ABSTRACT

Recent arguments in the dynamic capabilities literature suggest that firms need to use both internal development and external sourcing in order to thrive over time. We have a limited understanding of the conditions that best suit the choice of internal versus external sourcing, however, and no large-scale study has examined the extent to which firms’ ability to select appropriate sourcing modes improves their ability to renew their capabilities and survive in dynamic environments. This study examines how constraints that arise from firms’ existing stocks of capabilities and from their internal institutional contexts shape their choices of capability sourcing modes and, in turn, their ability to successfully obtain new capabilities and survive in their industries. Thus, the research focuses on an under-emphasized form of dynamic capability: the ability to select appropriate modes of capability sourcing. We test the arguments with a detailed survey and longitudinal study of the international telecommunications industry. We find intriguing variations in the way that heeding capability constraints and various forms of institutional constraints influences firms’ ability to renew their capabilities.
Firms that select appropriately between internal development and external sourcing as modes of obtaining new capabilities may gain long-term performance advantages. Internal development allows a firm to exploit its specific knowledge while protecting its knowledge and coordinating its development activities (Helfat, 1994). In parallel, external sourcing of new capabilities through acquisitions and alliances helps a firm develop new capabilities that guard against obsolescence and resolve organizational inertia (Rosenkopf and Nerkar, 2001; Vermeulen and Barkema, 2001). Recent arguments in the dynamic capabilities literature suggest that firms need to develop skills in both internal development and external sourcing to be able to renew their capabilities and thrive over time (Helfat, et al., 2006).

Yet, firms sometimes struggle to discriminate between conditions that suit internal development and external sourcing for acquiring new capabilities. Hence, firms that use sourcing modes appropriately should gain competitive advantages. Although we have a growing understanding of the conditions under which internal development and external sourcing are most appropriate, substantial open questions remain concerning the nature of such contingencies (Eisenhardt and Martin, 2000) and firms’ ability to select modes of sourcing new capabilities appropriately (Shaver and Mitchell, 2003). Moreover, no large-scale study has examined the extent to which firms’ ability to select appropriate modes of capability sourcing, and thereby form coherent portfolios of internal development and external sourcing projects, improves their ability to create new capabilities and helps them to survive in dynamic environments.

The dynamic capabilities literature has paid little attention to firms’ “selection capability”, which we define as the ability to select among modes of capability sourcing from the outset of a firm’s process of seeking new capabilities. Several insightful studies examine the ability of firms to implement different modes of capability sourcing, after the firms have selected a means of obtaining new capabilities. The studies identify the importance of developing the skills to implement external sourcing modes such as acquisitions (Zollo and Singh, 2004), alliances (Kale, Dyer and Singh, 2002), and contracts (Mayer and Argyres, 2004), while highlighting the role of recombination capabilities for internal development (Katila and Ahuja, 2002; Galunic and Rodan, 1998; Szulanski, 1996). However, before implementing a particular means of obtaining new capabilities, a firm must select that mode, choosing among internal development and external sourcing. The ability to select the right mode has received little attention. Indeed, there is an implicit assumption that capability development problems arise primarily because of implementation problems, rather than from selection mistakes.

We argue that selectively employing both internal and external modes of expansion is often necessary for firms to “achieve new resource configurations as markets emerge”, as Eisenhardt and Martin (2000: 1107) put it. Firms need to understand the conditions under which internal development or external sourcing will be most appropriate for seeking new capabilities. Although internal development and external sourcing can serve similar capability-sourcing objectives, they present differences in their capacity to cope with constraints that arise from firms’ existing stock of capabilities and from their internal social institutions, such as organizational practices and incentives to change. Internal development offers firms an effective way of developing new capabilities that are relatively close to their existing capabilities (Penrose, 1959; Helfat, 1994) and compatible with their internal institutional context (Nelson and Winter, 1982). In contrast, external sourcing provides a more effective way of acquiring capabilities that are more distant from the firm’s capabilities or that create internal friction. Spanning the firm’s boundaries through alliances and acquisitions provides it with an important way of obtaining radically new capabilities (Rosenkopf and Nerkar, 2001) and dealing with
internal conflict, a point that is reflected in several definitions of dynamic capabilities (Helfat, et al., 2006). For example, the ability of a firm to acquire and use external knowledge is part of its architectural competence (Henderson and Clark, 1990) and combinative capability (Kogut and Zander, 1992). Taylor and Helfat (2006) introduce the notion of linking mechanisms that connect the new core technology to existing complementary assets, as well as newly acquired assets.

We posit that a firm’s ability to renew its capabilities and ultimately to survive in turbulent environments is contingent upon its ability to choose the most appropriate mode of obtaining new capabilities. We expect that firms that appropriately assess constraints created by their existing stock of capabilities and constraints that arise from their internal institutional context when choosing between internal development and external sourcing will be more effective at developing new capabilities, and will ultimately survive longer than firms that do not take those constraints into account.

We test the arguments in the international telecommunications industry from 2000 to 2005. The sector provides a rich setting to study how firms acquire new capabilities in the face of rapid industry changes, including deregulation, price competition, technological convergence, and entry of foreign competitors (Williams and Mitchell, 2004). Institutional changes such as deregulation reset an industry’s clock (Delmas and Tokat, 2005; Walker, Madsen and Carini, 2002). Both established telecommunications firms and industry newcomers faced a substantial need to acquire new capabilities that would suit the changing environment (Chen, Williams, and Agarwal, 2006). To obtain new capabilities, telecommunications firms resorted to active use of internal development and external sourcing modes.

This study uses three sets of data to develop and test predictions. While developing our conceptual arguments, we conducted twenty-six interviews with knowledgeable executives in order to understand what type of capabilities firms needed to develop to survive in their fast-changing environment and how they closed their capability gap; we use quotes from these interviews to illustrate our arguments. We then conducted a large-scale survey in telecommunications firms operating in Europe, North America, South America, and Asia to assess firms’ criteria for choosing from among different modes of capability sourcing and the initial success of their capability development activities. We followed up by collecting longitudinal survival data of the respondent firms during the five years following the survey.

INTERNAL AND EXTERNAL MODES OF CLOSING CAPABILITY GAP

Definitions

Following Amit and Schoemaker (1993: 35), we define resources as stocks of available factors that are owned or controlled by a firm, and capabilities as the firm’s capacity to deploy resources for a desired end result. Capabilities are information-based, tangible or intangible processes that are firm-specific and developed over time through complex interactions among the firm’s resources. Examples of capabilities in our empirical setting include research capabilities, information technology capabilities, engineering know-how, commercial responsiveness, project management skills, and network management expertise, as we illustrate below. In turn, capabilities are supported by a set of organizational routines, which are patterns of activity embodied in human or capital assets (Winter, 1990). Routines are tacit, co-specialized with other routines, and embedded in organizational contexts (Kogut and Zander, 1992).

Prior research has discussed the concept of capability gap in terms of patents and industry categories, but little research addresses more multi-dimensional gaps in technical, marketing, and
administrative capabilities. We define capability gap in terms of distance between needed capabilities and the firm’s existing capability base, i.e., the set of required resources that firms would need to obtain and deploy to compete in a particular competitive setting (Helfat and Lieberman, 2002). Capability gap includes two dimensions: closeness and strength. Firms face a small capability gap when there is great similarity between its current capabilities and the needed capabilities (capability closeness) and when the firm has already achieved a strong position in the targeted capability area (capability strength). Firms face a large capability gap when there is dissimilarity between their existing capabilities and needed capabilities or when the firm has not yet developed strengths in the targeted capability area. Capability strength is relevant because needed capabilities and the firm’s existing capabilities can be similar, yet the firm’s current capabilities may not be strong enough to develop the needed capabilities. For instance, many European incumbents had already made efforts to develop data transmission technologies and were familiar with those technologies; yet the pool of technologies, partners, talents, and acquisition targets in this area was smaller than in the US, which prevented them from building a strong capability position in this area and pushed firms such as Siemens to find alliance partners or make acquisitions in the US.

Our discussions with telecommunications executives and industry analysts showed that established telecommunications firms and industry newcomers faced substantial gaps between their existing capabilities and those they needed to compete in the changing telecommunications environment. On the one hand, deregulation and development of data technologies placed incumbent public telephone organizations (PTOs), such as KPN, British Telecom, France Télécom, Telefonica, Telia, and Deutsche Telekom, at a disadvantage in key capability areas. Incumbents had weak marketing capabilities (e.g., limited ability to manage pricing schemes, analyze traffic, and coordinate corporate accounts) because they traditionally faced limited competition. In the technological area, incumbents had developed strong skills for operating voice transmission networks but had low capabilities in digital data transmission and data management. On the other hand, new firms and diversifying entrants from markets such as mobile telephony, cable, and data communications (e.g., Global Crossing, Level 3, and Mobilcom) often were more flexible than the established PTOs, but usually lacked customer bases, reputation, and critical size. In our fieldwork, as the quotes below illustrate, executives cited capability gaps between traditional circuit technology for voice traffic and new packet technology for data traffic. They also noted gaps in the marketing area due to the traditional low marketing sophistication of PTOs and the emergence of aggressive new competitors.

“There is a huge gap between the skills we need to deliver an integrated offering in the ICT business and our current competencies. To deliver such an integrated portfolio, we need 80% IT competencies versus 20% traditional telecom competencies.”

“Our current skills are based on traditional specialized engineering skills, while we are looking for engineers with a general view of network architecture and with broader responsibility. We also need sales and marketing people more specialized in Internet and carrier products.”

