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Fast-Follower Advantages and Network Externalities in I.T.-Driven Markets

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Abstract

Recent research into the theory of first-mover advantage has revealed that a significant number of first-movers in I.T.-driven markets eventually lose market leadership. The belief in first-mover advantage spawned a pervasive body of work in business strategy and was further perpetuated by popular media. The assumption of first-mover advantage has been extended by research suffering from survivor bias, whereby pioneers were recognized only among surviving firms. Instead, recent research suggests that fast-

followership may offer an important strategic advantage. For example, in their study of 27 I.T.-driven product categories, Hidding and Williams (2003) found that a fast follower gained market leadership, on average, 60 percent of the time. Although many hypotheses for fast-follower advantage have been suggested, few have been empirically tested. There is a particular dearth of research into fast-followership based on positive network externalities, which is of particular relevance in I.T.-driven markets. To stimulate the pursuit of such research, this paper presents a conceptual framework and a set of propositions that recognize key factors pertaining to network externalities that contribute to fast-follower advantage in I.T.-driven markets.

Keywords: Fast Follower, Competitive Advantage, First Mover, Network Externalities, Positive Feedback, Market Leadership, Positive Network Externalities to Adoption, Fast-followership, First-to-market, Network Effects

Introduction

Recent empirical research has shown that fast followers gain an advantage, on average, 60 percent of the time and that, generally, first movers do not win in I.T.-driven markets. First-to-market or first-mover advantage has become a pervasive part of the body of thought on business strategy, see, e.g., the seminal papers by Lieberman and Montgomery (1988, 1998). Roberts (2004) found that it is "worse" being a fast follower and "still worse" being a slow follower. Additionally, Keohane and Nye (1998), for example, state that "first movers are often the creators of the standards and architecture of information systems." However, research pertaining to first-mover advantage has suffered from survivor bias whereby a firm that gained market leadership, i.e., "survived", was incorrectly identified as the pioneering company. For example, Microsoft is sometimes viewed (e.g., by Keohane and Nye, 1998) as the pioneer that won, in part due to enforcement of intellectual property (IP) rights. However, Microsoft has most often been a follower, notably in Personal Computers (PC) operating systems, competing with incumbents (e.g., Apple) who also enforced IP rights. In other cases, the true first movers were not identified because they failed. For instance, Amazon and AOL (America Online) are often referenced as first movers but were, in fact, followers. The first movers in these product categories, Bookstacks and OnSale, respectively, are forgotten first-mover failures (Hidding and Williams, 2003).

Recent articles have concluded that "in some commercial situations, a fast follower can do better than a first mover" (Keohane and Nye, 1998) and that "Sustained first-mover advantage in eBusiness technology product categories is largely illusionary" (Hidding and Williams, 2003). While there are instances in which first movers have maintained an advantage, in their study of 27 I.T.-driven product categories, Hidding and Williams found first-mover advantages in only 3 to 17 percent of the product categories. In contrast, fast followers sustained market leadership on average 60 percent of the time. Tellis and Golder (2002) found similar results in a sample of 67 consumer product categories, which included 17 information technology product

categories, (some dating as far back as the 1800's). Further Markides and Geroski (2003) submit that, "The widely-held belief that pioneers enjoy first-mover advantages and grow to market dominance is not correct."

First Movers versus Fast Followers

Relevant to any discussion of first-mover (dis-)advantage is the distinction between "first" and "first mover." "First" can mean the inventor, the product pioneer, or the market pioneer. The inventor is the firm that develops the patents or important technologies in a new product category. The product pioneer is the first firm to develop a working model or sample in a new product category. Finally, the market pioneer is the first firm to sell in a new product category (Golder and Tellis, 1993). This is also an important distinction in I.T.-driven markets. For example, several Internet technologies including search engines and the worldwide web, were invented by university researchers. The first working model was then developed in a university research lab as the product pioneer, and later sold, i.e., a commercial transaction, by a for-profit company that was then deemed as the market pioneer. We define the "first mover" as the market pioneer and "first-mover advantage" in a product category as when the first mover currently holds market leadership, similar to Golder and Tellis (1993), Tellis and Golder (1996, 2002), and Hidding and Williams (2003). For purposes of this paper, we adopt Hidding and Williams' (2003) definition of fast followers as firms that were the 2nd, 3rd or 4th entrant into the market. Their research found that the probability of such a fast follower becoming the current market leader exceeded 50%. This paper does not focus on buyers or users of new technology, who are often called "adopters" (see, e.g., Rogers, 1995), but instead focuses on suppliers, sellers, and providers of technology and their order of entry into the market.

