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**The influence of technological regimes and strategic postures**

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# Make or buy of IT-enabled innovation: The influence of technological regimes and strategic postures

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**Abstract:**

IT-enabled innovations are of increasing importance for competitive success in most sectors today. This paper offers a novel theoretical and empirically illustrated explanation of why IT-outsourcing strategies differ between innovative first-movers, fast followers and late entrants. In particular, an analysis of three companies in the financial sector - Charles Schwab, Fidelity Investment, and Merrill Lynch - reveals that governance choices influence a company's appropriable learning curve advantage to slow down or speed up adoption and imitation of IT-enabled innovation. Moreover, we discuss the implications of governance choices in technological environments characterised by either accumulation or disruption.

*Keywords:* IT-enabled innovation, outsourcing, technological regime, strategic posture, first-mover advantages, financial services, online brokerage

## 1. Introduction

IT-enabled innovations are of increasing importance for competitive success in sectors ranging from banking through book retailing to pharmaceutical drug discovery. By *innovation* we mean "the generation, acceptance, and implementation of new ideas, processes, products or services" (Thompson, 1965: 36). Innovations are IT-enabled when they blend hardware and/or software assets with business capabilities to generate a novel process, product or service. Rarely do adopters of IT-enabled innovation command all necessary competence in-house so that 'distributed capabilities' need to be coordinated across firm boundaries (Coombs and Metcalfe, 2000).

For example, InnoCentive, an e-business venture by Eli Lilly & Co. is a web-based community initiated in 2001 that brings R&D challenges to leading scientists. Companies anonymously post problems - e.g. a method to detect inverted repeats in random transgenic DNA inserts is needed - and scientists compete to find solutions against cash awards in return for relinquishing intellectual property rights to their discovery. To develop the software that web-enables InnoCentive, Eli Lilly turned to a small 10-person outfit, Quivix LLC, which is backed by a virtual workforce of 455 free agent programmers[1].

While many process innovations across industries are IT enabled so are product innovation and new ways of transacting. By the end of 2000, Schwab had captured over half of the discount brokerage market, before main competitors started to initiate electronic channels through massive IT outsourcing collaboration with companies like IBM. Schwab, by contrast strongly relied on internal capabilities. The basic philosophy is "buy tools, build applications."[2] Exceptions are made if the requirements are not unique to Schwab or the required skills are not immediately available internally. However, while Schwab considers buying third-party software, the firm has resisted outsourcing its technology functions or transaction

[1] "Lilly's R&D prescription," *Fast Company,* April 2002.
[2] "Making Sweet Music with Charles Schwab," *Wall Street & Technology*, October 1996.

processing applications to avoid giving up either control or flexibility of capability development to sustain its first-mover advantage.

Against the backdrop of the importance of IT-enabled innovation in many industries, the key concern of this paper is to develop theory on how a firm's boundary choice with regards to creating IT capabilities, blending them with business activities, and protecting resulting learning investment impinge on the characteristics of the environment and its ability to create and sustain first-mover advantage. In particular, we address and empirically illustrate three crucial questions:

- How does outsourcing impact a firm's ability to adopt and benefit from IT-enabled innovation?
- How does the nature of the technological regime (Schumpeter I or Schumpeter II) influences boundary decisions?
- How and why do IT-outsourcing strategies differ between first-movers, fast followers and late entrants?

To address these questions we draw primarily on evolutionary theory (Nelson and Winter 1982; Dosi, 1988). An evolutionary perspective on the boundaries of the firm is context sensitive (Kogut and Zander, 1992; Teece, Pisano and Shuen 1997; Langlois and Foss, 1999; Afuah, 2001). It considers that outsourcing processes take place in a particular competitive situation and technology contexts (Tushman and Anderson, 1986). A change in firm boundaries has consequences for a firm's path dependent capacity to upgrade technological and business capabilities (Cohen and Levinthal, 1990) and appropriate returns from resulting innovation (Chesbrough and Teece, 1996; Teece, 2000). It also allows us to address the competitive consequences of boundary changes in terms organizational learning (Mahnke, 2001): Boundary change influences the ability of firms to integrate, build and re-configure internal and external competencies to address changing competitive and technological challenges.

In essence, we propose that appropriate boundary choice in the adoption of IT-enabled innovation depends on (a) the nature of technological advance (Schumpeter I or Schumpeter II) and (b) the focal firm's strategic posture (first-mover, fast follower, or late adopter).

The paper proceeds as follows. First, we address traditionally emphasized risks and opportunities of outsourcing and point toward issues that have been left largely unnoticed. Second, we draw attention to advances across technology paradigms in IT that a firm seeks to adopt, and make a distinction between capability enhancing and capability destroying contexts. Technological advance on which a firm's IT-enabled innovation rests is sometimes radical in nature, destroying the value of existing resources, process and service components or altering architectural linkages among components (Henderson and Clark, 1990). At other times, technological advance complements the value of a firm's existing capabilities (Abernathy and Clark, 1985; Tushman and Anderson, 1986). Third, we suggest how alternative strategic postures with regards to a particular technological S-curve helps explain type and extent of outsourcing in the process of adopting IT-enabled innovation. By distinguishing between different types of capabilities - IT capabilities, architectural capabilities and partnering capabilities - we specify the impact of outsourcing arrangements with regards to capability development and imitation risks. Fourth, we present a case study of the financial service industry to test our theoretical predictions. Conclusions follow.

## 2. In pursuit of comparative advantage: Risk and opportunities of outsourcing

IT outsourcing is broadly defined as a process undertaken by an organization to contract-out or to sell the organization's IT assets, staff and/or activities to a third party supplier who in exchange provides and manages IT assets and services for monetary return over an agreed period of time (Kern, Willcocks and Heck, 2002). The primary reasons why IT outsourcing have gained so widespread acceptance can be summed up as follows. Firms must constantly seek to lower their cost structures and respond with greater flexibility to changing market conditions and technological uncertainty in general. Moreover, all the elements of running a firm are becoming more competitive and complex in terms of technology integration. Competitive advantage also increasingly rests on electronically supported value chain linkages with and across firms. Under these circumstances, the most commonly cited drivers for outsourcing IT are financial (reducing costs, obtain immediate cash, replacing capital outlays with periodic payments), technical (improving the quality of IT, gaining access to new and/or proprietary technology), strategic (focus on core activities, facilitate M&A, time to market, specialized firms can more easily attract highly skilled professionals that are in short supply) and political motives (dissatisfaction with internal IT department, regarding IT as support function, pressure from vendors, desire to follow trends or imitate)[3] and firms usually outsource for achieving a combination of these benefits (Kern et al., 2002).

However, there are also significant risks associated with outsourcing. These risks include loss of control, declining rate of innovation, low performance, high transaction costs, other hidden costs including loss of key IT employees, dissipation of competitively relevant knowledge (Earl, 1996), and loss of absorptive capacity to monitor technological advance as well as motivation loss of remaining employees (Mahnke, 2001). While general risks and advantages of outsourcing are well established in the literature, little is known on how these differ in different technological regimes and across strategic postures.