In this paper, we assume that the development of capabilities entails some degree of intent and deliberation (Dosi, Nelson and Winter, 2000; Helfat and Lieberman, 2002), such that managers are aware of the gap between their existing capabilities and the capabilities they need to compete successfully in their industries. They then deliberately take action to close this capability gap. Note that when managers estimate that the gap is too wide, they may decide to
abandon their attempts at developing new capabilities. Although the abandonment of the search process is an interesting area of investigation, it is beyond the scope of the current study.

**Internal development versus external sourcing for obtaining new capabilities**

We distinguish between two modes of obtaining new capabilities: internal development and external sourcing. Internal development refers to creating a new capability within the existing boundaries of a firm by recombining the firm’s existing capabilities or creating entirely new ones. Examples of internal development include internal training, internal product development, opening new R&D labs, and hiring new staff members. External sourcing means trading in a strategic capability that stems from external sources. Trading in a strategic capability can occur by three means (Chi, 1994): purchase contracts, alliances, and acquisitions. Purchase contracts are cases in which firms buy distinct capabilities from third parties, such as off-the-shelf technologies and services and employing consulting services. Alliances are ongoing relationships among distinct organizations that retain strategic autonomy but agree to work together for a period of time. Examples of alliances include equity and non-equity joint ventures, R&D and marketing partnerships, and multi-party consortia. Acquisitions involve obtaining majority control of another firm or entity, and encompass acquiring entire corporations or individual businesses from ongoing multi-business corporations.

In attempting to create new capabilities, internal development offers advantages and disadvantages relative to external sourcing. Internal development provides safeguards for protecting the value of new capabilities (Williamson, 1975). External sourcing of new capabilities often raises concerns about opportunism due to difficulties in screening, trading, and transferring capabilities into the firm, thereby creating incentives for internal sourcing in order to protect the value of the capabilities (Teece, 1986; Gulati and Singh, 1998). When a targeted capability is of high value to the firm, internal sourcing provides stronger safeguards to protect its value and prevent leakage (Chi, 1994). Several empirical studies support the argument that fear of capability leakage leads to greater use of internal sourcing (e.g., Monteverde and Teece; 1982; Pisano, 1990), notably when firms lack the skills to govern external exchanges (Kale, Dyer and Singh, 2002; Mayer and Argyres, 2004; Zollo and Singh, 2004). Internal sourcing also allows a firm to coordinate activities needed to build on its existing capability stock (Kogut and Zander, 1996). The firm can use internal development to increase the specificity of the capabilities and to establish systemic interaction and interdependencies among capabilities (Dierickx and Cool, 1989). Internally developed capabilities can thus provide a more stable platform for future development of new capabilities than those acquired externally due to their greater integration into the firm’s context and knowledge base (Grant, 1996). These actions are less likely to be achieved using external modes of capability sourcing (Karim and Mitchell, 2000). Thus, internal development may protect companies from imitation for some time so as to allow for their resulting capability position to generate economic returns.

Yet, a firm’s internal development activities may create a straightjacket for the development of truly innovative resources (Reed and DeFillippi, 1990). Internal development is bounded by the firm’s existing capability endowments and supporting routines. Several studies examine how

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1 One could unbundle the three external sourcing modes, but this study seeks to identify factors that shape the success of a firm’s internal sourcing versus external sourcing activities. The three external sourcing modes lie along a continuum (Leonard, 1995), where motives for external sourcing strengthen as firms move from purchase contract to alliances to acquisitions. The drivers for selecting external sourcing are similar, making it appropriate to distinguish between internal and external modes. Arora and Gambardella (1990), for instance, show that use of external modes (purchase agreements, alliances, and acquisitions) co-varies whereas internal sourcing does not.
historical capability endowments affect a firm’s propensity to search for new capabilities (Penrose, 1959; Cohen and Levinthal, 1990; Kraatz and Zajac, 2001), and to look inside rather than outside the firm (Pisano, 1990; Barney, 1999; Rao and Drazin, 2002; White, 2000; Cuervo-Cazurra, 1999; Delmas, 1999). Furthermore, when firms lack key resources, they may face what Dierickx and Cool (1989) refer to as time compression diseconomies. Internal development may be inappropriate because of time constraints in dynamic business environments (D’Aveni, 1994).

To overcome the limitations associated with internal development, firms may need to resort to external sourcing to enter new capability domains (Stuart and Podolny, 1996; Rosenkopf and Nerkar, 2001). The choice between internal versus external acquisition of new capabilities parallels the spectrum that spans from exploitation to exploration (Vermeulen and Barkema, 2001). Internal development is commonly associated with local search (exploitation), as a firm’s internal development of new capabilities is technologically and geographically bounded (Helfat, 1994; Stuart and Podolny, 1996). Further exploitation and internal development may make a firm’s culture stronger but may also lead to oppressive conformity, blindness, and competency traps (Miller, 1993). In contrast, external growth is commonly associated with more distant search (exploration) and helps capability-seeking firms overcome the constraints associated with contextually localized internal search (Rosenkopf and Nerkar, 2001; Rosenkopf and Almeida, 2003). Acquisitions and alliances may help unfreeze mental maps, structures, and processes (Miller, 1993; Singh and Mitchell, 2005).

A quote from our interviews illustrates how one firm assessed its capability needs and the organizational capacities of its internal organization compared to its external sourcing options.

“The first question we ask once we have identified our resource gap, and to make our decision on whether we should do it by ourselves is ‘How far is it from our current skills?’ And then we ask: ‘How fast? How easy is it to acquire those skills compared to training? How much of these skills exist on the labor market? Or if not, can we acquire firms? How costly it is? What is the impact of the imported skills on our internal skills, our people? How do you balance that with our internal people and context?’”

The following section discusses how constraints stemming from capability gaps and internal frictions influence the choice of mode for acquiring new capabilities. Capability constraints arise from the lack of appropriate capabilities within the firm to pursue the development of needed capabilities. Institutional constraints arise when the firm faces severe internal friction that inhibits internal development of the needed capabilities.

INTERNAL DEVELOPMENT VS. EXTERNAL SOURCING: CONTINGENCIES

Taking capability constraints into account

Several streams of literature are relevant for discussing capability constraints. The resource-based view of the firm (RBV) posits that a firm’s specific capabilities determine the range of strategic options that it can use to create new capabilities (Penrose, 1959). Helfat and Lieberman (2002: 753) argue that capability gaps affect the likelihood, speed, and mode of market entry. In particular, they argue that “firms appear to take account not only of the resources they have (and seek to leverage through market entry), but also of gaps between their pre-entry resources and those required for entry”. In sum, the basis on which the firm makes this decision is its assessment of the gap between its existing capabilities and the targeted capabilities, that is, whether strategically important expertise or capabilities are unavailable internally or inadequate to support the development of the needed capabilities (Leonard, 1995).
When the capability gap is small, a firm typically can attempt to develop targeted capabilities internally (Leonard, 1995), as long as the capabilities are of sufficient strategic value and can be developed in a timely manner. In their analysis of studies that examine market entry, Helfat and Lieberman (2002: 747) stressed that “firms tend to enter by internal growth when their specialized pre-entry resources, such as marketing and technological resources, as well as local market knowledge, have greater similarity to the required resource profiles in the markets of entry.” When this is feasible, firms prefer to rely on internal development based on their historically developed capabilities and for which they have supporting routines. As we noted earlier, internally developed capabilities often benefit from superior coordination and integration within the firm and from superior protection from expropriation and imitation (Liebeskind, 1996). Conversely, when the capability gap is large, i.e., when the firm possesses only a limited subset of the capabilities required to develop the new capabilities, it seeks to acquire new capabilities from outside the firm (Penrose, 1959; Cuervo-Cazurra, 1999).

Empirical studies show that firms tend to develop internally new capabilities in areas closely related to their existing technological capabilities (Helfat, 1994; Helfat and Lieberman, 2002; Tripsas and Gavetti, 2000). Technical capabilities often involve tacitness, complex organizational processes, and social complexity that require linkages with other functions of the firm such as sales and marketing (Teece, 1986; Winter, 1990). Such linkages may prevent firms from developing truly innovative technical capabilities through internal development. In their study on the development of technological variation among Japanese semiconductor companies, Stuart and Polodny (1996) found a positive association between the propensity of a firm to form alliances and the degree to which it innovates in technological fields that are not directly directed to those in which it has developed technologies in the past. In their study of patenting activity in optical disk industry, Rosenkopf and Nerkar (2001) found that exploration that did not span organizational boundaries generated lower impact on subsequent technological evolution.

Similarly, internal development may not be appropriate for developing radically new marketing capabilities. Marketing capabilities, including brand names and sales networks, often embody socially complex incentive mechanisms and tacit knowledge about the competitive environment (Anderson and Schmittlein, 1984; Dierickx and Cool, 1989). Thus, marketing capabilities often lose value when redeployed outside their initial market. Consequently, when a competitive context changes dramatically, such as during deregulation in the telecommunications industry, and firms need to develop marketing capabilities that are radically different from the ones they possess, they may need to acquire marketing capabilities from external sources. A quote from our telecommunications fieldwork illustrates the idea that firms need to learn to assess capability constraints when choosing between internal development and external sourcing.

“We went for a long time for internal R&D, but we did not have these competencies. Then we tried to bring these competencies through alliances. Now we do acquisitions to speed up R&D. There is a pattern. We realized that we needed to reach a certain threshold of competencies before we could run effective internal development”.