Fast-follower Advantage

With empirical evidence that fast followers, rather than first movers, have an advantage, various questions arise, "Why do fast followers have an advantage?", Which fast followers gain an advantage and why?", and "What characteristics contribute to fast followers gaining market leadership?"

Interest in the disadvantages of first movers and advantages of fast followers has been growing, see (Bryman, 1997), (Isobe, Makino, and Montgomery, 2000), (Agarwal and Gort, 2001), (Boulding and Christen, 2001), (Bohlmann, Golder, and Mitra, 2002), (Hoppe and Lehmann-Grube, 2002), (Oliver, 2002), (Robinson and Min, 2002), and (Markides and Geroski, 2003). In their study, Wilson et al. (2003) identified empirically supported factors of fast-follower success, namely, product innovation, market timing, free-rider effects, and leveraging of complementary resources. The first factor, tested by Shankar et al. (1998), is a follower's innovativeness that overtakes a pioneer. A second, tested by Shankar et al. (1999), is timing of market entry during the growth stage, which yielded advantages for fast followers. The third, also

tested by Shankar et al. (1999), is free-rider effects such as lower costs in Research and Development (R&D), lower work force training costs, lower consumer education costs etc., which lead to fast follower advantage, see also Robinson and Min (2002). As Fingar (2000) noted "fast followers can replicate an innovative business model in Internet speed." Finally, fast-follower advantage may be explained by firms leveraging their complementary assets, see, e.g. (Roberts, 2004). For a sample of I.T.-driven industries, Wilson et al. (2003) tested the complementary resources hypothesis, as originally suggested by Teece (1987), and found some support.

Network Externalities

Although (fast-) follower advantages have been studied to some extent, they have "received considerably less attention" in industries characterized by network externalities (Schilling, 2002). Network externalities are when the value of a product (or connecting to a network) to one user depends on the number of other users (Shapiro and Varian, 1999). When a firm's product acquires a number of users, the value to each subsequent user increases. As the value to each subsequent customer increases, so does the firm's competitive advantage. This effect can be direct (i.e., involving one product), or indirect (i.e., involving two products, e.g., hardware and software) (Katz and Shapiro, 1994). Network externalities (Arthur, 1994, 1996; Liebowitz, 2002) are of particular relevance in I.T.-driven markets. Network effects have also been called "positive network externalities to adoption," "demand-side externalities," or simply "network effects." Research by Rajgopal et al. (2003) suggests that network effects offer important intangible assets to firms that are valued by the stock market.

Shapiro and Varian offer an in-depth discussion of concepts related to network externalities such as positive feedback, installed base, market tippiness, industry standards and lock-in, as well as compatibility and innovation, in their 1999 book entitled "Information Rules – A Strategic Guide to the Network Economy." They provide insight into sustained market leadership and various factors that can lead to advantage.

Network externalities can lead to market "tippiness." A market is tippy when competition among two or more firms results in a "winner takes all" scenario. In a tippy market, there are two cycles. A virtuous cycle: the product with many users becomes more and more valuable to each subsequent user and attracts ever more users; a second cycle is a vicious cycle: a death spiral in which the product loses value as it is abandoned by users. "Success and failure are driven as much by consumer expectations and luck as by the underlying value of the product. A nudge in the right direction, at the right time can make all the differences" (pp. 180-181). By its nature, identifying a tippy market occurs after it has tipped. Shapiro and Varian (1999) argue that market tippiness depends upon the balance between economies of scale and variety. The likelihood of a market tipping to a single technology is expressed in Table 1.

	Low Economies of Scale	**High Economies of Scale**
Low demand for variety	Unlikely	High
High demand for variety	Low	Depends

Table 1. Likelihood of market tipping to a single technology

(Table 7.1 in Shapiro and Varian, 1999, p. 188)

A critical question that firms face is whether a newly established market will be tippy or not. "These dynamics are driven by the strong desire of users to select the technology that ultimately will prevail - that is, to choose the network that has (or will have) the most users" (Shapiro and Varian, 1999).