### 3. Sourcing strategies depend on the nature of technological regimes

The IT capabilities and architectural capabilities that a firm coordinates within and across its boundaries yields competitive value only as long as external competitive contexts remain stable, which they sometimes do and sometime don't. One way to describe such external con-

[3] For a good example, see Loh and Venkatraman (1992).

texts is to distinguish between technologies signified by (a) knowledge (creative) accumulation or (b) creative destruction (e.g. Nelson and Winter, 1982; Dosi, 1988). Building on Nelson and Winter's (1982) notion of "technological regimes", Malerba and Orsenigo (1994) offer two specific patterns of technology development: Schumpeter I and Schumpeter II. The differences between the two opposite archetypes of technological regimes are mainly related to differences in appropriability conditions, cumulativeness of technical advances and the nature of knowledge underpinning firms' innovative activities. Given these differences, industries with different underlying technological regimes are likely to differ with respect to their dynamic and structural properties.

Schumpeter I regimes are characterised by 'creative destruction' in the sense that technological advance rapidly substitutes old technology. As the authors note: *"New entrepreneurs enter an industry with new ideas and innovations, launch new enterprises which challenge established firms, and continuously disrupt the current ways of production, organization and distribution, thus wiping out the quasi rents associated with previous technological advantages"* (1994: 85). By implication, Schumpeter I patterns stress the need to constantly access new technologies and constantly upgrade capabilities, while risk concerns regarding knowledge leakage might be less relevant due to rapid obsolescence of capabilities. In such an environment competitive advantages may be temporary and continuous profits can only be earned by constantly renewing the firm's competitive edge (Hamel and Prahalad, 1994; D'Aveni, 1994). Hence, a more dynamic environment de-emphasises competitive risks related to rapid imitation but stresses access to external knowledge and learning speed.

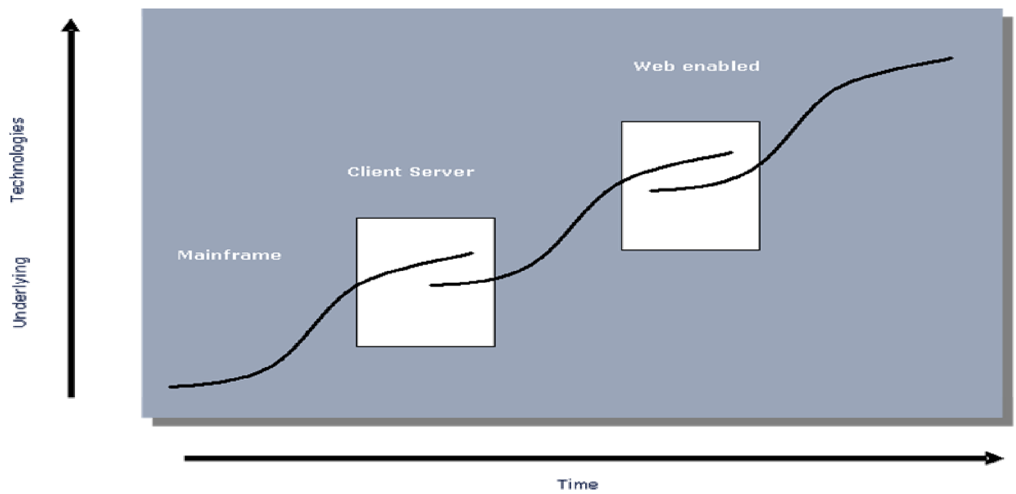
By contrast, Schumpeter II patterns of technology development are characterised by knowledge-accumulation in that technological advance builds on and gradually complements existing technology[4]. In these regimes, the ability of a firm to exploit the general level of

[4] *"…today's technical advances build from and improve upon the technology that was available at the start of the period, and tomorrow's in turn builds on today's"* (Nelson, 1995).

technological opportunity is a positive function of its specific stock of knowledge and technological and innovative capabilities accumulated over time. In such contexts, private firm knowledge is far less exposed to rapid obsolescence by technological advance made by other firms. Simultaneously, protection against knowledge leakage is relatively more important because competitors are more likely to command requisite absorptive capacity (Cohen and Levinthal, 1990) that makes imitation a viable competitive threat.

For example, as figure 1 illustrates, advances in IT have moved from (a) the mainframe area where computers were large, expensive and centrally managed, through (b) the emergence of decentralised client/server architectures accompanied with the standard application package concept where companies faced challenges of integrating and tailoring systems, application development and systems operations, to (c) web enabled computing (Lee, Huynh, Kwok and Pi, 2003).[5]

**Figure 1: Overlapping S-curves**




As technology advance proceeds, companies face challenges of reconfiguring their capabilities, upgrading and changing existing processes within and across the boundaries of the firm. These challenges are particularly severe in the areas of overlapping S-curves (Foster, 1985). However, technological development can shift from a Schumpeter II to a Schumpeter I regime (Afuah, 2001)[6]. If this is the case being vertically integrated in competences supporting old technological trajectories at the end of innovative possibilities can impede adoption of new technologies that are just at the beginning of their innovation potential. This period can be illustrated with an S-curve jump illustrating the transition from one enabling technology to another. Bettis and Hitt argue that if technologies rapidly alter the nature of competition managers will face major strategic discontinuities. This is more severe if *"…complex technological changes are occurring at a dizzying pace"* (1995: 7)

At this point, firm's integrated in old technology competence suffer from success traps (March, 1991), learning systems become dysfunctional (McKiernan, 2003), and core capabilities may turn into core rigidities (Leonard-Barton, 1992). Tushman and O'Reilly (1996) investigate the forces that constrain firms as they struggle with changing technological contexts. They suggest that success in one technology leads to structural and cultural inertia, and these impinge companies' ability to adapt, eventually leading to decline and failure in the adoption of new technology. As competition changes, managers fall victim to their inability to play two games concurrently – one evolutionary competence-enhancing, the other revolutionary competence-destroying, establishing the need to rapidly assembling new competence. As they argue, in *"periods of incremental change punctuated by discontinuous or revolutionary change…alignment among strategy, structure, people, and culture through incremental or evolutionary change punctuated by discontinuous or revolutionary change requires the simultaneous shift in strategy, structure, people, and culture"* (1996: 11). Hence, a firm's move towards extending its boundary may well be motivated organizational as opposed to market failure (Capron and Mitchell, 2003). If organizational failure exceeds market failure in con-

[5] Lee et al. (2003) suggest that outsourcing needs have co-evolved with technological advance. Our argument is complementary in that it addresses outsourcing arrangements across strategic postures in a technological regime.
[6] According to the industry life-cycle view, the evolution of S-curve in fact signifies the evolution from Schumpeter I technological regime (organization) into a Schumpeter II regime (organization) (Klepper, 1997).

tracting IT enabled capabilities, the firm will increasingly rely on external vendors to bring about and integrate IT-enabled innovation.

Based on the arguments above, we offer the following explanations for outsourcing strategies in the context of adopting IT-enabled innovation. Firms will on average outsource less in Schumpeter II environments compared to Schumpeter I environments. This is because innovative incremental differentiation possibilities based on IT capabilities and architectural capabilities decline toward the end of the development of a particular technological trajectory. In addition, concerns about imitation risk are lower in Schumpeter I environments. On average, in times of technological discontinuity, we expect higher levels of outsourcing as firms with strong IT capabilities in previous technology life cycles (TLCs), business capabilities, and architectural capabilities start experimenting with new technologies through collaboration with external suppliers. As is well known in the innovation literature, exposing the firm to innovative suppliers can be instrumental in breaking internal inertia. At the same time, firms with weaker capabilities in prior technological regimes can possibly leapfrog old leaders during times of discontinuous technological change through extensive partnering.