In parallel with resource-based arguments, the knowledge-based perspective on strategy emphasizes organizational factors that orient firms toward developing new capabilities that relate closely to their existing capabilities. As a result, the firm’s search process for new capabilities is likely to be local, in the sense that a firm is likely to search in the neighborhood of its current technological position (Nelson and Winter, 1982; Dosi, 1982). Cohen and Levinthal (1990) argue that firms tend to undertake internal changes that build on their existing ability to evaluate and utilize particular knowledge, which they refer to as absorptive capacity. As the firm moves
away from its technological and commercial capability base, its probability of success converges, at best, to that for a start-up operation (Kogut and Zander, 1992). The firm may even consider abandoning the development of the targeted capabilities if the capability gap is too large. The alternative to abandonment can be to search outside the firm and attempt to import external capabilities that the firm could not have created with its existing internal capabilities. Kogut (1991) argues that firms use internal development for projects that build on related capabilities and rely on joint ventures or acquisitions when the capabilities are distantly related.

In line with RBV and knowledge-based literature arguments, the diversification literature examines the relationship between a firm’s capability endowments and mode of market entry (for a review, see Helfat and Lieberman, 2002). An entrant with a high degree of relatedness to a market favors direct entry (Yip, 1982; Chatterjee, 1990). If an entrant expects a large reduction in operating costs from excess capabilities and requires few complementary capabilities, it is likely to prefer direct entry (Teece, 1986; Chatterjee, 1990). Empirical studies in the foreign direct investment literature generally support this pattern, showing that as firms enter new lines of business in foreign markets, they prefer joint ventures or acquisitions to greenfield investment (Hennart and Park, 1993). Similarly, Barkema and Vermeulen (1998) found that firms that expanded abroad into related industries were more likely to set up new ventures than firms that expanded into unrelated businesses, which tended to acquire existing firms.

In turn, the literature on acquisitions and alliances shows that external sourcing enables technological and commercial renewal by exposing the firm to a variety of technological domains, product environments, and geographical markets (Barkema and Vermeulen, 1998). Empirical studies show that managers often search for targets or allies with strong capabilities that complement the acquirer’s weaknesses, with a view to redeploying the stronger capabilities from the target (Capron, 1999) or use the ally’s strength (Dussauge, Garrette, and Mitchell, 2000). Examining the product line evolution of firms in the US medical equipment sector, for instance, Karim and Mitchell (2000) find that acquisitions provide opportunities for undertaking path-breaking changes by seeking targets that offer capabilities that differ markedly from a firm’s existing skills. They also find that acquirers are more likely than non-acquirers to possess capabilities that have only recently entered the industry, suggesting that firms that use internal development are more likely to pursue path-dependent changes than path-breaking changes. Through acquisitions, firms both acquire unfamiliar new capabilities and learn how to use their existing capabilities in new organizational settings and under competitive conditions (Mitchell, 1994; Zollo and Singh, 2004).

In sum, external sourcing offers opportunities for firms to overcome their capability deficiencies, allowing a more distant search and much faster capability reconfiguration than internal development (Barkema and Vermeulen, 1998; Krishnan, Satish and Krishnan, 2004; Carow, Heron and Saxton, 2004). Accordingly, we propose:

**Hypothesis 1.** Firms that internally develop new capabilities when there is a small capability gap and externally source when there is a large capability gap will be more effective in obtaining new capabilities and, in turn, will survive longer.

**Taking internal institutional constraints into account**

Complementing the RBV and knowledge-based perspectives, which focus on capability constraints as explanations for the choice between internal and external sourcing, evolutionary and institutional theories emphasize the role of institutional factors within the firm such as social stability and legitimacy as key enabling factors of capability development (Nelson and Winter
We use the term internal institutional constraints to refer to barriers that arise from the existing social context within a firm.

The evolutionary argument stresses that internal institutional constraints that arise from a firm’s irreversible investments and limited range of operating routines inhibit its ability to develop and use capabilities within the firm. Firms tend to develop proximate capabilities that do not disrupt their existing routines and processes, thereby maintaining the social fabric that weaves together the firm’s capabilities (Cyert and March, 1963; Nelson and Winter, 1982). Therefore, switching to new capabilities is difficult, because the social knowledge embedded in the current capabilities is only partially understood and it is unclear what social fabric would be required to support the new learning (Kogut and Zander, 1992). Indeed, the very stability of this social fabric within existing relationships yields valuable firm-specific capabilities.

From an internal standpoint, prevailing routines act as a truce in intra-organizational conflict (Nelson and Winter, 1982: 107), and attempts to change routines often provoke a renewal of the conflict, which can be destructive to the participants and to the organization as a whole. The fear of breaking the truce is in general a powerful force tending to hold organizations on the path of relatively inflexible routines. Substantial changes imply extensive other changes in routines throughout the rest of the organization. Such extensive changes will be particularly disruptive when they involve conflicting routines. When possible, a firm will try to target capabilities with features that will allow its existing routines to function smoothly, in order to maintain the truce that existing routines represent.

Thus, the social context in which resource transformation takes place greatly influences the social acceptance of the targeted resources and capabilities (Oliver, 1997). Institutional theory argues that the firm’s internal institutional context, and notably the social legitimacy and political acceptance of its capabilities, is key to capability sourcing decisions. From this perspective, firms operate within a social framework of norms, values, and taken-for-granted assumptions about what constitutes appropriate or acceptable economic behavior (DiMaggio and Powell, 1983; Scott, 1987). These internal institutional factors surrounding capability decisions constrain the potential of firms to develop new capabilities (Oliver, 1997; Ginsberg, 1994). Firms are more likely to use internal development for new capabilities that are socially accepted. Internal development of new capabilities that build on new routines meets institutional barriers. As Oliver (1997: 701) notes, “Whereas knowledge-based theorists assume that managers make rational choices bounded by uncertainty, information limitations, and heuristic bias, institutional theorists assume that managers commonly make irrational choices bounded by social judgment, historical limitations, and the inertial force of habit”.

Attempts to develop capabilities that depart from firm values and traditions often face internal resistance. Replacing the firm’s existing capabilities with new ones, even when those changes are economically rational, is likely to trigger social rejection as individuals are reluctant to alter an entrenched organization’s habits, and switch to less familiar practices. Individuals may also perceive the replacement of traditional capabilities with new ones as departing from firm norms and values (Oliver, 1997; DiMaggio and Powell, 1983; Scott, 1987) or as challenging their status and position of power (Ocasio, 1997; Menon and Pféffer, 2003). Therefore, social rejection is more severe when the targeted capabilities compete with or replace the firm’s existing capabilities. In particular, targeted capabilities might, in theory, be close to an organization’s existing capabilities, but, in practice, entrenched individuals may shun the development and use of new capabilities in order to retain their power, notably when they reduce or eliminate the value of existing capabilities. A quote from our fieldwork illustrates this point.
“In many telecom incumbents, the data traffic department used to be a marginal subsidiary compared to the powerful voice traffic department ruled by circuit technology engineers. The boom in data traffic has raised internal political problems due to the vested interest of the people in place. In some firms, investments and resource allocations toward data technologies have been postponed or limited due to this internal competition.”

Avoiding institutional conflict associated with new capability development may help maintain a social truce within the firm, but is likely to place it on rigid capability trajectories if a firm does not find alternative means of obtaining new capabilities. As Powell and Smith-Doerr (1994: 393) posit, the “ties that bind may become the ties that blind”. Thus, shared identity and social ties within a firm may bias toward continuing patterns of capability development that focus on existing knowledge and preserve vested interests, while preventing the firm from searching for new knowledge that would challenge people’s background and status.

The notion of internal institutional constraints complements the earlier discussion of capability constraints, because the social conflict involves non-rational, emotional components of the firm’s capacity to develop new capabilities internally. The internal legitimacy argument also closely parallels Abernathy and Clark’s (1985) and Tushman and Anderson’s (1986) notion of competence destruction, which arises when new capabilities are likely to reduce the value of existing capabilities. The initial argument concerning competence destruction is that firms will tend to avoid changes that involve substantial competence destruction. An extension of the argument is that the presence of competence destruction will influence the mode of capability sourcing of firms that attempt to change despite the potential for competence destruction.

Internal development will be more effective when developing capabilities that reinforce the existing systems rather than creating disruptive capabilities, thereby building incrementally on existing routines and maintaining an intra-organizational truce. Conversely, when a firm needs capabilities that conflict with its existing routines, it will benefit by turning to external modes of sourcing to gain access to capabilities. External sourcing of capabilities that would disrupt the firm’s existing organization provides a means of overcoming internal barriers to developing needed capabilities. Whereas we recognize that internal players seeking to protect status and power may shun the use of new capabilities regardless of the source, and thus may strongly resist attempts to bring in and build on outside knowledge, the firm will have less immediate need to attempt to adjust existing capabilities in the face of substantial internal conflict. By using external sourcing, firms may avoid major disruption within the existing organization at least during the earlier part of the process of capability development and thereby circumvent the hurdles brought by entrenched individuals, notably if they keep separate the newly-acquired capabilities from the existing structure. Only later can the firm undertake the process of integrating the acquired capabilities within the firm and adjusting existing capabilities, once the presence of the new capabilities has become a fait accompli or when some market pressures (notably in the case of acquisitions) provide momentum for firms to integrate acquired capabilities and deliver synergies. Furthermore, externally-sourced capabilities can be perceived as less threatening to individuals within the firm than internally-developed capabilities for reasons of internal competition and self-enhancement. In several case studies, for instance, Menon and Pfeffer (2003) found that managers tended to view external knowledge more favorably than internal knowledge when the targeted capabilities posed status threats for insiders.
As a result, we expect that firms gain performance advantages when they use internal development for developing new capabilities that fit with their existing social context and turn to external sourcing for new capabilities that face social rejection. Accordingly, we propose:

**Hypothesis 2.** Firms that internally develop new capabilities when the needed capabilities fit with their existing social context and externally source when needed capabilities conflict with their existing social context will be more effective in obtaining new capabilities and, in turn, will survive longer.