Kauffman et al. (2000) studied network externalities in electronic banking networks. Their findings show "the extent to which firms may be subject to over-reliance on a proprietary network, even as their competitive marketplace changes." Schilling (2002) found that in addition to installed base and complementary goods, a firm's learning orientation and timing of market entry were critical in the development of a technology standard and influenced the likelihood of technology lock-out.

However, Schilling notes that most of the empirical work performed on network externalities has focused on single product categories, for example, spreadsheet software (Gandal, 1994; Brynjolfsson, 1996), microprocessors (Wade, 1995), and prepackaged PC software (Shurmer, 1993).

Consequently, there appears to be a relative dearth of empirical research into the effect of network externalities on fast-follower advantage across various (I.T.-driven) product categories. To encourage others to undertake such research, this paper presents a conceptual framework and a set of propositions relating to fast-follower advantage as derived from the theoretical basis of network externalities.

Propositions

This section describes key factors that aim to illuminate the "how and why" (Jones, 2004) of fast-follower advantage due to network externalities. The factors are organized in a conceptual framework. The framework can be interpreted as an "Understanding" category of theory (Jones, 2004) or a "little t" theory (Dennis and Valacich, 2001). The framework recognizes four major categories of factors and various subcategories (see Figure 1). There is at least one proposition formulated for each subcategory. It is important to note that there may be interactions among various factors. For example, standards involve compatibility and customer expectations, which, in turn, relate to timing. However, in this paper, we do not explore such interactions, but focus on the

main effects such factors are likely to have. Each of the factors in the framework are explained in detail in the sections that follow.

We encourage others to expand upon the conceptual framework and propositions offered in this paper towards the development of a theory of fast-follower advantage. Next steps may involve developing hypotheses with specific metrics from the propositions offered here and testing the causal relationships expressed in such hypotheses, e.g., through (empirical) process studies (Gregor, 2001, p. 7).

Product

Products, i.e., the solutions provided by technology and the capabilities that fulfill the wants and needs (both realized and unrealized) of consumers, offer firms strategic advantage (Shapiro and Varian, 1999). An I.T.-driven product may include any combination of a physical good, service, or information (Nezlek and Hidding, 2001). It is important to note that information is

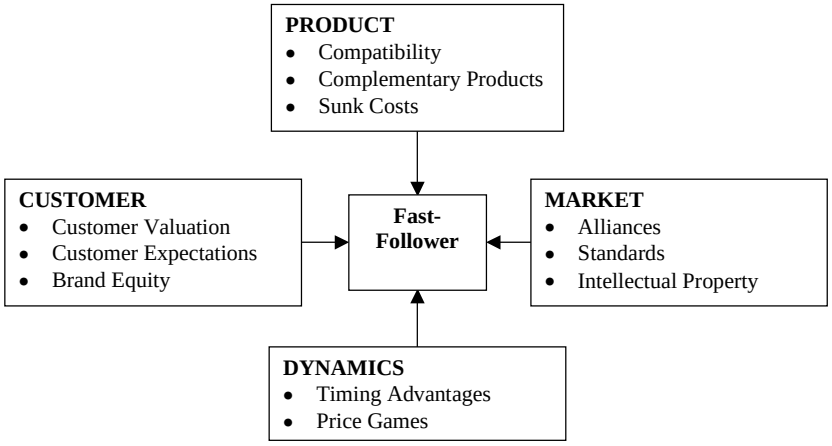

Figure 1. Impact of Network Externalities Factors on Fast-follower Advantage

conceptually independent of the physical good upon which it was recorded (e.g., a CD or brain cells). The goods, services, and information that comprise a product each have specific and different characteristics that determine the economic characteristics of any bundle. Consider songs distributed over the Internet (excluding legal issues at this point), since there is no physical good or service (e.g., CD) that is part of the product, the economics of these songs is exclusively information based.

Compatibility

The challenge of introducing a new technology that is incompatible involves overcoming the collective switching costs to create a sufficient network size. Collective switching costs incorporate the combined switching costs of all users, "…switching costs work in a nonlinear way: convincing ten people connected in a network to switch to your incompatible network is more than ten times as hard as getting one customer to switch. But you need all ten, or most of them: no one will want to be the first to give up the network externalities and risk being stranded" (pp. 184-185)[1]. "Switching from Apple to Intel equipment involves not only new hardware but new software. And not only that, the "wetware" – the knowledge that you and your employees have built up that enables you to use your hardware and software – has to be updated. The switching costs for changing computer systems can be astronomical" (p. 12).

