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Modes And Effects Of Change: Evidence From Telecommunications Firms

Abstract

This paper compares incentives to undertake internal and external changes and, in turn, examines the success of the changes. We use a routine-based conceptual perspective that draws from several institutional views of strategy, including the resource-based view, evolutionary theory, transaction cost economics, and institutional theory. We argue that the incentives to undertake internal and external modes vary with the extent of the capability gap that the firm faces, as well as the extent of external and internal market failures that the firm would incur in its attempt to change. In turn, we argue that the success of a change will reflect the alignment of the change mode and the incentives. Our argument develops several novel aspects of the concepts of external and internal market failures. The empirical analysis draws on a detailed survey of 160 telecommunications firms operating in Europe, North America, Latin America, the Middle East, or Asia in 2000-2001. The analysis offers one of the few large-scale analyses of change mode choices. The results provide general support for the predictions, with a few unexpected results that provide intriguing insights into the factors that underlie successful and failed change.

Keywords: Business change, global telecommunications sector, internal v. external
Modes And Effects Of Change: Evidence From Telecommunications Firms

How do firms change their capabilities in the face of constraints to change? During the past four decades, strategy research swung from the assumption that businesses can change easily to the argument that firms are highly inert. Increasingly, strategy researchers are seeking a mid-point between these assumptions, recognizing that firms do sometimes change their capabilities, but face strong internal and external inertial pressures that they must overcome in order to do so (Oliver, 1997; Teece, Pisano, and Schuen, 1997; Argote, 1999; Capron, Mitchell, and Swaminathan, 2000). Much of the earliest research on business change focused on the role of leadership. Recent strategy research concerning business change continues to recognize the role of individual leadership, but increasingly is focusing on organizational levels of analysis. One of the key organizational-level arguments is that firms can choose from an array of internal development and external modes of change depending on the context in which they are attempting to create new capabilities. Many researchers have focused on single modes of change, emphasizing the specific roles internal development (Szulanski, 1996, Galunic and Eisenhardt, 1996), purchase contracts (Anand and Khanna, 2000), inter-firm alliances (Doz and Hamel, 1998; Gulati and Singh, 1998), and acquisitions (Capron, Mitchell & Dussauge, 1998; Singh & Zollo, 1997; Capron, 1999) in their capacity to develop, acquire, and integrate new business capabilities. However, research is just beginning to scratch the surface of understanding the drivers of choice among internal and external modes of change.

This paper compares incentives to undertake internal and external changes and, in turn, examines the success of the changes. We use a routine-based conceptual perspective (Karim and Mitchell, 2001) that draws from several institutional views of strategy, including the resource-based view (Penrose, 1959; Wernerfelt, 1984), evolutionary theory (Nelson and Winter, 1982; Kogut and Zander, 1992; Galunic and Eisenhardt, 1996), transaction cost economics (Williamson, 1975), and institutional theory (Oliver, 1997). We argue that the incentives to undertake internal and external modes vary with the extent of the capability gap that the firm faces, as well as the extent of external and internal market failures that the firm would incur in its attempt to change. In turn, we argue that the success of a change will reflect the alignment of the change mode and the incentives. Our argument develops several novel aspects of the concepts of external and internal market failures, while our empirical analysis offers one of the few large-scale analyses of change mode choices. The results provide general support for the predictions,
with a few unexpected results that provide intriguing insights into the factors that underlie successful and failed change.

Our empirical analysis draws on a detailed survey of 160 telecommunications firms operating in Europe, North America, Latin America, the Middle East, or Asia in 2000-2001. The international telecom industry provides rich data concerning the processes by which firms change as they seek to acquire new capabilities in the face of rapid industry changes. The telecom industry has faced intensive deregulation, price competition, telecom and information technology convergence, and foreign competition in recent years. Firms in the industry have used multiple modes of change in the face of such pressures.

**BACKGROUND: CAPABILITIES, BUSINESS CHANGE, AND MODES OF CHANGE**

We begin by outlining the core concepts of capabilities, business change, and change modes. By capabilities, a term that we use as synonymous with resources, we mean stocks of knowledge, skills, financial assets, physical assets, human capital, and other tangible and intangible factors (Wernerfelt, 1984; Amit and Shoemaker, 1991). In turn, capabilities consist of sets of routines, which are identifiable patterns of activity embodied in human or capital assets (Winter, 1987). Routines may involve technical, marketing, managerial, and other skills.

By business change, we mean altering the capabilities that define what a firm is able to do. Changes include developing new products, new productive processes, new markets, and new organizational structures (Schumpeter, 1934). We assume that business managers commonly seek to undertake changes when they face gaps between the capabilities that their firms possess and those that the firms need to operate in the current competitive environments or in the competitive environments that they expect to face in the future. Thus, we assume intended economic rationality concerning the need to change on the part of business managers, while recognizing that managers will often face severe constraints in their ability to respond to economic incentives.

We distinguish between internal development and external modes of change. Internal development refers to the changes that a firm undertakes by recombining its own existing resources or developing new resources on its own. Examples of internal development include internal training, internal product development, and building new plants. External modes of change include purchase contracts, alliances, and acquisitions. Purchase contracts are cases in which firms buy distinct resources from third parties, such as purchasing off-the-shelf
technologies and services, licensing technology, and employing consulting services. Alliances are ongoing relationships with other organizations, such as firms or universities, in which the organizations 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 both acquiring entire corporations and acquiring individual businesses from ongoing multi-business corporations. In this study, we will group the three external modes into a single external category, which we will compare to internal development. In doing so, we posit a decision process in which managers first decide whether to undertake a change internally or to seek outside the firm for resources that they need to undertake a desired change. 