## 4. Sourcing strategies depend on strategic posture

The choice of suitable governance structure to adopt IT-enabled innovation depends as well on firms' strategic postures. It follows that governance structure is a function of a number of economic (dis)advantages and operational constraints emanating from the interaction between the strategic behavior of entrants and the dynamics of the environment succeeding the entry.

*IT outsourcing decision: Disadvantages/Advantages of strategic postures*

Firms adopting IT-enabled innovation can pursue three strategic postures: First-mover, fast follower, and late adopter strategies. The notion of first-mover has proven difficult to conceptualise as it includes both technology and market aspects (Lieberman and Montgomery, 1988). Golder and Tellis (1993) distinguish between the inventor (first to develop patent or technology), the product pioneer (first to develop working model) and the market pioneer (first to sell new product). The latter corresponds to the standard definition of a first-mover, which we also adhere to. The essential difference between the three strategic postures refers to the timing of entry into a particular IT-enabled innovation. The timing of entry has implications for market development cost, R&D risk, entry barriers faced, available supplier competence, learning curve advantages with regards to IT and architectural capabilities and partnering capabilities (see table 1).

Lieberman and Montgomery (1988) argue that first-mover advantages can be attained in situations where i.e. adoption of innovative product and process technology results in appropriable learning curve effects. Investments in market development and R&D can only be re-covered if cost savings and marginal revenue through the adoption of IT-enabled innovation are (a) large enough and (b) protectable by means of law, or defy imitation due to tacitness and complexity of underlying capabilities (Chesbrough and Teece, 1996).

It is important to distinguish between different types of learning curves associated with the adoption of IT-enabled innovation: IT capabilities, architectural capabilities, and partnering capabilities. IT capabilities concern the mastery of hard and software components, while architectural capabilities combine such IT capabilities with business capabilities (Henderson and Clark, 1990). In addition, to the extent, first-movers can rely on competence in supplier markets, partnering capabilities (Dyer and Singh, 1998) are instrumental in reducing transaction costs (Williamson, 1991) and effective capability integration (Gulati, 1999) across the organizational boundaries in vendor/ client relations. While first-movers may have learning curve advantages with respect to developing internal IT capabilities and architectural capabilities as long as a TLC's innovation potential is not exhausted, they often have to deal with a lack of supplier competence, especially with regards to blending IT capabilities and industry specific business process.[7]

Another first-mover advantage exists if early adoption of IT-enabled innovation leads to buyer switching costs. This is often the case, where IT-enabled innovation dictates the structuring of client interfaces, and clients have to learn the use of particular transaction platforms, etc. Once buyers invest in their first IT systems, there is additional incentive for the IT provider both to design incompatible systems if incompatibility raises switching costs (Katz and Shapiro, 1995) and to actively seek to prevent the entry of gateway technologies- i.e. bridges to make incompatible technologies compatible (Greenstein, 1997). Associated advantages of first-movers include making a large and lasting impression on customers, earning strong brand recognition, and reaping network externalities.

Although first-movers may enjoy advantages through an early adoption of IT-enabled innovation, they also face substantial risks and often pay a high price for pioneering (Boulding and Christen, 2001). Thus, a late entrant can obtain advantages by taking a wait-and-see approach to adopting IT-enabled innovation[8]. These include, as suggested by Lieberman and Montgomery (1988), (1) the ability to free-ride on the innovators R&D investments, (2) resolution of technological and market uncertainty, (3) technological discontinuities that provide "gateways" for new entry, and (4) various types of "incumbent inertia" for instance due to sunk cost considerations, which materialize in "exit barriers" (Porter, 1980) or inertia in its processes (Nelson and Winter, 1982) associated with architectural capabilities in old techno-

[7] Note in this context that 'technological uncertainty' as a predictor of vertical integration yields mixed results in transaction cost studies. Perhaps the degree of competence in supplier markets can reconcile varying results. The 'market' as governance default mechanism is unavailable if no supplier market with proper competence exists.

[8] Although some firms may decide upon their strategic posture and the specific decision depends on whether the technological competition takes the form of a race or a waiting game (Katz and Shapiro, 1985; Dasgupta, 1988), firms with weaker innovative capabilities are almost always forced to assume the late entrant position (Lieberman and Montgomery, 1998; Cho, Kim and Rhee, 1998). This implies that "competitively imposed" strategic postures can shape the future boundary decisions of the firm.

logical regimes.[9] However, these advantages are not equally available to all later movers. For instance, while free-riding on R&D investments may be possible for all "non-first-movers" if results diffuse in an industry, the resolution of technical and market uncertainty is only advantageous for the late adopters and not for the fast follower. Thus, a distinction between fast followers and late entrants is necessary.

**Table 1: Implications of entry timing**

| | *First-mover* | *Fast Follower* | *Late Mover* |
|---|---|---|---|
| Market development costs | +++ | ++ | + |
| R&D risks | +++ | ++ | + |
| Entry barriers | + | ++ | +++ |
| Supplier competence | + | + | +++ |
| IT Capability | ++ | ++ | + |
| Architectural capability | +++ | +++ | + |
| Partnering Capability | + | + | +++ |

+++ = high, ++ = medium, + = low.

*IT outsourcing decision: Knowledge creation vs. imitation risks*

First-movers engaged in outsourcing relations face a critical tension: successful outsourcing often requires putting competitively crucial capabilities at risk (Williamson, 1991; Kogut and Zander, 1992). While IT outsourcing may help firms to access capabilities that they cannot build in a reasonable time frame themselves, it also gives vendors a window to valuable knowledge that they may leak to other clients including competitors acting as late movers.

Several sources of knowledge-leakage have been considered in the literature (Mansfield, 1985; Levin, Klevorick, Nelson and Winter, 1987) including movement of personnel, informal communication networks, meetings, suppliers and customers, patent applications, and reverse engineering. Furthermore, in the context of outsourcing capabilities for IT-enabled innovation, a notable factor fostering the diffusion of enabling capabilities requires

[9] Contrary to the literature's insights, neither Makadok (1998) nor Lopez and Roberts (2002) find that first mover advantages erode quicker in weak appropriability regimes than in strong appropriability regimes .

close attention: An essential part of an IT-service provider's value proposition to clients is its ability for cross-project learning within the same industry as well as across industries.[10]

While external suppliers, due to economies of specialization can be expected to command substantial strength in IT component capabilities as they move faster down a particular IT technology related learning curve, they are also more likely to add value to a client's capabilities if they command expertise in industry specific best-practices by blending IT capabilities with industrial process knowledge. By implication, to the extent clients select external vendors based on their reputation in a particular industry, the greater the incentives of vendors become to leverage expertise gained in a first-mover's assignment for similar assignments in the same industry. If so, the differentiation potential of IT-enabled innovation for the first-mover will diminish and its time span of appropriation will be shortened.

On the other hand, the best a fast follower or late adopter can expect from a vendor is 'industry best practice' rather than an 'innovative leading practice'. While adopting an industry's best practice helps moving up towards the industry's efficiency frontier, adoption leads to competitive parity not competitive advantage (Barney, 1991). By implication, first-movers exhibiting substantial architectural capability strength may be more likely to utilize external suppliers to support separated component capability areas, where they have fallen behind (Liebeskind, 1996), while minimizing the risk of disseminating architectural capabilities on which their IT-enabled innovation rest. Late movers, by contrast, have greater incentives to turn to more comprehensive outsourcing arrangements as this can contribute to making up for competitive disadvantage.