In a market with strong network externalities, firms that can maintain control over the network through interconnectivity, compatibility, and complementary products based on their strengths and limitations, will be better able to gain positive feedback and ultimately a sustainable advantage. Companies must determine the appropriate tradeoff between performance and compatibility (the choice between evolution and revolution), and openness and control. Apple, for instance, did not seek to connect with the PC network, opting instead to develop a "hot" new product for a niche market. Shapiro and Varian (1999), suggest that niche strategies are inherently dangerous in markets with strong network externalities. Netscape, on the other hand, faced a classic problem of interconnection. Netscape's browser had to work in conjunction with Microsoft's operating system, making it increasingly vulnerable to the competitor on which it relied.

As an industry evolves, so too must the technology. A firm may seek an evolutionary strategy, offering customers a migration path from an existing product to a more advanced product. A firm that does not provide customers with a smooth migration risks losing them. "The key to the evolution strategy is to build a new network by linking it first to the old one […] One way to deal with the compatibility-performance trade-off is to offer one-way compatibility. When Microsoft offered Office 97 as an upgrade to Office 95, it designed the file formats used by Office 97 to be incompatible with the Office 95 formats. Word 97 could read files from Word 95, but not the other way around" (pp. 192-193). The key is to properly recognize customer needs and avoid underestimating the previous technology. These observations regarding product compatibility lead to 2 propositions.

Proposition 1: A fast follower can usurp a first mover's customer base by offering a smooth migration path for customers to an evolutionary product (offering value-added features and/or improved quality and innovations) and

1 All (page) references are to (Shapiro and Varian, 1999) unless otherwise noted.

gain an advantage. This advantage is strengthened with continued innovations and product evolutions, offering backward and competitive compatibility as well as interconnectivity, which move the fast follower further away from the first mover's product. Additionally, if a first mover neglects to offer a migration path to its customers the fast-follower advantage is increased.

A revolutionary strategy is "inherently risky" as firms typically observe a go-it-alone mentality. According to Andy Grove, to start a revolution, a product must "…offer performance 'ten-times better' than the established technology…." (p. 196), to encourage a sufficient amount of users to switch. But, the market is in its infancy and there are no complementors and few companies with which to form alliances. Therefore, firms must spend much of their effort educating customers and establishing a market.

Proposition 2: In markets with a strong need for customer education, and where the first mover invests significant resources to develop the market, a fast follower who enters the market with a superior second or third version gains an advantage.

Complementary Products

Complementary products can create economies of scope and/or scale, and offer a viable means of growing an installed base and enhancing customer lock-in, i.e., the more complementary products a firm has, the greater the lock-in of its primary product. Except in instances where equipment quickly depreciates or becomes obsolete or there is a market for used equipment, after-market products can strengthen the customer relationship and dependence on the firm's brand of products.

As Shapiro and Varian (1999, p. 143) note, "The company that can successfully offer and sell the largest collection of attractive complementary products will enjoy a tremendous advantage in the primary lock-in market, because it will be able to set more attractive terms for the primary product […] Iomega designed its Zip system so that Zip drives would accept only Zip-compatible disks manufactured by Iomega. The plan was to build an installed base of Zip-drive users and then earn profits from the sale of Zip disks to these locked-in users. To realize this strategy, Iomega invested in building an installed base of Zip drives."

Proposition 3: A fast follower who offers attractive, complementary products, and thus extends its brand, can create positive economies of scale and strengthen customer loyalty, lock in, and entrenchment, thus gaining an advantage. This advantage is strengthened for fast followers who have a secure installed base of customers.

Sunk Costs

In a network economy, information products face rapidly decreasing marginal costs. Firms must understand the value placed on their information product and price accordingly, "…production of an information [product]

involves high fixed costs but low marginal costs. The cost of producing the first copy of an information [product] may be substantial, but the cost of producing (or reproducing) additional copies is negligible." Furthermore, "[…] markets for information will not, and cannot, look like textbook-perfect competitive markets [….] Selling a generic product – say, a digital map, for 10 cents – isn't viable when your competition can sell the same map for 9 cents and still make a profit" (pp. 22-23). However, network effects positively impact revenue and profits, e.g. as more individuals connect to the network, unit costs decrease and prices, revenue and unit profits can increase.

