC, a slew of software and hardware products became available to support this new standard. The network effects thus made the process self-sustaining. IBM had the size and reputation to develop the momentum towards the acceptance of its design as a standard. With a large installed base, IBM preempted the competition, and companies that entered the market later had little choice but to accept the PC standard.

Environment

A firm's local environment can play a key role in its ability to establish a standard. The agglomeration of suppliers, customers, competitors, and complementary innovators is often a determinant for the winner of a standard. When the IBM PC was being established as a standard, all the companies that provided the software and complementary technologies were based in the United States, with most of them concentrated in the Silicon Valley. Being located close to a large source of talent also allows a firm to quickly develop its products and enter the market first in order to establish a standard.

Government policies are another factor that can affect how standards are established. A government can mandate standards in order to foster competition and ensure that consumers have an adequate choice of products. A firm can also use the regulatory/ judicial environment to help it in establishing a standard. Sun Microsystems, the company that invented and controls Java is a good example of such a strategy. Java is a programming language that allows a program to be written for and used by a whole host

of computing devices from mainframes and personal computers to palmtop PCs and personal data organizers. Sun is in the process of turning Java into a recognized technology standard, but that process has not been as fast or as smooth as many Java licensees would like. Sun hopes that Java will become the standard computing over the Web. Microsoft Corp. decided to preempt Sun and developed its own version of Java. Sun sued Microsoft for altering Java and won an injunction from the court whereby Microsoft has to warn developers that the Microsoft version of Java does not run on non-Windows machines. This decision allowed Sun to control how Java is developed. At the same time, Sun has felt the pressure from users to Java to provide them with more information in order to ensure that they can develop products with the same ease as Sun's programmers. Therefore while Sun has used the courts to help it protect Java as a standard, the market has forced it to keep the standard open.

Another interesting case of government intervention was with the Code Division Multiple Access (CDMA) standard for wireless communication. CDMA was introduced in 1987 as a user-required preference. This meant that unless a user specifically demanded CDMA, it was not offered. Although CDMA had the ability to carry more information than the competing Time Division Multiple Access (TDMA), it seemed destined to lose the battle. In 1996 however, South Korea adopted CDMA as its national standard for cellular communication, giving the technology a much needed endorsement that it needed to be adopted by several hundred service providers in the far East.

Chance events

Chance sometimes plays an important role in the emergence of a standard. One of the most fortuitous cases of a chance event is that of Microsoft. In 1980 when IBM approached Microsoft to develop software for its PC, Microsoft just happened to be negotiating with Seattle Computer for the purchase of Q-DOS. Microsoft used the opportunity to buy Q-DOS from Seattle Computer and quickly license it to IBM for use on the PC. Although this chance event was of importance, equally critical were the strategic steps that Microsoft took to ensure that its operating system became the

standard. The strategy of a company is therefore one of the most important determinants in its success in establishing a standard.

Strategy

The strategy that a firm adopts is the linchpin in its ability to establish its technology as a standard. One of the most well documented instances of the role of strategy is that of the triumph of JVC's VHS standard for videotapes over Sony's Betamax. JVC was able to use its strategy of rapid deployment, free licensing and fast market entry to establish the VHS as a standard for videotapes. The details of this battle are included in Appendix A.

Grindley identifies several main elements for an enabling strategy as listed below:⁸

Build an installed base - The main priority for a firm when competing in a new market should be to establish an installed base of users. This starts the network effect early. The installed base can be developed by subsidizing early users, forming alliances with distributors and manufacturers, and ensuring adequate production capacity. This strategy effectively makes the technology an open standard. Netscape distributed its browser freely to ensure that the user base expanded rapidly and that it kept the competition out of the market. The drawback of creating an open standard is that the innovator does not have the opportunity to extract premium rents for its efforts to develop a new technology. However, if the proprietary knowledge is not easily defended, establishing an open standard may be the best option for a firm.

Establish credibility - A firm needs to establish credibility in the marketplace. Buyers of the technology as well as co-producers and manufacturers are understandably nervous about supporting a new standard. Therefore, the firm needs to do everything it can to remove uncertainty from the market. Fast publication of market results can help to convince users. Alliances with co-producers and open standards often help a firm's credibility. Open standards usually reassure users that they will not be held hostage once they have adopted the standard and made substantial investments. Another method of

establishing credibility and winning support is to sponsor co-producers and initial users of the standard. Sponsorship helps get over the coordination hurdle, and ensures a supply of complements for the initial users.

Price for market penetration - Although the firm establishing a standard may be tempted to charge premium prices for its innovation, it is more advantageous in establishing standards to charge low prices to increase volume and market share. Low pricing can be used even when there is no competition to build up the base and get to the fast growth phase earlier. This strategy is possible only when the firm has the financial ability to absorb high initial R&D and marketing costs without the corresponding high initial revenues.