In general, valuable capabilities that leak from first-movers to competitors may be hard to exactly imitate, even if external vendors contribute to ease the diffusion process by standardization of service delivery. Nonetheless, leaking capabilities may also lead to innova-

[10] Emphasized in an interview with the CEO of the Danish subsidiary of a major global IT outsourcing firm.

tive substitution based on a combination of leaked knowledge and complementary knowledge that is already in possession of competitors, or is acquired through the simultaneously use and coordination of multiple external vendors.

*IT outsourcing decision: Technology life cycle and unstructured technical dialog*

The character of technology is dynamic. It evolves from the initial "integral" phase to the opposite "modular" phase and then cycles back. As the technology progresses from one phase to another, the optimal organizational configuration of the firm must also shift if it is to continue to capture value from its innovation (Chesbrough and Kusunoki, 2001)[11]. Alongside supply dynamics (Dosi, 1982), the evolution of technology is contingent on the interaction between the technology development and the demand environment in which the technology is ultimately evaluated (Adner and Levinthal, 2001). Following any innovation, competition and strategic intent focuses rapidly and predominantly on product or service functionality; since the innovation is often not good enough to satisfy the needs of the majority of customers in the market (Christensen, 1996; Adner and Zemsky, 2001)[12]. The early market entrants then strive to develop better functionalities to wring as much performance as possible from the new technology. Innovation architectures however tend to be initially interdependent, which in turn requires intense "technical unstructured dialogue" (Monteverde, 1995) and "overlapping problem solving/development" processes (Clark and Fujimoto, 1991) within the firm. In other words, engineers/designers in this first phase encounter interdependent interfaces i.e. they do not know what to specify, cannot accurately measure important attributes and do not yet understand how variation in one subsystem impact overall system performance (Christensen et al. 2002). Thereby, they are in strong need of joint and overlapping problem solving,

[11] According to Pavitt (1998) firms can fail even when they master a new technology as they often cannot match their coordination and control systems to the nature of available technological opportunities.

direct observation, face to face discussion, interaction with physical prototypes and computer-based representation (Wheelwright and Clark, 1992) and extensive learning by experimenting (Baldwin and Clark, 1994) all of which should be accommodated by some degree of organizational stability (Rosenbloom and Cusumano, 1987). In the race to develop better functionalities, first-mover and fast followers will accordingly have lesser incentives to outsource.

Gradually, however, the functionality of products or services surpasses what customers in large portions of the market can utilise. This means that the customer's willingness to pay for improvement is largely exhausted.[13] Consequently, the functionality race turns into a race of speed, flexibility and customisation (Christensen, et al. 2002; Baldwin and Clark, 2000) and hence efforts to compete along these dimensions cause product or service designs to move toward modular architecture (Ulrich, 1995). Modularity then allows structured technical dialogue within and across the boundaries of the firm, decentralization and vertical disintegration. In this process, buyer switching costs imposed by early market entrants (in particular stemming from "system lock-in" i.e. incompatible architectural standards or networks) are too reduced as the buyers can upgrade particular components without replacing the entire system (Sanchez, 1995). Once the decomposition of innovation's architecture is underway, as structured technical dialogue is rendered possible, late movers will be able to rely upon intermediate markets for outsourcing of processes or activities[14].

*Conclusion: Strategic postures and sourcing strategies*

While current studies indicate when firms are more likely to outsource, they omit the role of strategic posture. We propose that first-movers -in the beginning of a TLC - refrain

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[12] Demand homogeneity allows a firm to produce a single integrated solution that is close to optimal for the majority of customers (Langlois and Robertson, 1992). In early life cycle stages of technologically progressive industries demand is yet highly uncertain and variable ((Gal-or, 1987)

[13] There is decreasing marginal utility to increases in functionality (Meyer and Johnson, 1995).

from extensive outsourcing for three reasons**.** First, simply because the supplier market is underdeveloped (Willcocks and Fitzgerald, 1994) and technological uncertainty will cause contractual failures (Williamson, 1975)**.** Second, extensive outsourcing increases the risk of imitation by followers and latecomers leading to competitive parity**.** Third, first-movers will initially confront with interdependent interfaces, where 'unstructured technical dialogue' occurs**.** Thus, moving along a particular TLC, first-movers will tend to in-source (outsource) early on (later on) component processes as the TLC proceeds and marginal improvement possibilities level out. Late movers will tend to outsource to undo first-mover advantages at lower costs and risks. Fast followers, on the other hand, can neither utilise a developed market nor the specialization skills of such, but they may be able to follow an imitation strategy and therefore adopt some kind of hybrid sourcing

## 5. Strategic postures, technological regimes and sourcing strategies

We have developed propositions for how different technological regimes and different strategic postures impact firms' sourcing decisions. To sum up, in terms of Schumpeter I-patterns we have postulated that in such environments firms will on average outsource more than in Schumpeter II technological regimes. Further, we believe that the incentive to outsource is positively related to the frequency of disruptions and hence in an environment characterised by high frequency of disruptions, because of constantly changing strategic postures, all firms will depict the same propensity to outsource. Studies of the performance of first-movers compared to imitators in rapidly changing environments suggest that imitation is a superior strategy to innovation (Mellani and Johnson, 2000). More specifically, in these environments later entrants may have advantages if technological discontinuities and competence-destroying technological change provide opportunities for competitive leapfrogging (Cho et al., 1998).

[14] Similarly, Robertson and Langlois (1995) contend that when the product life cycle reaches the maturity stage and the innovation is largely autonomous in that it has lost its systemic qualities, vertical disintegration would be

Concentrating on the technological accumulation setting (Schumpeter II) or a particular S-curve, our general argument is that firms have relatively low incentives to outsource. Overall, we propose that firms' incentive to outsource increases as the technology evolves through its life cycle, reaching the maximum in the modularity stage.

## 6. Sourcing strategies in the financial industry

The global financial services industry is undergoing a dramatic restructuring driven by two potent forces: de-regulation and IT. Nowhere has the scale of competitive change been more pronounced than in the US, where gradual relaxation of regulation since mid 1980s accompanied by revolutionary advances in IT have led to a rapid convergence of financial services, fuelled a wave of cross-segment consolidation (e.g. Citigroup and JP Morgan Chase) and spawned a rash of new entrants. Particular impact of these dual forces has played out in the emergence and growth of online investing services for retail and institutional investors. From a structural standpoint, the brokerage landscape has been significantly transformed by the e-commerce, Internet and web-related technologies, which have allowed the "remote" distribution of financial services at a far lower unit cost (Bakos et al. 2000; Chen and Hitt, 2002). Since the opening of first virtual brokerage in 1994, the market has grown considerably. In 2001, 43% of investing households held online brokerage accounts at some 100 full-service and pure e-brokerages. Online trading represented over half of total trading[15].

In the following, we provide a techno-history account of three leading brokers with formidable presence in the online brokerage world in order of entry: Charles Schwab, Fidelity Investment and Merrill Lynch. All three service providers are fully established and diversified companies with a long history of traditional investment broking and equally impressive track-record of IT-enabled service innovation.

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the most appropriate.