Proposition 4: As costs of providing a product diminish over time, a fast follower who incurs lower costs of (re-)production has an advantage over a first mover who incurs sunk costs as well as similar (re-)production costs. This advantage is especially strong with information products where reproduction costs are near zero and sunk costs can be very high. The greater the sunk costs incurred by a first mover, the more volatile the market, and the faster the costs are diminishing, the greater the advantage for the fast follower.

Customer

The second major category of factors pertaining to network externalities that influence fast-follower advantage is about customers. A large installed base of customers, large market share, or strong brand awareness does not necessarily equate to sustainable market leadership. In the rush to be first, many dot-com companies dismissed the basic business principle of "know the customer." As (Hanson and Sovie, 2002) state, "Customers are smart. They want functionality, security, flexibility and service, not just a low price and the latest piece of cool. And they will not adopt a new technology before they are ready. If you know how to ask and listen, your customers will tell you what features and variables are critical, which are not, and when the time is right to move forward."

Customer Valuation

Information has different value to different customers. The better a company can understand this value, the better able they are to develop the product and price accordingly. "Merely posting something that is available in print on-line doesn't add value to it […] even more important, if you don't come up with ways to add value to *your* on-line content, your competitors will surely come up with a way to add value to their content" (p. 66).

Setting appropriate expenditures to attract new customers is imperative. Evaluating future streams of profit associated with potential customers enables a firm to place appropriate acquisition value on those customers. Inappropriately valuing these customers may result in overspending on acquisition. In the long run, firms will have difficulty recouping their initial investment of attracting these customers. Many Internet start ups suffered from this gross mismanagement, spending exorbitant sums of money on

marketing to generate mass market awareness and attract customers who did not provide sufficient revenue streams necessary to recoup their acquisition costs. Moreover, if a firm offers deep discounts to subsidize a customer's switching costs to acquire that customer without retaining them, the firm, "…may never recoup the subsidy, since any attempt to do so later in the lock-in cycle will induce this customer to switch again." (p. 152).

Proposition 5: A fast follower can gain an advantage over a first mover who pioneered a technology, product, or service by extracting added customer "value" and/or improved quality by means of development or refinement. Use of database marketing and customer-specific information to identify and fulfill wants/needs and trends versus simply extending a hot/new technology enables a fast follower to attract prospects away from a first mover. This advantage is enhanced in the presence of low or decreasing switching costs.

Search costs continue to diminish as the amount of information and products online increases. Artificial loyalty programs, which lock-in customers by means of frequent purchaser benefits or referral bonuses, will become increasingly popular and help to convert conventional markets into lock-in markets as, "…customers find themselves bearing significant switching costs in the form of foregone frequent-purchaser benefits when they change brands. The companies that can structure their charges to attract and retain lucrative heavy users will edge out their rivals. These customer loyalty programs will have the effect of reducing customers' price sensitivity, permitting the seller to successfully charge higher list prices [….] the prospect of rapid imitation puts a premium on generating some consumer lock-in early." (pp. 158-159).

A powerful database from which to continue to enhance the customer relationship and assess customer wants/needs/habits, increases a firm's advantage and its ability to create tailored loyalty programs, added value services, and enhance positive network externalities to adoption.

In their study of network effects in the 16-bit home video game industry, Shankar and Bayus (2003) suggest that the value is "a function of network size (i.e., installed customer base) and network strength (i.e., the marginal impact of a unit increase in network size on demand) […] a firm that has a relatively small installed base may compete successfully if it has adequately high network strength…" In addition, customer value is associated with a firm's "active" installed base. A firm can monitor their active installed base by the number of new shipments, "…if your share of new shipments is less than your share of the installed base, you are losing ground on your rivals." For example, "Netscape's share of the installed base of browsers remains high, but its share of new 'placements' is considerably lower [….] lots of software just clutters up people's hard drives, monitoring usage of the software is critical; the "active" installed base is far more meaningful than cumulative historical placements" (p. 151).

Proposition 6: A fast follower who can identify additional ways of generating profitable revenue streams from new and existing customers can hijack a first-mover's customer base by outbidding them on acquisition (e.g., they can offer attractive discounts based on that customers "value") gaining

an advantage. If the first mover attempts to battle by offering more attractive discounts but does not properly value the customer, they may initially sustain the customer base but eventually lose, unable to recoup their costs of acquisition.