Use pre-announcements - Product pre-announcements can often be used to influence expectations. They are also effective in scaring away competitors or giving the firm time until a product is ready. Competitors with limited resources may take a wait and see attitude, clearing the way for the firm to establish a position in the market. Pre-announcements need to be handled with care though, especially if a firm is not certain of when its product will be ready. If the firm announces a better version of its own product, customers will wait for the better version. This leads to a cannibalization of firm's own sales, even before its new product has hit the market.

Satisfice the design - A winner of a standard is not necessarily the most technologically advanced firm but often the one that implements its strategy most effectively. Before the standard is brought to market, there is a certain level of competition regarding technology development. However, once the product is on the market, technological superiority becomes less important. The aim of the firm should be to establish a standard that satisfies the market need rather than pursue a standard that optimizes the design. The standard should be brought to this point before products are launched.

Philips Corporation's failure to establish its DCC tape as a recording industry standard illustrates how some errors in an otherwise good strategy can result in failure.

⁸ Grindley, Peter. Standards Strategy and Policy - Cases and Stories, Oxford University Press, 1995: 25-26

In 1992 Philips launched its DCC digital audio recording technology. Philips had hoped that consumers would switch from existing analog cassette tapes to its DCC system. It simultaneously issued a wide selection of prerecorded DCC tapes under its in-house PolyGram Records label. The company also ensured that the new DCC system would play existing analog cassette tapes. It therefore ensured that consumers' switching costs were minimized.

Although Philips had a reasonably strong strategy, it failed in certain key areas. Philips entered the digital recording market at a time when Sony was introducing a competing and incompatible digital recording technology, the minidisc. Confronted with two competing technologies, consumers decided to take a wait-and-see attitude, which ultimately helped neither system. Philips entered the market at a very high price for its DCC player, retailing at \$900-\$ 1200 per unit. It would have achieved greater consumer adoption had it priced the product using a market penetration pricing. It also did not do a good job of educating the consumers about the benefits of a digital recording technology, nor did it mention the issue of backward compatibility. Finally, Philips failed to establish an installed base. Philips'initial product offering was limited to an expensive DCC player for home entertainment centers. It did not offer portable DCC players, nor did it offer DCC players for cars, although both options were technically feasible.

CONCLUSION

A firm that is competing in an industry where standards are important has to take some strategic steps to ensure that it is successful. If the firm wants to establish a standard and be a trend-setter, it needs to assess its capabilities to ensure its success. It needs to ensure that it has the financial capacity, technological ability, marketing strength, and reputation to establish a standard. Although the odds of establishing a standard can be greatly increased with the right strategy, the firm should recognize that chance plays a large part too. The firm's management should be visionary enough to accept a competing standard as the *de facto* standard if it becomes obvious that its own runs the risk of failing. Sticking to one's guns can be dangerous if it leads to financial

distress, and affects the reputation of the firm. The lessons learned from Sony's foray into the VCR industry and Apple's battles in the computing industry should give firms reason to pause before entering a standards battle.

If the firm is a late mover in the industry and needs to adapt a standard before one is firmly established, it needs to assess the competing standards in the market to ensure that it invests in the winning standard. A firm can be very successful in the marketplace even without controlling the standard if it can differentiate itself based on quality of service, incremental innovation of product, or speed of delivery.

APPENDIX A

JVC vs. Sony

The triumph of JVC's VHS system over Sony's Betamax is an excellent example of how product standards can be used to ensure the success of a new product. The introduction of the VCR for consumer markets began in the mid-1970s. Sony had pioneered the VCR market, and was striving to make its Betamax format the industry standard. Sony made a fatal error however, and insisted on keeping its technology proprietary. It planned to follow a high margin, technology driven strategy. JVC on the other hand used an open standard, high volume, market oriented strategy to become the volume leader in the market. Although JVC launched its machines a year after Sony's introduction of Betamax, JVC made a critical decision in partnering with RCA to distribute its VHS machines. RCA had a huge distribution network and VHS overtook Betamax in its second year. By 1981, it had 80 percent of the US market. By 1984, Philips, which had introduced its own standard (the V2000) had adopted the VHS standard, and in 1988 Sony finally adopted the VHS standard as well.

JVC achieved its success by providing a system which, although second on the market, was truly accepted by the consumer. It convinced a large section of Japanese manufacturers that the VHS standard could command a wide market. The acceptance by manufacturers was reassuring to the consumers and they were willing to place their bets on the VHS standard. JVC also didn't threaten other manufacturers with unreasonable expectations of margins, or with stated goals of market domination. It was liberal in offering other firms its technology. It did not aim to collect high initial rents, but rather concentrated on the returns it could make in the long run, once VHS became the standard.

The VCR case is a useful example to illustrate how a firm can achieve market dominance even though it came to market late, and without any major technological advantage.