Although external sourcing may provide a superior solution when the capability gap is large or when internal friction is severe, several limits arise with the influences. First, if the capability gap is particularly large, external sourcing may fail if the firm lacks absorptive capacity. The absorptive capacity logic (Cohen and Levinthal, 1990) suggests that a firm needs some level of related knowledge internally to be able to recognize, absorb, and build on external knowledge. Second, as we noted earlier, when the gap is too great, firms may also decide to stop the search process. Third, in a newly emerging technological field or market, external sources may also be inadequate because the needed capabilities have not yet been developed by external partners. Lastly, firms vary in their ability to reconfigure internal and external resources (Helfat and Peteraf, 2003; Zollo and Singh, 2004). Because reconfiguration skills might grow with experience, the analyses will control experience in internal development and external sourcing.

**DATA AND METHODS**

**Data collection and sample**

The research developed over three stages. We first conducted a qualitative study to gain insights into the nature of firms’ capability gaps, their use of different capability sourcing modes, and their criteria for choosing between internal development and external sourcing. We next developed and administered a survey to telecommunications firms that were located in North America, Europe and Asia. We then collected survival data to assess the extent to which telecommunications firms that participated in our survey survived in the following years.

The first part of our data collection included twenty-six qualitative interviews that helped refine our predictions, formulate questions that were relevant to managers, and develop a survey instrument. Initially, we conducted eleven in-depth interviews to gather information on the industry, the type of capabilities firms were looking for, and the way they filled their capability gaps. The format of the interviews was open-ended. We addressed the following questions: “What changes in your environment are you facing?”, “What type of new competencies and skills do you need to adjust to these changes in your environment?”, and “How do you intend to acquire those needed skills?” Each interviewee then discussed the modes of acquiring new capabilities that their firm used. We gained access to senior executives through an Executive Education Telecom program at a leading European business school. The interviews, which lasted for one to two hours, drew on a diverse set of managers. We interviewed people who worked for telecom incumbents such as France Télécom, British Telecom, and KPN, as well as newcomers such as Enertel. The executives held positions in areas such as purchasing, marketing, finance, customer service, and data engineering, and in businesses such as mobile, data, and fixed lines. We also interviewed a partner at McKinsey who had substantial telecom expertise.

We then conducted eight on-site interviews with managers who held high-level positions in their firms. These included general managers of ICT (Information and Communication Technology), E-business, leased line, voice over IP (Internet Protocol), and Innovation
businesses. The interviews, which lasted between two and three hours, comprised three parts. In the first part, managers outlined key capabilities they needed in order to survive in the telecom industry. In the second part, managers described how they intended to fill the capability gap and what criteria they used to choose among the different modes for sourcing new capabilities. Typical questions asked in this part were “How do you manage the capability gap?” and “When do you decide to go externally rather than doing it by yourself?” With managers whose firms had been involved in recent acquisitions, we asked, “Why did you make these recent acquisitions?”, “Why did your firm use acquisitions rather than internal development via an alliance or a market exchange?”, and “Was it an effective way of obtaining the needed capabilities?” In the third part, managers reported stresses associated with the modes they chose to develop the needed capabilities. Questions in this part included “How effective has this acquisition (or alliance, market exchange, internal development) been in building the needed skills?” and “What have been the challenges and pressures for your firm associated with this acquisition (or alliance, market exchange, internal development)?” We asked follow-up questions as the people identified issues associated with specific modes. The on-site interviews allowed a rich interaction with people at the firm. The executives introduced us to their colleagues in order to provide corporate documents, archival data, and access to assistants for follow-up questions.

We concluded the qualitative data collection by conducting a research workshop with seven senior managers from telecom and technology-related firms to explore our framework and items. The seven executives received the assignment as a group to provide feedback on our framework and to brainstorm about complementary influences on the choice of modes of acquiring new capabilities.

Second, we collected survey data for telecommunications firms based in multiple countries to determine the criteria and outcome of the firms’ efforts to create new capabilities. The survey identified the firms’ efforts to assess their capability gaps, their use of the various capability sourcing modes, and their criteria for choosing between internal development and external sourcing. We pre-tested the survey with senior North American and European executives from diverse backgrounds. We pilot-tested the revised survey instrument with on-site interviews with other senior executives, leading to the final version of the questionnaire. We designed and administered the mail survey following Dillman’s (1978) “Total Design” method.

We used two sources for respondents. During late 2000 and early 2001, we mailed the survey to about 1,500 senior managers (40% in Europe, 40% in the US, and the remainder distributed throughout the world; we did not send the survey to the executives we interviewed during the initial fieldwork). All respondents held positions equivalent to vice president or higher in general management areas such as corporate development. We sent two follow-up letters and two replacement questionnaires within the three weeks following the first mailing. We also administered the survey to 90 senior managers from telecommunications firms that were participating in executive education programs. We obtained 135 responses to the mail survey, which is a reasonable number given the seniority of the respondents and the detailed nature of the questionnaire. In addition, 27 of the executive education participants mailed back their responses. In total, our data includes 162 telecommunications firms that responded to the survey.

Third, we collected survival data on our respondent firms. We assessed whether the responding firms continued to operate in 2005, five years after the survey. We were able to identify the current status of 153 out of the 162 responding firms, as we discuss below.
Performance variables

One performance variable assesses firms’ effectiveness at obtaining new capabilities ($\eta_1$). To do this, we asked respondents to assess the effectiveness of their firms in creating new capabilities compared to that of their main competitors, in three capability areas: 1) R&D capabilities, 2) IT capabilities, and 3) marketing capabilities (customer knowledge, branding and pricing). The three items use a seven-point scale, with one for “behind competition” and seven for “ahead of competition”. We use this variable as a mediating variable in the analysis of survival, which is the ultimate dependent variable in the study.

The survival variable ($\eta_2$) assesses whether the responding firms continued to operate in 2005, five years after the survey. We were able to identify the current status of 153 of the responding firms: 93 firms (61%) had survived, 35 firms (23%) had shut down, and 25 firms (16%) had been acquired (most or all cases of acquisition involved target firms that were struggling, rather than successful firms that had reached the limits of their growth). We created a dependent variable that took the value of 1 for dissolved firms, the value of 2 for acquired firms, and the value of 3 for surviving firms. Although both dissolved firms and acquired firms typically represented “troubled firms”, we maintained the distinction between those two types of outcome. In some cases, firms might be acquired to achieve critical scale or access needed capabilities, so that acquisition does not necessarily represent a negative economic outcome.

Independent variables

We asked the respondents to reflect on the use and motivation of internal development and external sourcing projects that they had conducted over the three to five years prior to the survey. This approach seeks to identify firm-wide patterns in firms’ capability development activities and avoids the selection bias that would arise if respondents focused on a single, self-selected decision. It also forces respondents to consider all the projects that they undertook, and not just the most successful or most recent projects.

The survey questions allowed us to measure how capability gap and internal institutional context influenced managers’ decision to use internal development rather than external sourcing. The first independent variable ($\xi_1$) assesses the extent to which respondents assess the gap between targeted technical capabilities and their own existing technical capabilities when they choose between internal development and external sourcing. For example, we asked managers to rate on a 7-point scale (1= fully disagree; 7= fully agree) their agreement with the following statement: “In the past 3 to 5 years, we used internal development rather than external modes when our existing technical capabilities were close to the needed technical capabilities”. We used two items to construct this variable. These items report the respondents’ assessment of the extent to which they preferred internal development over external sourcing when their existing technical capabilities were close to the needed capabilities (capability closeness, item 1) and when they have a very strong competitive position in the technical area (capability strength, item 2). The $\alpha$-Cronback for $\xi_1$ is 0.74.

The second independent variable ($\xi_2$) assesses the extent to which respondents assessed the gap between the targeted marketing capabilities and their own marketing capabilities when they chose between internal development and external sourcing. For example, we asked managers to rate on a 7-point scale (1= fully disagree; 7= fully agree) their agreement with the following statement: “In the past 3 to 5 years, we used internal development rather than external modes when our existing marketing capabilities were close to the needed marketing capabilities”. We used three items to construct this variable. These items report the respondents’ assessment of the
extent to which they preferred internal development over external sourcing when their existing marketing capabilities were close to the needed capabilities (capability closeness, item 1), when they have a strong competitive position in the marketing area (capability strength, item 2), and when they already knew the customers in the targeted capability area (capability strength, item 3). The $\alpha$-Cronback for $\xi_2$ is 0.77.

The third independent variable ($\xi_3$) assesses the extent to which respondents assessed the fit of the targeted capabilities with their internal institutional context based on their existing systems and culture when they chose between internal development and external sourcing. For example, we asked managers to rate on a 7-point scale (1 = fully disagree; 7 = fully agree) their agreement with the following statement: “In the past 3 to 5 years, we used internal development rather than external modes when the needed capabilities fitted our system of incentives and culture.” Three items report the respondents’ assessments of the extent to which they preferred internal development over external sourcing when the needed capabilities fit their firm’s system of incentives and culture (item 1), when the firm’s system of incentives suited hiring the needed people (item 2), and when their firm had systems in place to integrate newly hired people (item 3). The $\alpha$-Cronback for $\xi_3$ is 0.71.