Customer Expectations

"Marketing strategy designed to influence consumer expectations is critical in network markets" (p. 181). The stronger the network effects, the greater the influence of expectations. Creating excitement about a product ("buzz") can be as powerful as the product itself. Identification of key audiences such as initial adopters and influential buyers can create momentum before a product is even released. This momentum can be important in creating a standard or critical mass, warding off competitor power. Competitive pre-announcements can create positive consumer expectations for one product while generating uncertainty for another. Generation of attention helps to create value in the customer's mind. "The big problem is letting people know about it. Amazon.com […] entered into a long-term, exclusive agreement with America Online (AOL) to gain access to AOL's 8.5 million customers. The cost of this deal […] can be understood as the cost of purchasing the attention of AOL subscribers" (p. 7). Greater attention can lead to increased trial and adoption, greater network externalities, and increased installed base of customers, leading to positive feedback. "By convincing Industrial Light & Magic to use its graphics computers to create the dinosaurs for Jurassic Park, Silicon Graphics hope to showcase its workstations and spur future sales" (p. 153).

Proposition 7: Capturing "economies of attention" (via word of mouth, free content, marketing, public relations, viral marketing) generates increased customer expectations and product "buzz," sometimes elicited via "decoy" announcements. A fast follower who achieves increased awareness and adoption at the time of introduction via "economies of attention" has an advantage over a first mover.

Brand Equity

Enabling customers to 'experience' a product increases its value. Information and services are experienced upon consumption, creating a challenge in allowing customers to pre-test such products. Companies with strong brand and reputation have an advantage in creating perceived value and overcoming the issue of experience, "Customer perceptions are paramount: a brand premium based on superior reputation or advertising is just as valuable as an equal premium based on truly superior quality" (pp. 113-114). These firms may also enjoy higher switching costs and customer lock-in. Reputation, product quality, and customer loyalty can offset low switching costs or limited lock-in. The difficulty comes in the ability to measure accurately these switching costs and the differing switching costs across a customer base.

While a brand name is important, firms cannot rely solely upon perceived brand name strength for success. A brand name can support premium prices in certain instances, however as Shapiro and Varian describe, this is not always effective: "…information providers with established brand names often hesitate to drop prices quickly enough to ward off potential entrants […] a valuable brand name will allow you to command some premium, but it will not guarantee you the same prices or margins you enjoyed before new information technologies arrived that caused per-copy and distribution costs to fall" (p. 31).

Proposition 8: Fast followers who enjoy strong brand name reputation and/or positive company image, realizing benefits from customer trust and loyalty, can gain an advantage over less-known first movers This advantage is strongest for experience goods and services where brand reputation and company image aids in the reduction of consumer trial anxiety.

Market

The third major category in our conceptual framework (see Figure 1) deals with the market. In a free market, increased revenues will attract competition; the key is maximizing demand, keeping price above marginal costs, anticipating industry trends, and possessing the agility to react to a rapidly changing environment. As Shapiro and Varian discuss, "Technology marches forward. You have to keep looking out for the next generation of technology […] Microsoft has been the master of this strategy with its 'embrace and extend' philosophy of anticipating or imitating improvements […] If you cater too closely to your installed base by emphasizing backward compatibility, you open the door to a revolution strategy by an upstart" (pp. 276, 278).

Alliances

In markets with network effects interdependence is increasingly significant. Even with complete vertical integration, a firm may achieve a higher level of recognition, value, or adoption with key allies. Firms that sell to an influential buyer or gain an endorsement from a strong customer, gain an advantage. "A large company may be influential because it dictates to others the format in which it insist on receiving information" (p. 153). "Many digital cameras are bundled with a stripped-down version of Adobe's PhotoShop. The camera or scanner doesn't have big network externalities or switching costs but PhotoShop certainly does" (p. 243).