[15] eMarketer, 2002, "Online Investing"

***First-mover into online brokerage: Charles Schwab***

Charles Schwab is the largest worldwide discount broker with nearly $1 trillion in customer assets, eight million active investors and over 300 offices across the world. Although Schwab offers services via other channels, more than half of its clients' total trades are conducted over the Internet. With an online market share of 28% (2001), Schwab is the undisputed market leader and enjoys the reputation of the first-mover into the brokerage cyberspace among the traditional brokers. Schwab was initially founded as a securities dealer in 1971 then became a discount broker in 1974. In 1999, the company's market capitalization exceeded that of Merrill Lynch despite the fact that Merrill's asset base was three times the size of Schwab.

Throughout its history, innovation through IT has been a key component of Schwab's success[16]. In fact, the long time President and the co-CEO David Pottruck has been frequently cited as saying *"we are a technology company in the brokerage business"* (Ramchandran and Gurbaxani, 1999). As early as 1979, Charles Schwab, the founder, realized that if he was going to quickly grow the company and gain a competitive edge, he had to own cutting edge technology. So in 1979 Schwab acquired a used back-office IBM System 360 mainframe plus software left over from CBS' 1976 election coverage for two million dollars – which was a big bet as at the time the net worth of the entire company was only two million dollars. Since then Schwab has consistently spent between 11 to 14% of its revenues on IT and continued to pioneer new and unique IT-enabled services. By 1982 the firm's technology was well ahead of a typical Wall Street outfit[17]. In 1982, Schwab became the first brokerage firm to offer its customers 24-hour a day, 7-day a week automated phone service and simultaneously launched Pocketerm- a handheld device that downloaded stock quotes from FM receivers. According to

[16] This commitment to technological innovation has also been recognized by the IT and financial services communities. Top IT magazines, including InfoWorld, PC Week, Wired, and CIO and Fortune and Money Magazine have all honoured Schwab with various distinctions for its use of technology.
[17] Fortune, 01.06.1992, "How Schwab Wins Investors"

Fortune Magazine[18] "*Schwab's system, unveiled in 1982, went beyond Merrill's in that it allowed brokers to execute orders instantly through a computer link to the exchange floor*". Two years later, Equalizer, in-house built DOS based trading software, was released. In 1986, Schwab introduced the Schwabline, a system that downloaded market data over a phone line and printed the information on adding-machine paper. On the seventh anniversary of the company's dramatic bet, the Business Computer Systems Magazine[19] wrote:

> *"Charles Schwab set out 7 years ago to become the biggest, highest-volume discount broker in the US, and the success of that venture has been due to a zealous commitment to information systems. The firm's business formula stresses increasing customer service through the use of sophisticated computer and communication systems. Schwab's 175-person Information Systems Division has a budget of $35.5 million for 1986…The need to act fast in the brokerage business is a primary motivation behind the firm's commitment to proven technologies".*

Towards the end of the decade, Schwab debuted the TeleBroker- an automated touch-pad order entry system which also allowed retrieval of real-time stock quotas. Callers were prompted through the process by a computer and never spoke to a broker. At the end of 1991, owners of PCs among Schwab's clients could trade electronically. Only in December 1991, Schwab did 6% of its volume entirely by modem and that year alone the discount broker spent at least $20 million on systems development[20]. In 1993, StreetSmart software- an extended version of Equalizer- was introduced. The application was the first Windows-based software to allow online trading of stocks, bonds and mutual funds. It followed up the next year with a version for Macintosh computers and, in 1995, with a second-generation Windows version. To serve active stock-traders, in 1994, the company rolled out Custom Broker, a program that makes use of a variety of financial newswires and other information services to get data to

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[18] Fortune, 01.06.1992, "How Schwab Wins Investors"
[19] Business Computer Systems, August 1986, "Technology Trader"

customers fast by phone, fax or computer or pager. Finally in 1996, Schwab began offering Internet trading through e.Schwab, which proved to be a highly successful strategic move. By the end of 1998, more than two million accounts had been signed. In 1998, Schwab merged its separate Internet and offline services into a single business. By March 2000, Schwab's web site averaged 40 million hits per day and processed more than 70% of its trades online. The co-CEO Pottruck now believes Schwab's business proposition lies in its *"seamless blending of the physical and digital world"*. The CIO Dawn Lepore adds *"If you wait until a technology is widely adopted before you try it, you have lost your market advantage. That's why we were early entrants on the Web and we have such a big market share"*[21]. e.Schwab was originally designed to run on a PC and link to Schwab's trading system via its proprietary network, but was quickly reformulated as a Web-based service when new entrants such as E-Trade introduced e-stock trading at prices that undercut Schwab's.

Schwab's sophisticated IT capabilities are largely a product of in-house experimentation and development as the CIO Dawn Lepore explains:

> *"One of Chuck (Schwab)'s first big decisions was to go in-house with technology at a time when we were much too small to have made that decision…But he recognized that for a company to grow and to achieve that kind of vision we had for the future, going in-house and building our own proprietary technology was going to be critical. He made that decision back in the seventies and we have never looked back"* (Dewan and Mendelson, 2001)

Indeed the company has traditionally stayed away from collaborative development with external vendors when possible. Instead it has preferred acquiring the software or tools and building the applications internally. The same approach is mirrored in the company's attitude towards outsourcing: One thing the firm will never do, says the CIO, is to outsource its technology functions or transaction processing applications: *"We're in a cyclical business*

[20] Forbes, 03.02.1992, "A Touch of Class"
[21] Information Strategy, September 1997, "Betting the Bank"

*and we want to take advantage of changes in marketplace. You give up flexibility, I believe, if you outsource. And we are not willing to give up either control or flexibility"* (Dewan and Mendelson, 2001). The Institutional Investor confirms: *"Like other firms, Schwab has made computerized electronic trading systems a priority, but it didn't just draw up a shopping list and hand it to some consultant"*[22].

Schwab's technology philosophy is to be on technology's leading not bleeding edge[23]:

> *"We have this view that we will have an infrastructure that will continually evolve. Any specific technology strategy is not sustainable. What is sustainable is a constant evolution of your technology and people who are very good and creative at applying technology to business problems. So we really focus on keeping our infrastructure constantly evolving. We have rules like no more than two generations of technology at any one time"* (The CIO in Dewan and Mendelson, 2001).

The four year Systems Architecture and Migration Strategy (SAMS) is a testimony of the evolutionary development approach. In 1992, Schwab moved aggressively to build on its technology capabilities by initiating the SAMS project to migrate from mainframe-based information systems to a next-generation distributed computing architecture built around IBM mainframes, Sun servers and Windows NT desktop systems. Schwab chose server architecture as a more efficient way to add capacity, cut transaction-processing costs, and enable the speedy delivery of new kinds of functionality to customer-service representatives.

Looking forward, having successfully adapted its business to the Web, the company now wants to achieve what might be considered as the industry's Holy Grail: anywhere, anytime customized service delivery[24]. The chairman and co-CEO Charles Schwab leads the way: *"We will have three-dimensional customization. It will be audiovisional, it will be organized, it will be whatever way you want it"*.

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[22] Institutional Investor, April 1996, "On Technology's Leading Not Bleeding Edge"
[23] Institutional Investor, April 1996, "On Technology's Leading Not Bleeding Edge"

***Fast follower into Online Brokerage: Fidelity Investments***

Once known as a mutual fund company, Fidelity Investments is a privately owned global provider of brokerage services, retirement services, wealth management, securities execution and life insurance. In addition, the company manages some three hundred mutual funds.