The fourth independent variable ($\xi_4$) assesses the extent to which respondents assessed their internal institutional context based on the social acceptance of the targeted capabilities. For example, we asked managers to rate on a 7-point scale (1 = fully disagree; 7 = fully agree) their agreement with the following statement: “In the past 3 to 5 years, we used internal development rather than external modes when the needed capabilities created little or no internal resistance.” The two items for this variable report the respondents’ assessments of the extent to which they preferred internal development over external sourcing when the needed capabilities triggered little or no internal competition (item 1) or “created little or no internal resistance” (item 2). $\alpha$-Cronback for $\xi_4$ is of 0.81.

Control variables

We assessed several other factors that might influence the firm’s chances of survival, including size, age, international scope, profitability, R&D and advertising investment, regulatory dependence, and ownership structure.

Firm size. Size confers both greater status and greater opportunity for cultivating outside options, and thereby influences the likelihood of a firm to survive in its environment (Uzzi, 1996). Size affects patterns of inter-organizational social exchanges because of its direct association with status and power; larger firms may find it more difficult to change successfully because of higher inertia compared to smaller firms. Firm size may also help firm survival. We measured firm size using a five-point scale that accounts for the number of employees worldwide (with 1 for firms that have fewer than 200 employees and 5 for firms that have more than five thousand employees).

Firm age. Young firms operate under unrefined routines and do not have capabilities to withstand a sustained period of poor performance (Levinthal, 1991). Furthermore, they tend to have inadequate expertise in corporate development activities and limited administrative skills. They also have insufficient access to external relationships due to a liability of newness, and lack skills to search, select, price, and integrate appropriate alliance and acquisition partners. We measure firm’s age using a five-point scale (with 1 for firms that are younger than two years old and 5 for firms that are older than twenty years old).
International scope. The geographic diversity of an acquirer’s activities can help screen and integrate capabilities from different environments (Bartlett and Ghoshal, 1989). Firms spanning several geographic settings tend to develop capabilities of managing complex information-processing and decision-making requirements. In contrast, a more focused domestic firm may lack the necessary organizational routines that the multinational firm has. We used a three-point variable to measure the firm’s international scope: domestic (1), regional (2), and global (3).

Firm profitability. A highly profitable firm is likely to have valuable capabilities that it can leverage for internal development capabilities. Strong profitability also commands bargaining power in acquisition and makes the firm more attractive to alliance partners and acquisition candidates. We used a five-point scale to assess the firm’s return on equity (ROE), with 1 equal to an ROE inferior to five percent and 5 equal to an ROE superior to twenty percent.

Firm R&D and advertising investments. A firm’s investment in key capabilities can also enable its internal development of new capabilities, and help screen and absorb external knowledge. Building on Morck and Yeung’s (1992) measure, we calculated the firm’s investment in R&D compared to its sales with a five-point scale (with 1 for firms that spend less than two percent of their sales on R&D and 5 for firms that spend more than fifteen percent of their sales on R&D). We developed a similar measure for the firm’s investment in advertising.

Firm dependence on regulation. In the telecommunications industry, firms are often highly dependent on regulation, such that they deploy political strategies to shape a political environment that is favorable to their economic survival (Bonardi, Hillman and Keim, 2005). A regulation that favors the firm’s interests helps its survival, whereas a regulation that is counter to the interests of the firm reduces its likelihood of success in its environment. Using a five-point scale (with 1 for “not at all”, and 5 for “to a very large extent”), we measured the extent to which the firm is dependent upon regulation.

Firm ownership structure. Some telecommunications firms were supported or owned, to a significant degree, by their national governments. We expect government-linked firms to be more protected from competitive pressures, and thus more likely to survive in their environment compared to their privately-owned and stock-listed peers. We controlled for that effect by adding two dummy variables: one dummy that takes the value of 1 when the firm is privately-held and a second dummy that takes the value of 1 when the firm is stock-listed (our baseline is when the firm is state-owned).

Table 1 provides the descriptive statistics of the variables.

********** Insert Table 1 about here **********

Assessing potential sampling and method biases

Our use of managerial judgments is consistent with our conceptual framing. Firms’ choices between internal and external sourcing depend on their managers’ assessment of their own capability-based and institutional constraints rather than on seemingly objective measures of these concerns. The respondents were senior executives with high-level responsibilities, who were knowledgeable of their firms’ decision-making processes, and who were able to reflect on the composition of their firm’s capability development projects. While a single executive rarely makes all sourcing decisions within a firm, our fieldwork indicates that senior executives have sufficient perspective to recognize their firms’ decision rules in capability sourcing activities.

At the same time, we recognize several limitations associated with our study design. As with any survey, concerns about retrospective data collection arise. Research indicates that memory
degrades exponentially with time (Sudman and Bradburn, 1973). Furthermore, top managers often attempt to cast past behaviors and outcomes in a desirable light, especially when they have a reputational or emotional investment in such outcomes (Golden, 1992). We recognize that the nature of our topic may induce *ex post* rationalizations and/or a desirability bias.

Several steps helped reduce the biases. We examined differences between respondents and non-respondents to establish whether sampling bias was a problem. We found no significant differences in the financial and economic profile of 27 respondents and 63 non-respondents who received the surveys during executive education programs. Similarly, we found no significant differences among the 27 executive education cases and the rest of the responses. Nor did we find any significant differences in the profitability of respondents and non-respondents among public firms in the sample, or among early and late respondents (Armstrong and Overton, 1977).

We generated a rich corpus of measurement scales based on a review of the literature and on the on-site interviews with telecommunications senior executives. The survey contained multiple items measuring each construct, which were distributed throughout each section to avoid consistency bias. We also introduced several control questions at various points. We deleted the few cases that exhibited a lack of convergence across similar questions. To address possible response-style biases (e.g., yea-saying), we introduced items that were heterogeneous in content and worded some items positively and others negatively (Baumgartner and Steenkamp, 2001).

We used several checks for common-method biases. To check whether common method bias between the independent variables ($\xi_1, \xi_2, \xi_3, \xi_4$) and the mediating variable ($\eta_1$) influenced the results, we followed the unmeasured latent variable approach from Podsakoff, MacKenzie, Lee, and Podsakoff (2003). Using AMOS, we added a single unmeasured latent factor with all the observed measures as indicators to a measurement model containing all measured items and their corresponding latent constructs. This approach separates trait effects from method effects and random effects. The analysis found no systematic variance among the items, while adding the first-order factor produced low parameter estimates for its indicators. These results suggest that using the questionnaire for the variables of interest did not seriously bias the results. Furthermore, we conducted a Harman one-factor test on the items in our analysis. The factor analysis extracted four factors, with the first factor accounting for 23 percent of the variance. Since no single factor emerged as a dominant factor accounting for most of the variance, common method variance is unlikely to be a serious problem in the data (Podsakoff and Organ, 1986). We also placed questions concerning antecedents and outcomes at various points in the survey – this limits the chance that answers to one set of questions would determine answers to later questions, and reduces the possibility that the respondents’ implicit theories about reasons for selecting a mode would influence how they answered performance questions. Last, we used objective data to measure the dependent variable for firm survival. By using different sources of information for building dependent and independent variables, we reduce the potential impact of common-method bias (Podsakoff, *et al*., 2003).

**Structural model**

We used AMOS 4.0 (Arbuckle, 2002) to estimate a structural model. AMOS belongs to the second generation of the multivariate analysis family of techniques, which also includes LISREL. Structural modeling addresses structural and measurement issues frequent in survey-designed research. This method is appropriate to test the hypothesized model because of its ability to (1) consider multiple regressions simultaneously to permit the analysis of direct, indirect, and spurious relationships, (2) estimate models with latent variables, (3) estimate the
loadings of each observed variable in the context of the full model rather than in isolation, (4) accommodate measurement errors in both dependent and independent variables, (5) accommodate reciprocal causation, simultaneity, and interdependence, and (6) account for correlations among error terms (Bollen, 1989).

A model for AMOS estimation comprises two parts. An inner structural model captures the relationship between the endogenous and exogenous latent variables. An outer measurement model estimates latent variables in terms of observable measures.

The inner structural model specifies the relations among the theoretical constructs (latent variables) and is written as: \( \eta = \beta \eta + \Gamma \xi + \zeta \), where \( \eta \) is a \((m \times 1)\) vector of endogenous latent variables, \( \xi \) is a \((n \times 1)\) vector of exogenous latent variables, \( \beta \) is a \((m \times m)\) matrix of endogenous variable coefficients, \( \Gamma \) is a \((m \times n)\) matrix of exogenous variable coefficients, and \( \zeta \) is a \((m \times 1)\) vector of residuals. The latent endogenous variable in this model is the firm’s survival \( \eta_2 \). The four measures that assess the extent to which firms take into account their capability and institutional constraints when forming their portfolio of internal and external sourcing projects and the control variables are latent exogenous variables \( \xi \). The mediating performance variable is the firm’s effectiveness in creating new capabilities \( \eta_1 \).