Industry standards may also be driven by alliances, "Digital, Intel, and Xerox subsequently recognized their common interest and formed the DIX group […] The coalition convinced the IEEE, a highly respected and neutral industry-wide organization, to adopt Ethernet as an open standard, subject to the usual "fair and reasonable" licensing terms, and Xerox agreed to license Ethernet to all takers at a nominal $1000 flat fee. Adoption by the IEEE did much to create self-fulfilling expectations that the Ethernet would emerged

as the accepted industry standard" (p. 253). The government may also act as an influential purchaser, offering finances or endorsement of a product or technology. In markets where network externalities are difficult to build, governmental backing can create a "pioneer" market for the product or technology, offering an advantage. "It is unlikely that the Internet would have achieved its current level of popularity without early subsidization by the government" (p. 314). Influential buyers and strategic relationships such as these can affect adoption, attention and drive positive feedback.

Proposition 9: A fast follower who can develop favorable alliances and/or gain support of an influential buyer, effecting adoption, recognition, attention, and distribution has an advantage. This advantage is strengthened if such alliances generate adoption of an industry standard.

Standards

Standard setting has both competitive and anti-competitive effects on an industry and can shift the locus of competition from systems to components. "Standard setting benefits consumers in three fundamental ways. First, it can increase price competition, because standard technologies and products can be more readily compared and contrasted. Second, it can increase compatibility and interoperability, allowing new suppliers to compete in producing products and services related to the underlying standard technology. Finally, standard setting can increase the use of a particular technology, giving the installed base enhanced economic and functional value to the extent that it is compatible with a large network of applications […] it can also thwart innovation or entrench an older standard when a newer, better, or more widely accepted technology is available" (Balto, 2000).

As discussed above, alliances can be an important component of the network economy and increasingly advantageous in a standards war. "Banks are keen to see Smart Cards (computer chip plastic cards) take off because they will be able to use this technology to offer a far greater range of value-added services to their customers […] Visa and MasterCard are working to establish a smart card standard that will allow smart cards offered by different suppliers to work in the same card readers" (p. 236). Fast followers have an increased chance of developing a successful standard, because it typically emerges once customers have gained some experience with different products/standards in the market.

Proposition 10: Fast followers working collectively with others such as competitors, complementary product developers, or standards organizations to develop a new standard gain an advantage when this collaboration expands the total market and may even assist in the emergence of a new market.

Intellectual Property (IP)

This advantage of developing a standard is strengthened for fast followers who hold a patent. Developing protection from competitors via IP ownership

can create an advantage. A firm must decide whether to develop the standard that the firm can tightly control or to create an open architecture to gain network effects in some component of the architecture. Shapiro and Varian discuss how Intel Labs is playing a major role in developing interfaces and standards such as 'plug and play' and the 'accelerated graphics port,' then making them available to component manufacturers. "Of all the players in the hardware side of the PC world, Intel has the greatest interest in seeing that components interconnect smoothly and perform well. The faster, cheaper, and easier to use the components are, the more demand there is for Intel CPU's" (p. 232).

Proposition 11: Fast followers with proprietary rights to a standard, who successfully control the development of extensions and the evolution of the technology, thereby limiting competing proprietary extensions, are at a significant advantage to competitors. The advantage is even greater when switching costs are high and customer lock-in is strong.

Dynamics

The fourth major category of factors pertaining to network externalities that influence fast-follower advantage deals with (market) dynamics. "Since industries characterized by network externalities demonstrate dramatic path dependency effects, timing of entry ought to be particularly important…." (Schilling, 2002). Correct timing of entry, timing of release of new versions of the product, and timing of price changes becomes more critical. Particularly because of high-sunk costs, coupled with near-zero marginal costs of information (technology) products, price games become especially important.

Timing Advantages

Competition remains a key factor in the network economy. When a firm is alone in the market and competition is lacking, it can become complacent. In such a monopolistic market, firms fail to pay attention to marketing efforts, customer wants and needs, or cost controls. First movers in this situation may forgo new customer acquisition or customer retention methods and demand premium prices due to lack of customer choice. All of these factors create an opportunity for a potential follower. Such a lack of competition, "…made Apple products more expensive and, eventually, less powerful" (p. 11).

Proposition 12: First movers who enjoy longer pioneer lead-times and little competition may become complacent, offering attentive fast followers an advantage. This advantage is increased if the first mover does not posses sufficient resources, such as financial resources, to withstand a long lead-time before network effects and market size become substantial.