Fidelity is currently the number two online broker by market share[25]. Although the roots of Fidelity and main rival Schwab are in different businesses, they have traditionally been renowned for successfully combining marketing, information and customer service capabilities to develop profitable IT-enabled banking services (see for instance, Willcocks and Plant (2001)). Fidelity spends about 25% of its revenue on IT compared with about 15% at Schwab and about 5% at Merrill Lynch[26]. Of 20,000 people employed, about 20% are IT professionals. Fidelity is also the first mutual fund that established Web presence.

Throughout the 1980s Fidelity grew at an impressive pace (both the number of clients and agents needed to serve those more than quadrupled between 1982-1989) meanwhile investing millions of dollars in IT development. At the end of the decade the company was managing $137 billion in assets, processing 9.8 million customer transactions and fielding a daily average of 139,400 telephone calls from customers. It had already launched a number of highly successful IT-enabled innovative trading services not to mention the industry's first automated telephone voice response system. One such service was a market –watch screen which highlighted price changes and flagged stocks as they hit their highs and lows each day. Another service offered by Fidelity as early as 1984, -Investor's Express- became the first comprehensive brokerage service available from a national broker to use on the computer. A Wall Street Journal article in 1987 praised the technology commitment and vision running across the firm: "*Fidelity has made the marketing of mutual funds a high-tech extravaganza. Sidestepping brokers to reach customers directly, Fidelity uses highly automated systems to*

[24] Digital 4Sight, 2000, "Customer Fulfilment in the Digital Economy: Charles Schwab"
[25] Wall Street Journal , 12.06.2000, "Online Investing"

*swamp mutual fund holders with mail - 200,000 pieces a day - urging them to invest more and allowing them to buy, sell or switch investments among more than 100 funds…Still in the dream stage at Fidelity are systems that would let customers track the market even more closely than the hourly pricing now available, manage their funds through home computers and hold asset accounts with a single monthly balance sheet for checking, and credit or debit cards."*[27] Business Week later observed: *"In the late 1980s, Fidelity Investments could do no wrong. The Boston mutual- fund giant's reputation for good returns and stellar customer service went happily hand in hand with its fame as a quick adapter of new technologies. The firm took a big lead as it implemented voice-recognition technology and daily valuations of 401(k) plan accounts, becoming the nation's largest provider of such plans*."[28]

Fidelity remained largely a main-frame environment during the 1980s[29]. The transition to client/server came in 1991 upon a decision to standardize, restructure and simplify the three-tiered internal operating environment. Accordingly, a comprehensive development methodology, Fidelity Advanced Systems Environment (FASE) 2000, was constructed on joint application development, rapid prototyping and enterprise-wide data modelling. The FASE 2000 method was platform independent so that it could be used to create mainframe, minicomputer or PC applications. In about six months into the 1992, Fidelity managed to develop the first tangible product of FASE 2000: a client/server accounting application for the financial and management information system. All the same, despite its absorption of new technology, Fidelity's CIO admitted *"no near term plans to cart away mainframes. The main frames will remain the source of all fund-management transaction data for the next decade"*[30]

Fidelity's persistent desire to be on technology's cutting edge has occasionally hampered the company. One critical mistake was Fidelity's attempt to build Windows-based soft-

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[26] Institutional Investor, March 2002, "Fidelity to the Future"
[27] Wall Street Journal , 12.06.1987, "Technology (Special Report): Frontiers"
[28] Business Week, 28.10.1996, "On the Cutting Edge"
[29] Datamation, 15.10.1993, "UNIX Superserver Shoot-out"

ware for its retail-brokerage customers to use in making investments online. The project, Fox Plus, ended up taking three years longer to get in gear than arch-rival Schwab's PC-based system StreetSmart. While Fidelity stumbled, Schwab expanded its lead, signing up several hundred thousand clients to its proprietary software. In May 1995, Schwab widened the gap by launching Internet-based equity trading, and in July 1995, it added fund and option trading. The discount broker continued to lead with the all-electronic account offering e.Schwab.

Since then Fidelity and Schwab have continued to wrestle each other in expanding online services and reinforcing underlying technology infrastructure. In April 1999, Fidelity released the latest version of the firm's high-speed Internet dependent desktop trading and reporting system as well as a proprietary Internet platform through which registered investment advisers can offer clients view-only access. Three months later, Schwab started replacing the SchwabLink with a new and improved version which relied on the Internet to send files such as mutual fund trades as opposed to the previous private network dependent version[31]. August, Schwab launched Velocity – a new Java-based desktop trading application aimed at active trading individuals. In a few weeks, Fidelity responded with Powerstreet Pro, an entirely Internet-based application targeting active investors. For frequent traders, Powerstreet offered more sophisticated research tools like Nasdaq level II quotes and provided the ability to execute more exotic trades online such as short sales[32]. Schwab's next competitive move was to expand the online trading to after hours. Fidelity does not seem to give up: "*With the Web there was a lot of talk about first-movers, grab this, grab that"* says the COO of Fidelity, *"That's important. But what's more important is whether you are spending to build a good business"*[33]. This belief has been strongly embedded in the CEO Johnson's motto ever since the company bought its first mainframe computer in 1965: *"Are we spending enough, are we*

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[30] Computer World, 21.09.1992, "Fidelity's Development Plans Leans on JAD and Prototyping"
[31] Financial Planning, 01.08.1999, "Who is on first? Fidelity is Ahead At the Moment"
[32] American Banker, 28.09.1999, "Fidelity Investments Revamps Its Trading Site"
[33] Institutional Investor, March 2002, "Fidelity to the Future"

*going fast enough?"*[34]. Just like Schwab, Fidelity too has taken a home-grown approach: *"If Fidelity wants to do something, they do it themselves. They may not be first to the market, might not make the flashiest press releases in the beginning, but they have a tried-and-true product in which they are confident, and it shows"* notes US Bancorp Piper Jaffray[35].

While Schwab has beaten Fidelity in online trading race, Fidelity has outcompeted Schwab by about a year and a half by pioneering the wireless stock trading services in 1999. Until Schwab's launch of own wireless brokerage services, more than 65,000 Fidelity customers had signed up for wireless access to their accounts and on a monthly average Fidelity's Web site was being visited four million times by PalmVII users. Schwab executives however do not consider the company late to the game: *"We are not the first, but we are early"* says CIO Dawn Lepore, *"This is a marathon, and it's just beginning"*[36]

***A Late Adopter of Online Brokerage: Merrill Lynch***

With $1.4 trillion in assets and 650 offices around the world, Merrill Lynch is a leading global financial management and advisory company. It has its origins in retail broking but has gradually built a business around issuance, advisory and institutional broking. Merrill Lynch is one of the world's largest underwriters of both debt and equity, the fourth largest M&A advisor and the fifth largest fund manager (both by volume).