Thus, the outer measurement model is written as: \( y = \Lambda_y \eta + \varepsilon; x = \Lambda_x \xi + \delta \), where \( y \) is a \((p \times 1)\) vector of endogenous indicators, \( x \) is a \((q \times 1)\) vector of exogenous indicators, \( \Lambda_y \) is a \((p \times m)\) matrix of regression coefficients of \( \eta \) on \( y \), \( \Lambda_x \) is a \((q \times n)\) matrix of regression coefficients of \( \xi \) on \( x \), \( \varepsilon \) is a \((p \times 1)\) vector of measurement error for the indicators of endogenous variables, and \( \delta \) is a \((q \times 1)\) vector of measurement error for the indicators of exogenous variables.

To provide a metric, we set the factor loading for an indicator of each latent construct at one (Bollen, 1989). AMOS estimated the structural and measurement models using the Full Information Maximum Likelihood estimator, which provides an efficient estimator in the presence of missing data.

Measurement model results for latent variables

Consistent with Anderson and Gerbing’s (1988) two-step approach, we estimated a measurement model prior to examining the structural model. We modeled the two capability constraint constructs \( \xi_1, \xi_2 \), the two institutional constraint constructs \( \xi_3, \xi_4 \), and the mediating performance measure \( \eta_1 \) as five correlated first-order factors. Table 2 reports factor loadings, internal consistency, convergent validity, and discriminant validity, based on measures from Fornell and Larcker (1981).

********** Insert Table 2 about here **********

All the non-fixed indicator loadings for each construct are significant \((p<0.01)\), and range from 0.55 to 0.98. A common rule of thumb is to accept items with more explanatory power than error variance (Carmines and Zeller, 1979). In practice, this implies accepting loadings greater than 0.70. The data meet this criterion for all but three items; we retained those items in order to maintain a richer measure of our constructs (the results were robust to dropping the items). The estimates of the “average variance extracted” range from 0.63 to 0.93, which are higher than the 0.50 threshold that Fornell and Larcker (1981) recommend to demonstrate convergent validity. Each construct shares more variance with its measures than it shares with other constructs (the correlation between any two constructs is less than the square root of the average variance extracted of the two constructs), demonstrating discriminant validity.
RESULTS

Figure 1a reports the structural model. Overall, the results support the predictions.

********** Figure 1a here **********

The results strongly support the first hypothesis, concerning capability constraints. Firms that made their choice between internal development and external sourcing of new capabilities based on the extent of the technical and commercial capability gaps were more effective in developing new capabilities and therefore more likely to survive than firms that did not take into account their capability constraints.

The results partially support the second hypothesis, concerning institutional constraints, with an intriguing exception. As expected, firms that chose between internal development and external sourcing of new capabilities based on the fit with their internal systems were more effective in developing new capabilities and, in turn, more likely to survive than firms that did not take into account their internal systems fit.

In contrast, counter to hypothesis 2, we found that firms that undertook internal development of new capabilities that faced low social acceptance were more effective in developing new capabilities and more likely to survive than firms that used internal development only for projects that would not create social conflicts. Hence, although paying attention to the internal institutional context when forming the portfolio of internal development and external sourcing projects is valuable on some dimensions, paying too much attention to avoiding conflict and preserving a social truce within the firm can reduce a firm’s ability to renew its capabilities. We return to this intriguing result in the discussion section.

Several control variables influenced survival. Older firms, firms with higher levels of advertising investment, and state-owned telecommunications firms were more likely to survive. Surprisingly, we found a negative relationship between a firm’s R&D investment and its likelihood of survival, perhaps because too much focus on internal R&D activities rendered firms inward-focused and less prone to searching for radical new capabilities that reside outside of the firm. Size had no influence; we found similar results when we estimated models with different ways of measuring firm size (staff, sales, logarithm of sales). Thus, firm age has more impact on firm survival than size per se. Perhaps, in this fast-moving industry, where firms have grown rapidly through acquisitive growth (while lacking integration skills), firm age is a better proxy for firm resilience. We also found that the home region of a respondent firm has an effect on firm survival such that respondents outside the US, in particular those from Europe, exhibit a negative association with firm survival. Firms outside the US might have been affected more negatively by the changes in the telecom industry and the difficulties of acquiring new capabilities compared to US firms that had access to a wider pool of talents, partners, and acquisition targets in the needed capability areas such as marketing and IT.

We conducted supplemental analyses to ensure the robustness of our results. We first changed the coding of our survival dependent variable ($\eta_2$). We re-estimated the analyses by collapsing the dissolved and acquired categories, thereby creating a dummy that took the value of 1 for surviving firms and 0 otherwise. Our results did not change qualitatively, although the relationship between ($\eta_1$) and ($\eta_2$) became slightly weaker, while still remaining statistically significant. This comparison suggests that maintaining the distinction between dissolution and acquisition provides more information than collapsing the two “non survival” outcomes (acquisition and shutdown), as we initially argued.
We added direct paths between our four independent variables ($\xi_1, \xi_2, \xi_3, \xi_4$) and survival, in addition to their indirect influence on survival through the mediating capability effectiveness outcome variable ($\eta_1$). None of the direct paths between the four independent variables and the firm’s survival was significant, while the reported results did not change qualitatively.

A limit of the model is that most of our items address situations where the capability gap is small or internal friction is limited. Our goal when we designed the survey instrument was to be parsimonious and to avoid asking two sets of similar questions. In other words, we asked the respondents whether they preferred internal development over external sourcing under specific conditions (small technical gap, small commercial gap, fit with system, low internal competition) and did not ask a similar set of questions where we would have asked whether they would have preferred external sourcing over internal development under the reverse conditions (large technical gap, large commercial gap, misfit with system, high internal competition).

Nonetheless, the survey also included questions that asked specifically about the firms’ practices when there was a large capability gap or high internal friction. In particular, we asked whether they used acquisitions and alliances to develop radically new capabilities (large capability gap) or capabilities that entailed major internal reorganization (high internal friction). We then tested a new model that added a construct ($\xi_5$) that captures the extent to which firms resorted to external sourcing to develop distant or conflicting capabilities. The new construct includes two items. The first item is the average of the scores on the two survey questions that ask whether the firm has used acquisitions (question 1) or alliances (question 2) to acquire radically new capabilities (1-7 scale). The second item is the average of the scores on the two survey questions that ask whether the firm has used acquisitions (question 3) or alliances (question 4) to acquire capabilities that require a major reorganization of the firm (1-7 scale). We found that this new construct has a positive and significant effect on the firm’s ability to renew its capabilities ($B=0.22; CR=2.05; p=0.04$), while the effects of the constructs of the initial model ($\xi_1, \xi_2, \xi_3, \xi_4$) on firms’ renewal ability remained unchanged. These results suggest that firms that use external sourcing to close a large capability gap or obtain resources that do not fit with the current internal context are more likely to renew their capabilities than firms that do not use external sourcing for distant capability searches.

Self-selection issues might also arise in the study. Firms that survive might also be firms that accumulated the highest experience in both internal development and external sourcing, which would generate potentially confounding influences between the firm’s ability to select the appropriate mode of sourcing (based on capability and institutional constraints) and other benefits that stem from its experience, such as learning-by-doing or other contingencies that influence the selection of different modes of capability sourcing. To control for potential self-selection, we created a new variable that measured the firm’s combined internal development and external sourcing experience. This variable is the sum of two 7-point scale variables, which capture the extent to which the firm has used internal development and external sourcing to create new capabilities in the past three to five years. A high value on experience represents significant experience in both internal development and external sourcing.

We developed a two-stage model where, in addition to a direct effect of the firm’s combined experience in internal development and external sourcing on resource renewal and survival, the experience variable constituted an antecedent of the firm’s ability to select its modes of capability sourcing (i.e., has an effect on ($\xi_1, \xi_2, \xi_3, \xi_4$)). We then assessed the remaining effect of the relationship between the consideration of the capability and institutional constraints in sourcing decisions and the firm’s ability to renew its capabilities beyond the pure experience
effect. The results remained qualitatively similar (see Figure 1b).

********** Figure 1b here **********

At the same time, two results concerning sourcing experience had intriguing implications in Figure 1b. First, there was no systematic direct effect of the firm’s combined internal development and external sourcing experience on its ability to change and survive. This null result suggests that simply resorting to both modes of sourcing does not guarantee superior performance. Instead, firms must select sourcing modes that reflect particular contexts. Second, firms with substantial experience in both modes of capability sourcing were more likely to take into account their technical capability gap and the fit of the targeted capabilities with their internal systems when making capability sourcing choices. In other words, experience helped firms develop the dynamic capability to select appropriate capability sourcing modes.

DISCUSSION AND CONCLUSION

This paper predicted that firms that have the ability to select modes of sourcing new capabilities appropriately will be better able to renew their capabilities and survive longer than firms with weaker selection capabilities. In particular, we argue that firms that appropriately take into account constraints based on their capabilities and institutional contexts when choosing between internal development and external sourcing will be more effective at developing new capabilities and, in turn, will survive longer than firms that mis-assess those constraints. The core argument is that firms need to develop the ability to assess the most appropriate mode of capability sourcing in the face of constraints that arise from their existing stocks of capabilities and their internal institutional contexts. The analysis supports most core predictions, with intriguing variations in the relationship between the role of some forms of institutional factors in capability sourcing decisions and a firm’s performance. Overall, the results suggest that capability and institutional arguments complement the insights of transaction cost economics, in which external market failures drive firms’ capability sourcing choices (Jacobides and Winter, 2005; Santos and Eisenhardt, 2005).