Contract length, amount of time alone in the market, and experience factors can contribute to advantages and/or disadvantages. If, for instance, first movers can build a large installed base before competition arrives or

introduces a 'killer app' before others can respond, they may be able to create distance between themselves and fast followers, which can be difficult to overcome. The key is extending the timing advantage to create a lasting edge. Additionally, strong advantage is created if a first mover can control the length of contracts, i.e., long-term contracts or stagger termination to create barriers to entry. Ticketmaster[tm] has been successful at staving off competition with its "…multiyear contracts with major stadiums and other revenues to handle their ticketing needs, making it harder for upstart ticketing services to break into the market in a locale. [Additionally,] stagger the termination dates on contracts with different customers […] any new entrant would have to operate well below efficient scale for some period of time..." (p. 168).

Proposition 13: A fast follower will have difficulty breaking into a market and is therefore at a disadvantage, when a first mover holds significant long-term contracts.

Price Games

In game theory, Bertrand-Stackelberg games support follower advantage under conditions of perfect information (Gardner, 1995). Gal-Or (1987), however, argued that there is no "perfect information" in the real world and derived that in a game of imperfect information, the first mover has a disadvantage. Essentially, a fast follower beats the first mover by gaining market information and learning from the leader's mistakes without incurring the associated costs. Henkel (2002) dubbed 1.5[th]-mover advantage based upon a partial commitment by the initial mover, which is followed by full commitment after other players have moved.

In a network economy, a pricing game may not be effective when other conditions such as switching costs, customer value, and industry standards are also important. If a firm begins to fall behind, it may begin a strategy of survival pricing (cutting prices after the tide has moved against them) in an effort to stay afloat. (Shapiro and Varian, 1999). This is especially dangerous if competitors do not engage in a price war. IBM for instance offered OS/2 at considerably lower prices than its competitors. This ultimately led to OS/2's demise, as customers, especially corporate purchasers, were much more concerned with who would be the eventual winner than saving $50 on the technology. In the spreadsheet wars, "Borland priced Quattro Pro very aggressively when squeezed between Lotus 1-2-3 and Microsoft Excel back in 1993 […, however,] the purchase price of software is minor in comparison with the costs of deployment, training, and support" (p. 288).

A strategy of differential pricing, which for example has been successfully employed by the airline industry for years, achieves value-based pricing. For instance, "The on-line database provider Lexis Nexis sells to virtually every user at a different price. The price that you pay may well depend on what kind of enterprise you are (corporate, small business, government, academic), the size of your organization, when you access the databases (during the day or evening), which databases you use" (p. 41).

Proposition 14: A fast follower who successfully differentiates their product, e.g., by competing as an industry standard, on quality, brand name, and/or customer value, can win by forcing incumbents into a price war.

Conclusion

Maneuvering in a network economy requires agility and sound business strategy. Firms must seek the appropriate balance between maximizing value with liberal terms and conditions and protecting 'property', allowing easy access and sharing of their product, while protecting against easy reproduction by competitors. Even a substantial installed base will fade over time. Moreover, creating value and competitive advantage in the network economy involves development of customer relationships. In the face of decreasing brand loyalty, increasing consumer choice, an increasingly savvy customer, and reproduction costs reduced to virtually zero, customer valuation is imperative.

We began by citing empirical evidence that fast followers have an advantage over first movers in I.T.-driven markets, which yielded questions regarding the characteristics of fast followers that ultimately lead to advantage. We developed a set of propositions regarding key factors pertaining to network externalities that influence fast-follower advantage in I.T.-driven markets. The propositions are organized in a conceptual framework that recognizes four major categories of factors, namely Product, Customer, Market, and Dynamics. We hope that the framework and the propositions offered in this conceptual paper will contribute to the understanding of why market leadership is typically gained by fast followers and not by first movers.

While we have identified a set of key factors, it is important to note that the eventual market leader may employ a combination of factors. As reliance on a solitary strategy of first-mover advantage has proven unsound, dependence upon a single strategy to achieve market leadership as a fast-follower may also prove detrimental. No single strategy may provide sustainable advantage and complacency can lead to rapid decline.

We encourage others to extend our conceptual framework and propositions as well as develop and test hypotheses expressed in specific metrics towards a theory regarding fast-follower advantage in I.T.-driven markets. Further research and empirical testing should result in important insights into the characteristics of fast-followers that lead to strategic advantage, and the development of business practices, which can be employed to gain and sustain advantage in today's network economy.

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