Until the advent of 1990s the company had been regarded as one of Wall Street's leaders in terms of in-house IT development capabilities and the strategic use of information systems[37]. For instance, it was the first brokerage firm to use fibre optics and to develop a software program - Merrill Link - which allowed customers to review their securities portfolio

[34] Institutional Investor, March 2002, "Fidelity to the Future"
[35] Computer World, 23.10.2000, "Betting for Web Investors"
[36] New York Times, 05.08.2000, "Schwab Plans Wireless Link on the Road"
[37] The Banker's Magazine, Sept/Oct 1985, "Competitive Advantage and Information Technology"

from a home computer[38]. In addition, its average annual spending of $165 million on systems applications and development was hardly matched by the competition. Along with Prudential Securities, Merrill Lynch pioneered the use of high performance computers and massively parallel processing systems (MPP) to conduct complex financial analyses for internal purposes and clients. Unlike late adopters Bear Stearns and J.P. Morgan, however, Merrill's system developers built their own applications for I/860 MPP based on similar applications the firm had used on its IBM 3090 600s mainframe. Merrill had additionally developed its own financial applications for the I/860[39]. Throughout the 1980s Merrill had also collaborated with external vendors to innovate new IT-based financial tools and systems for the market. One such effort resulted in the formation of International MarketNet (ImNet) in 1983, a joint venture with IBM, which built sophisticated brokerage work stations and market data systems.

At the end of 1980s the top management focus shifted from technological innovation to technological integration. "*Productivity as the password of the 1990s for the entire financial services business"* declared the management. As Koerner (1990) noted then "*Today the technology planning unit at Merrill Lynch no longer exists. Innovative technology within the company also appears to be something of the past, at least for the moment"* (p.28). To that end, a drastic five year data consolidation project was initiated. When the work was completed in April 1993, Merrill had consolidated from fourteen to two data centers, increased its MIPS capacity by hundred percent and generated savings of $100 million. This was an entirely internal achievement which marked Merrill's competencies in database management: "*At one point",* admitted the Executive VP*, "we thought we could outsource all of our data centers to IBM. Well they came back and said they couldn't do it any better than how we are doing it"*[40]. Satisfied by the outcome, in 1995, Merrill announced a $800 million in-house client server workstation development project to replace its eight year old main frame text-based

[38] Wall Street Computer Review, February 1986, "Can Computers Help Merrill Take Possession of the Field"
[39] Computer World, October 12, 1991 "Financial Services Firms Move in Parallel"

information system in use for retail applications. Dubbed Trusted Global Advisor (TGA), the new Windows NT based (to replace 286-based) workstations began to be rolled out in 600 Merrill Lynch Private Client offices early 1997[41].

Merrill's predominant engagement in technology rationalization and in-house server building has however retained it from pacing up with the significant developments of the 1990s; in particular in the brokerage services cyberspace. For instance, it took Merrill two additional years and $200 millions to develop a system that enabled brokers to make direct-to-the-floor trades for customers as quickly as Schwab's[42]. Although the company had been generating half of its revenue from private services, Merrill was a reluctant latecomer in offering brokerage services on the Internet[43]. As De Meyer et al. (2002) put it: *"it suffered from the classical lapses of leading incumbents who are at times slow to realize the implications of a disruptive technology"* (p. 58). On September 23, 1998 Wall Street Journal quoted Merrill's Vice-chairman John Steffans: *"…The do-it-yourself model of investing, centred on Internet trading, should be regarded as a serious threat to American's financial lives. This approach to financial decision-making does not serve clients well and it is a business model that won't deliver lasting value"*[44]. Feeling the heat from web-based brokerages, Merrill brought in a leader from outside the brokerage services field- an unusual practice for the company- as its first Chief Technology Officer and began a four month trial of an online client site only for selected institutional clients in 1999[45]. Web technology was yet still seen as peripheral. In an interview in 1999, the CEO Dave Komansky said "*the Internet and technological delivery of the goods and services is clearly in the state of flux, and I am confident that no one knows the end game today….But we do not purvey information; we transfer information into wisdom,*

[40] Computer World, 29.11.1993, "Wall Street Consolidates Its Assets"
[41] Wall Street Technology, 12.07.2002, "Cooking New Broker Workstations"
[42] Fortune, 01.06.1992, "How Schwab Wins Investors"
[43] InternetWeek, 05.03.2001, "No Wimps Allowed-Merrill Lynch Institutionalizes E-Biz"
[44] Wall Street Journal, 23.09.1998, "Merrill Says Online Investing is Bad For Investors"
[45] InternetWeek, 16.10.1999, "Merrill Lynch Feels Heat From Discounters"

*advice and guidance…I have yet to see the machine that can transfer wisdom*". Later that year, Merrill rolled out Merrill Lynch Direct for self-directed investors offering low-cost on-line trades. In 2000, Merrill entered into a partnership with FinTrack Systems Corp to offer FinTrack's browser-based trading solution to small institutional investment firms.

In 2002, Merrill signed a $1 billion outsourcing contract - the largest in the firm's history - with a consortium of best in class vendors led by one general contractor Thomson Financials to improve its wealth management work station platform (TGA). The move represents a major change in Merrill's traditional 'in-house' approach to IT initiatives. The CEO, Scott Neal, calls this a shift from "build everything yourself" to "build whatever can differentiate you from your competitors, but buy the rest"[46]. According to Gartner Inc. *"we have seen that shift from them partly because they were spooked by e-business and they were comparatively slow in setting up their online system"*[47]. In this hybrid outsourcing model, Thomson serves as a general contractor responsible for the desktop and managing the subcontractors including IBM, HP, Dell, AT&T and Microsoft. While hybrid agreements are not uncommon, it is unusual that the lead role assigned to a specialized proprietary system developer.

The ultimate objective of the deal is to replace 14.000 TGAs which is "*brittle technology, old technology that was expensive to maintain and support"* (Merrill's CIO). Since it was based on client/server, TGA neither had any in-built CRM capabilities nor allowed the integration of Merrill's online sites (where clients could do transactions) with it. It also required great bandwidth and significant testing before new applications were added. The new workstation implementation is one of the largest web-based implementations in the industry. Why outsource both the desktop and web simultaneously? Merrill's CIO answers: *"We did a Forrester study in the fall with our financial analysts and 98 percent said it was important to their clients to be able to access their accounts online. Over 90 percent said it was important*

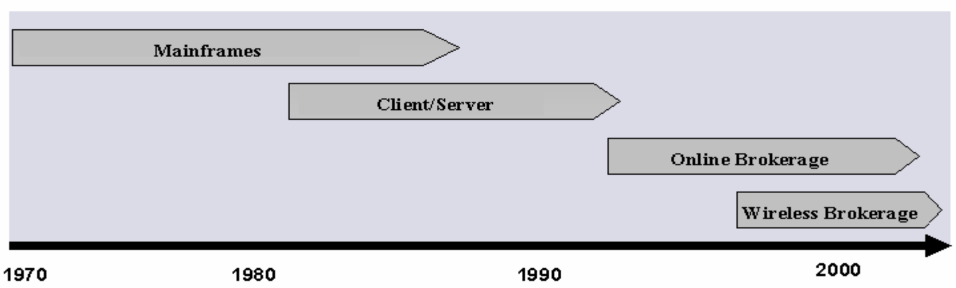
[46] CIO, 15.09.2003 "Merrill Lynch's Bilion Dollar Bet"
[47] eWeek, 01.08.2003, "Fishing for Assets"

*to their clients that they are technologically enabled…This was one of the reasons we out-sourced the desktop and the Web site at the same time."*[48]

***Summary of the case study***

The following figure illustrates the evolution of technologies in the brokerage industry over time. The shifts in technology have been competence destroying for some firms while competence enhancing for others. Whereas the shift from mainframes to client servers went relatively smoothly for all three firms, Merrill stumbled in moving from client servers to online where Schwab and Fidelity took the lead largely owing to their intact architectural capabilities. Today, we witness the success of Fidelity in the wireless brokerage business where Schwab is catching up and Merrill is again likely to be a late entrant.