The results concerning capability constraints add voice to a central debate in extending the resource-based view of the firm to an understanding of dynamic capabilities by which firms can attempt to change their existing resources (Peteraf and Barney, 2003; Helfat and Peteraf, 2003; Lavie, 2006). We found that firms that properly consider the role of their existing capabilities in their capability sourcing decisions fare better than firms that do not consider criteria that the resource-based view highlights. While the resource-based view of the firm has been criticized for being an ex post rationalization (Priem and Butler, 2001), our study suggests that capability-based perspectives can offer prescriptive implications.

The results also highlight both the benefits and the costs of heeding internal institutional factors when forming the portfolio of internal development and external sourcing projects, which has received only limited attention in prior research. In particular, the results demonstrate the role of more socially and behaviorally-based factors in capability sourcing, as a complement to the seemingly more “objective” role of stocks of capabilities. Indeed, the contrasting results we obtained between the impact of the two institutional variables – the benefits of “systems fit” and the costs of “conflict avoidance” – on a firm’s performance can be interpreted in the light of our fieldwork and the literature that discusses the benefits of conflict for ambidextrous organizations.

The value of undertaking internal development when the activities would generate conflict rather than avoid conflict initially appeared counter-intuitive. A tentative explanation emerged,
however, in assessing our interviews with telecommunications industry executives. In particular, as well as having a potential for disruption, conflict creates the potential for taking new views of problems and generating new insights for solutions. Firms that have learned how to take advantage of conflict, while limiting potential harm, may benefit by initiating internal projects in conflict-strewn environments.

Drilling down into the conflict literature reinforces this interpretation. Traditionally, theorists have viewed conflict as disruptive. More recently, however, some theorists suggest that conflict may actually benefit by making sourcing choices that engender conflict (McGrath, 1984; Eisenhardt and Schoonhoven, 1990). Jehn (1997), for instance, finds that groups that accept task conflict are particularly effective. Thus, conflict can be a useful tool for business development. Firms that can strike a subtle balance between organizational processes that nurture legacy (align with current incentive systems) and favor adaptation (introduce competing business models and organizational settings) may be able to achieve a degree of organizational ambidexterity that will help them create new capabilities (Tushman and O’Reilly, 1996; Gibson and Birkinshaw, 2004).

Our study contains several limits. We recognize that interpreting the results is sensitive to our underlying assumptions. We assume that managers have the ability to estimate their capability gap in real time and can give a retrospective estimate of the capability gap. Yet, managers may be rationally bounded and not fully capable of assessing the capability gap, notably in industries where speed of change and uncertainty about the value of future capabilities are high. A retrospective estimate of capability gap may also comprise biases, notably when uncertainty associated with the needed capabilities declines over time. Judgmental bias may occur when decision makers gain information over time and then try to recall what they knew before, which Fischhoff (1975) refers to as hindsight bias. Hindsight bias is the tendency to exaggerate what one knew before. This exaggeration narrows the gap between what we knew and what we know, and distorts our ability to provide a fair retrospective estimate of the capability gap. We also assume that managers make at least partially deliberate efforts to close their capability gap (Dosi, Nelson and Winter, 2000; Helfat and Lieberman, 2002). Organizational inertia, individuals’ emotional and cognitive sunk costs, and entrenched interests constitute hurdles to the deployment of efforts for closing capability gap. Managers may decide not to start the search process or abandon efforts after initial efforts fail, notably when the capability gap or internal friction is too high. Last, we recognize that our results may have limits in generalizing to different industry settings. The telecom industry we studied was characterized by fast-moving changes, technological uncertainty, deregulation, and competitive intensity. In such fast-moving sectors, external sourcing may trump internal development for a greater range of projects. However, in slower moving industries, the benefits of internal development may dominate even if the technology is not close to current capabilities – if firms have time to develop capabilities and thereby yield the benefits associated with internal development (Dierickx and Cool, 1989).

The limitations offer paths for future research. As we stressed, the results are sensitive to the underlying core assumptions about individuals’ rationality and a firm’s capability sourcing strategy. Examining these assumptions is important, notably for a stream of research which is still in its early stage of development. It would also be valuable for further research to use different empirical methods to capture the relationship between a firm’s constraints, sourcing modes, and ultimate performance. Additional qualitative research would deepen the notion of a firm’s ability to assess its capability gap, to manage its choices of capability acquisition, and
clarify how firms frame internal contexts to balance legacy and change. Insights into whether and when firms decide to abandon their process of searching for new capabilities could also be gained through fieldwork. In addition, other contingencies may mediate the relationship between the firm’s survival and the nature of its capability sourcing choices; candidates include the pace of the competitive environment, capability uncertainty, competitor capability trajectory, the firm’s internal and external governance skills, social connections, and leadership skills. It would also be useful to examine how the influences of internal factors such as capability and social climate interact with external factors such as market failures. Moreover, it would be helpful to break the unitary category of external sourcing into a more diverse set of external modes. Finally, further research could test the generalizability of our findings across industries with different innovation rates.

Nonetheless, this study advances the emerging discussion of how firms change. Research in strategy, economics, and organizational theory has been animated by two conflicting perspectives about change (Levinthal, 1991). On the one hand, extensive literature identifies many barriers to firm change. Indeed, a presumption of inertia or, at best, path dependent change, may be the dominant theme of organizational research during the past two decades (e.g., Nelson and Winter 1982; Hannan and Freeman, 1984; Tushman and Anderson, 1986; Cohen and Levinthal, 1990). On the other hand, there is a large and diverse branch of literature on adaptive organizational change, addressing topics such as boundary choices for new transactions (Williamson, 1975), top management turnover (Hambrick, Cho and Chen, 1996), and changes in leadership decision-making criteria (McNulty and Pettigrew, 1999). Traditionally, these two hands have tended to wave past each other, stressing either constraints or adaptability.

This study helps address the intersection between inertial and adaptive pressures. A small body of research has focused on the interface between constraints and change, attempting to identify ways that firms change in the face of constraints to change. Early work developed the idea of punctuated equilibria (e.g., Gersick, 1991; Romanelli and Tushman, 1994; Sastry, 1997), arguing that major changes occurred infrequently. More recently, strategy research has suggested the idea of dynamic capabilities (Teece, Pisano and Shuen, 1997; Eisenhardt and Martin, 2000; Helfat, et al., 2007), with discussions of change processes that firms use to make substantial ongoing changes. The conceptual framework for the dynamic capabilities perspective is still emerging. One task in pursuing research on firm renewal lies in identifying mechanisms that firms use to overcome constraints to change (Siggelkow, 2001; Zollo and Winter, 2002).

Most generally, then, this paper suggests that internal and external modes of capability sourcing are key mechanisms by which firms can attempt to change in the face of capability and institutional constraints to change. Ultimately, the ability to manage the challenge of selecting appropriate sourcing modes has a substantial impact on a firm’s long-term survival.
REFERENCES


| Table 1. Descriptive statistics                                                                 | Scale | Mean | Std. Dev. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 1. Closeness of existing technical capabilities                                                  | 1-7   | 4.99 | 1.41      | 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 2. Strength of existing technical capabilities                                                   | 1-7   | 5.17 | 1.44      | .59| 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 3. Closeness of existing marketing capabilities                                                   | 1-7   | 4.35 | 1.43      | .32| .17| 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 4. Strength of existing marketing capabilities                                                   | 1-7   | 4.48 | 1.65      | .23| .34| .68| 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 5. Familiarity with customer in targeted capability area                                           | 1-7   | 5.36 | 1.24      | .29| .39| .45| .46| 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 6. Fit of targeted capabilities with firm’s systems                                               | 1-7   | 4.64 | 1.47      | .21| .17| .26| .27| .09| 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 7. Fit of incentive systems to hire new people                                                    | 1-7   | 4.41 | 1.51      | -.06| .07| .15| .15| .03| .53| 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 8. Little competition with targeted capabilities                                                  | 1-7   | 4.78 | 1.48      | .14| .05| .08| .08| .34| .04| .06| 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 9. Little internal resistance for targeted capabilities                                            | 1-7   | 4.63 | 1.43      | .07| .07| .08| .11| .15| .32| .02| .12| .68| 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 10. Firm size                                                                                    | 1-5   | 3.96 | 1.20      | .10| .25| .14| .19| .16| -.11| -.16| -.14| -.08| .04| .32| 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 11. Firm age                                                                                     | 1-5   | 2.07 | .88       | .14| .28| .00| -.01| .02| -.11| -.11| -.08| .05| .07| .49| .43| 1 |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 12. Firm geographic scope                                                                         | 1-5   | 2.14 | 1.16      | -.02| -.15| .08| .10| -.13| .04| .16| .19| -.15| -.15| .19| -.28| -.05| .18| 1 |   |   |   |   |   |   |   |   |   |   |   |   |
| 13. Firm R&D Investment/sales                                                                    | 1-5   | 3.08 | 1.47      | -.00| -.12| .06| .02| -.18| -.09| -.04| .05| -.17| .03| .12| .21| .16| .07| .01| 1 |   |   |   |   |   |   |   |   |   |
| 14. Firm Advertising Investment/sales                                                              | 0/1   | .49 | .50       | -.03| -.11| .02| .05| .04| .19| .18| .09| .18| .13| -.44| -.24| -.40| -.02| -.05| .04| 1 |   |   |   |   |   |   |   |   |
| 15. Firm privately-owned                                                                         | 0/1   | .34 | .97       | -.19| -.22| -.12| -.05| -.07| -.18| -.07| -.04| -.11| -.01| -.05| -.09| -.28| -.24| .07| -.07| -.03| .00| 1 |   |   |   |   |   |
| 16. Firm stock-listed                                                                            | 0/1   | .52 | .50       | .12| .02| -.03| -.00| -.01| -.15| -.20| .18| .12| -.08| -.37| -.03| .45| .34| .15| -.08| -.09| -.22| -.20| 1 |   |   |   |
| 17. Firm - Outside Europe and US                                                                   | 0/1   | .09 | .29       | .08| .02| -.07| -.01| -.09| -.02| -.05| -.03| .00| -.08| .04| .01| -.10| -.09| .05| .21| -.08| -.09| -.12| -.41| 1 |   |   |   |
| 18.的重要性于策略的有关于公司的战略                                                                 | 1-5   | 4.64 | 1.39      | .31| .35| .09| .11| .11| .01| .02| .16| -.15| -.17| -.06| .08| .13| .20| -.17| .18| -.02| .09| .04| -.04| .07| 1 |   |   |   |
| 19. Firm ability to obtain targeted R&D capabilities                                                | 1-7   | 4.33 | 1.31      | .13| .07| .10| .12| .06| .19| .32| .17| -.20| -.20| -.11| .02| .15| .00| .03| .08| .11| .05| -.14| .11| .40| 1 |   |   |   |
| 20. Firm ability to obtain targeted IT capabilities                                                 | 1-7   | 4.37 | 1.41      | .01| .05| .39| .38| .24| .21| .19| .23| .04| .02| .01| .06| .10| -.11| .03| .04| .22| -.13| -.03| .12| -.11| .10| .21| 1 |   |   |
| 21. Firm ability to obtain targeted marketing capabilities                                           | 1-7   | 2.38 | .84       | -.02| -.01| .15| .11| -.09| -.09| -.13| .11| -.02| -.01| -.05| -.08| -.15| -.23| .09| .04| .03| -.16| .03| -.14| .04| .08| .12| .02| 1 |   |   |   |   |