**Figure 2: Technology Cycles in the Brokerage Services**




## 6. Discussion

Boundary management has become an essential element of corporate strategy (Poppo and Zenger, 1998). However, the decision of whether or not to outsource has mostly been regarded in terms of the direct benefits and costs of such a choice. Interrelations with features of the external environment have been subject to little investigation. In this article we extend the sourcing literature by acknowledging certain characteristics of the technological advance and

[48] Wall Street & Technology, May 2003 "An Interview with Merrill Lynch's Byron Vielehr".

the competitive situation. Specifically, we consider the impact of the nature of technological regime and strategic timing of entry.

First, we proposed that the nature of the technological regime affects a firm's sourcing decisions. Firms will on average outsource less in Schumpeter II environments compared to Schumpeter I environments as innovative incremental differentiation possibilities based on IT capabilities and architectural capabilities decline toward the end of the development of a particular technological trajectory. In addition, environments characterised by frequent technological disruption ease concerns about imitation.

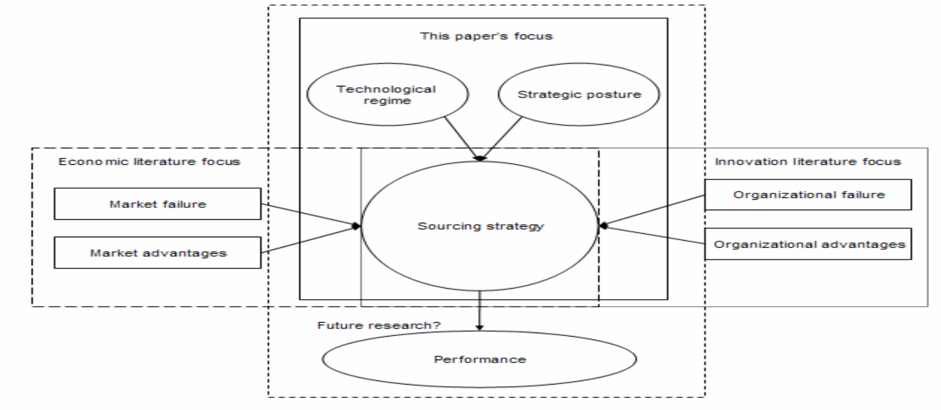
Second, we claimed that the timing of entry has implications for market development cost, R&D risk, entry barriers faced, available supplier competence, learning curve advantages with regards to IT and architectural capabilities, as well as partnering capabilities. As a result, strategic postures, whether decided or imposed, by affecting the costs and advantages of firms also have severe effects on a firm's boundary decisions. By distinguishing between different learning curves (IT capabilities, architectural capabilities, and partnering capabilities) we show that firms depending on their strategic posture will be able to exploit different learning gains either internally or in the market. Consequently, first-movers refrain from extensive outsourcing for three reasons: underdeveloped supplier markets and contractual failures, the risk of imitation and the need for "unstructured technical dialogue". In contrast, late entrants will utilize the developed external market and the economies of specialisation within this through outsourcing. Fast followers, on the other hand, can neither utilise a developed market nor the specialization skills of such, but they may be able to follow an imitation strategy and therefore adopt some kind of hybrid sourcing.

Finally, we presented a case study of three leading traditional brokers with online presence: Charles Schwab, Fidelity Investment and Merrill Lynch. The focal point for our purpose in these three cases is the sourcing decisions. Whereas both the first-mover (Schwab) and the fast follower (Fidelity Investment) into the online services choose to in-source their IT activities, the late entrant (Merrill Lynch) decides to outsource. These findings support our theoretical predictions in that they indicate that strategic posture impacts the sourcing decisions of firms. More specifically innovators and fast followers are less likely to outsource in the early stages of a technology's evolution than the late entrants. This issue has, to our knowledge, not been directly addressed in the outsourcing literature before. Thus, we argue that the field of IT outsourcing remains without a comprehensive theoretical framework as important elements of the firm's environment have been neglected. This paper merely points to two such elements: the firm's strategic posture and the nature of the technological regime. We believe that these two elements are central for understanding sourcing decisions.

In general, we caution against generalizing the findings of this paper. The casework focused on a single industry and included only three firms within. This limits our ability to argue any statistically significant points. Additional case studies would allow us to enrich our findings perhaps even with variables absent in this study. Further research on sourcing of knowledge intensive services and changing organizational forms could explore the relationship pointed at here between different elements of corporate strategy of firms and the impact of such these on boundary decisions. Interesting questions that can be addressed include (a) why do some incumbent firms survive and prosper (e.g. by competence-enhancement) after technological disruption, (b) what influence do vendor market dynamics have on the sourcing strategies of firms with different strategic postures, and (c) what are the performance implications for first-movers, fast followers and late entrants that adopt different sourcing strategies?

Figure 3 positions this paper's contribution in relation to existing research and research questions that can be addressed in the future.

**Figure 3: Positioning the Paper**




## 7. Conclusions

This paper assumes an evolutionary process perspective on firm boundaries in the context of adopting IT-enabled innovations in the financial sector. Understanding outsourcing processes cannot be reduced to a binary choice between make and buy of IT related capabilities. Importantly, an evolutionary process perspective on boundary processes pays close attention to the implication of strategic postures (first-mover, fast follower, and late mover strategies) and technological regimes in IT technology that may be accumulative or disruptive on a technological regime level, and competence destroying or enhancing on a firm level.

Unlike transaction cost theory, we do not assume that managers who shift "current boundaries" face "technologically separable interface" between activities, as Williamson (1985: 1, chapter 3) seems to suggest. We suggest that this assumption may be valid only for late movers with regards to adopting IT-enabled innovation, where interfaces between IT capabilities and business capabilities might benefit from 'structured technological dialogue' defining interfaces between activities. This is hardly the case for innovative first-movers. While concerns about opportunism of vendors may impinge on types of outsourcing contracts chosen, we show that knowledge diffusion risks should be greater concern in cumulative technological regimes compared to disruptive ones. While transaction cost economics side-step process issues of governance change, this is our focal concern. For example, an evolutionary perspective sheds light on the question how outsourcing – the process of shifting firm boundaries - influences the dynamic capabilities of the firm to internally and externally integrate competence in the adoption of IT-enabled innovation.

Current theories of firm boundaries give indications to why certain activities might be candidates for outsourcing by stressing efficiency gains in terms of transaction and production costs. They overlook, however, that 'technologically separable interface' between activities might be not available in codified form, and neglect learning effects, which have strategic consequences in terms of capability development and adaptability in competitive environments of varying dynamics. We suggest future research focuses on how organizational failure and market failure in the adoption of IT-enabled innovation interact, leading to interesting contracting network that serve as vehicles to blend IT capabilities and business capabilities in the 'extended enterprise.' Finally, as far as managers are concerned, the evolutionary perspective on the boundaries of the firm suggests considering long-term consequences of outsourcing processes on the dynamic capabilities of the firm. A managerial focus on allegedly easy to obtain short-term efficiency gains (by curbing opportunism and/or preventing imitation) obscures the complexity of technological developments and capability integration with and across the boundaries of the firm that reflective practitioners have to deal with when managing the boundaries of the firm.

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