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## Table 2. Measurement Model

<table>
<thead>
<tr>
<th>Latent variables</th>
<th>Internal consistency&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Average Variance Extracted&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Correlations between latent variables&lt;sup&gt;3&lt;/sup&gt;</th>
<th>(\xi_1)</th>
<th>(\xi_2)</th>
<th>(\xi_3)</th>
<th>(\xi_4)</th>
<th>(\eta_1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>((\xi_1)) Capability constraints: Distance with existing tech. capabilities</td>
<td>0.98</td>
<td>0.97</td>
<td>0.98</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>((\xi_2)) Capability constraints: Distance with existing mark. capabilities</td>
<td>0.85</td>
<td>0.66</td>
<td>0.45 0.81</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>((\xi_3)) Institutional constraints: Fit with systems</td>
<td>0.91</td>
<td>0.63</td>
<td>0.23 0.37 0.79</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>((\xi_4)) Institutional constraints: Social acceptance of targeted capabilities</td>
<td>0.98</td>
<td>0.97</td>
<td>0.14 0.37 0.98</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>((\eta_1)) Firm’s effectiveness in obtaining new capabilities</td>
<td>0.90</td>
<td>0.76</td>
<td>0.38 0.33 0.34 -0.31 0.87</td>
<td></td>
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</tr>
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</table>

### Measurement paths

<table>
<thead>
<tr>
<th>((\xi_1)) Capability constraints: Distance with existing technical capabilities</th>
<th>(\lambda_1)</th>
<th>Unstandardized Estimates</th>
<th>Critical ratio (Estimate/SE) (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Closeness of existing technical capabilities</td>
<td>(\lambda_1)</td>
<td>0.98</td>
<td>4.96***</td>
</tr>
<tr>
<td>• Strength of existing technical capabilities</td>
<td>(\lambda_2)</td>
<td>1.00</td>
<td>Fixed</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>((\xi_2)) Capability constraints: Distance with existing marketing capabilities</th>
<th>(\lambda_3)</th>
<th>Unstandardized Estimates</th>
<th>Critical ratio (Estimate/SE) (1)</th>
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</thead>
<tbody>
<tr>
<td>• Closeness of existing marketing capabilities</td>
<td>(\lambda_3)</td>
<td>0.82</td>
<td>8.26***</td>
</tr>
<tr>
<td>• Strength of existing marketing capabilities</td>
<td>(\lambda_4)</td>
<td>1.00</td>
<td>Fixed</td>
</tr>
<tr>
<td>• Familiarity with customer in targeted capability area</td>
<td>(\lambda_5)</td>
<td>0.55</td>
<td>6.48***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>((\xi_3)) Institutional constraints: Fit with systems</th>
<th>(\lambda_6)</th>
<th>Unstandardized Estimates</th>
<th>Critical ratio (Estimate/SE) (1)</th>
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</thead>
<tbody>
<tr>
<td>• Fit of targeted capabilities with firm’s systems and culture</td>
<td>(\lambda_7)</td>
<td>1.00</td>
<td>Fixed</td>
</tr>
<tr>
<td>• Fit of incentive systems to hire new people</td>
<td>(\lambda_8)</td>
<td>0.70</td>
<td>5.83***</td>
</tr>
<tr>
<td>• Fit of incentive systems to integrate newly-hired people</td>
<td>(\lambda_9)</td>
<td>0.62</td>
<td>5.46***</td>
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</table>

<table>
<thead>
<tr>
<th>((\xi_4)) Institutional constraints: Social acceptance of targeted capabilities</th>
<th>(\lambda_{10})</th>
<th>Unstandardized Estimates</th>
<th>Critical ratio (Estimate/SE) (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Development of needed capabilities triggered little or no internal competition</td>
<td>(\lambda_{10})</td>
<td>0.98</td>
<td>5.98***</td>
</tr>
<tr>
<td>• Development of needed capabilities triggered little or no internal resistance</td>
<td>(\lambda_{11})</td>
<td>1.00</td>
<td>Fixed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>((\eta_1)) Firm’s effectiveness in obtaining new capabilities</th>
<th>(\lambda_{Y1})</th>
<th>Unstandardized Estimates</th>
<th>Critical ratio (Estimate/SE) (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• R&amp;D capabilities</td>
<td>(\lambda_{Y1})</td>
<td>1.00</td>
<td>Fixed</td>
</tr>
<tr>
<td>• IT capabilities</td>
<td>(\lambda_{Y2})</td>
<td>0.99</td>
<td>4.06***</td>
</tr>
<tr>
<td>• Marketing capabilities</td>
<td>(\lambda_{Y3})</td>
<td>0.55</td>
<td>2.86***</td>
</tr>
</tbody>
</table>

<sup>1</sup> Internal consistency = \(\frac{\text{\(\sum \lambda_{yi}\)}^2}{\left(\text{\(\sum \lambda_{yi}\)}^2 + \sum (1 - \text{\(\lambda_{yi}\)}^2)\right)}\). The internal consistency measure is similar to Cronbach’s alpha, except that the alpha measure assumes that each indicator of a construct contributes equally (i.e., the loading is equal to unity). Fornell and Larcker (1981) argue that their measure is superior to Cronbach’s alpha because their measure uses item loadings estimated within the causal model.

<sup>2</sup>Average variance extracted (AVE) = \(\frac{\text{\(\sum \lambda_{yi}^2\)}}{\left(\text{\(\sum \lambda_{yi}^2\)} + \sum (1 - \text{\(\lambda_{yi}\)}^2)\right)}\). AVE reports the average amount of variance in the indicators explained by the latent variable (relative to their average measurement error) and the correlations (\(\phi\) estimates) among the latent constructs in the model.

<sup>3</sup>The on-diagonal elements are the square root of the average variance extracted, which assesses discriminant validity (Fornell and Larcker, 1981).

(1) CR values greater than 1.64, 1.96, and 2.32 are statistically significant at 90%, 95%, and 99% confidence level, respectively.
Structural Model Results

**Figure 1a**

- Use of internal development vs. external sourcing based on capability gap
- Technical Capability Gap $\xi_1$
- Marketing Capability Gap $\xi_2$
- Firm's Effectiveness in Creating Capabilities $\eta_1$
- Firm's Survival $\eta_2$
- Controls:
  - Firm size
  - Firm age (+)
  - Firm geographic scope
  - Firm R&D/Sales (-)
  - Firm Adv./Sales (+)
  - Firm ROE
  - Firm Private Firm (-)
  - Firm Listed Firm (-)
- $R^2 = 0.51$
- $R^2 = 0.25$
- $0.24^{***}$
- $0.11^{*}$
- $0.17^{**}$
- $0.10^{**}$
- $0.07$  
- $0.33^{***}$
- $-0.32^{***}$

**Figure 1b**

- Use of internal development vs. external sourcing based on firm's internal frictions
- Technical Capability Gap $\xi_1$
- Marketing Capability Gap $\xi_2$
- Firm's Effectiveness in Creating Capabilities $\eta_1$
- Firm's Survival $\eta_2$
- Controls:
  - Firm size
  - Firm age (+)
  - Firm geographic scope
  - Firm R&D/Sales (-)
  - Firm Adv./Sales (+)
  - Firm ROE
  - Firm Private Firm (-)
  - Firm Listed Firm (-)
  - Importance of regulation
  - Europe (-)
  - Rest of the world
- $R^2 = 0.50$
- $R^2 = 0.24$
- $0.22^{***}$
- $0.11^{**}$
- $0.18^{**}$
- $0.32^{***}$
- $0.30^{***}$

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*** p<0.01; ** p < 0.05; * p < 0.10