PREDICTIONS: CAPABILITY GAPS AND MARKET FAILURES

We consider three principal influences on the choice of internal and external modes of change. We first discuss capability gaps, next turn to external market failures, and then discuss internal market failures. This section integrates several arguments concerning influences on mode choice, while developing new arguments concerning the influences, particularly the role of different forms of market failures.

We begin with the straightforward prediction that a firm’s tendency to search externally for new capabilities will increase with the extent of the gap between the firm’s existing capabilities and those that it desires. This prediction stems from views of strategy that highlight two aspects of capability gaps, including capability closeness and capability strength. Capability closeness is the extent to which two capabilities share the same routines. Capability strength is the degree to which the routines that make up a firm’s capabilities would suit the targeted capabilities when compared to other firms’ capabilities. A capability gap, then, is the extent to which a firm’s current routines will provide the basis for desired changes, both in comparison to the needed new routines (closeness) and in comparison to competitors’ routines (strength).

1 We tested the assumption of sequential decision making in our empirical analysis, by asking survey respondents (1) whether they considered certain modes first before turning to other modes and, if so, (2) in what order they considered the modes. The responses reported statistically significant patterns of sequential decision making, with internal development the most common initial mode, followed by purchase contracts, alliances, and then acquisitions.
Several arguments suggest that the choice between internal development and external modes of change depends on the closeness of the gap between the changing firm’s existing capabilities and the needed capabilities. In the resource-based view, firms tend to undertake internal development when they estimate that their current routines provide the skills needed to create desired new capabilities (Wernerfelt, 1984). Similarly, 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. Arguments concerning operating routines (Cyert and March, 1963; Hannan and Freeman, 1989) and path dependent learning (Levitt and March, 1988) lead to a similar conclusion. Dosi (1982) points out that businesses tend to develop new capabilities in areas closely related to their existing technological skills. Teece (1986) argues that inheritance of past routines leads firms to develop new capabilities in areas where they possess prior capabilities. Galunic and Rodan (1998) suggest that a narrow gap between needed and existing capabilities will both increase the likelihood of novel resource reconfiguration within a firm and decrease the costs of implementation.

In addition to capability closeness, several arguments suggest that the strength of a firm’s capabilities will influence internal and external mode choices. The recent strategy literature commonly stresses the distinction between exploiting existing routines and exploring new routines (March, 1991; Koza and Lewin, 1998). When firms seek to reinforce areas in which they have existing competitive strength, they often prefer internal development rather than external modes of change. Conversely, when firms seek capabilities in areas that are new to them, they will tend to turn to external modes. Similarly, Cuervo-Cazurra (1999) argues that firms develop capabilities internally once they have already achieved a competitive level close to that required for effective competition, and will seek externally when they face a large competitive gap. Studies in the foreign direct investment literature, meanwhile, show that firms with strong technological capabilities have less need to buy or ally with existing firms and are more likely to enter foreign markets through greenfield ventures (Hennart and Park, 1993). That is, greater capability strength relative to local firms favors the choice of internally developed investment rather than alliance or acquisition. In general, a firm has greater incentives to develop new capabilities internally when the firm has a strong competitive position in the targeted area.

The reverse side of the capability gap argument is that firms will tend to turn to external sourcing when there is an extensive gap between existing and desired capabilities. Many
organizational theorists argue that businesses face substantial constraints to internal development. Nelson and Winter (1982) stress that a firm's irreversible investments and limited range of operating routines constrain its ability to develop and use capabilities within the firm, so that firms will turn to external sourcing when their existing routines differ from the routines needed for a change. In parallel, the acquisitions and alliances literatures show that managers often search for targets or allies with strong capabilities that complement the acquiring firm’s weaknesses, planning to redeploy the stronger capabilities from the target (Capron, 1999; Karim and Mitchell, 2000) or use the ally’s strength (Inkpen and Beamish, 1997; Dussauge, Garrette, and Mitchell, 2000). Given enough time and money, firms might be able to use internal development for changes that face large gaps, but competitive pressures commonly lead firms to undertake external modes. Thus, we expect that firms will resort to external modes when gaps between the needed capabilities and the existing capabilities are large, and to internal modes when the gaps are small.

Proposition 1. The less the gap between a firm’s existing capabilities and the capabilities that the firm requires, the more likely the firm will use internal development to undertake business changes.

We next argue that greater external market failures lead to greater tendencies to change internally. External market failures arise from two types of sources, including the nature of the capabilities that a firm wants to obtain and the ability of the firm to govern external exchanges.

Two literatures offer complementary arguments concerning how market failures that arise from the nature of capabilities affect mode choice. Transaction cost economics theory emphasizes potential opportunism as the primary driver of market failure in cases that involve idiosyncratic capabilities (Williamson, 1985). In this view, sourcing idiosyncratic assets from external partners, whether via purchase contracts, alliances, or acquisitions, often meets frictions due to the difficulties in screening, trading, and transferring the assets into the firm. In contrast with exchanges in external markets, firms can use internal development to protect resource value from appropriation (Teece, 1986; Chi, 1994).

In parallel with transaction cost arguments, the evolutionary literature argues that market failures arising for capabilities that have high coordination requirements will cause firms to use internal development for changes that involve multiple routines (Grant, 1996; Spender, 1996). By coordination requirements, we mean the need for cooperation between providers and users that helps exchange and reconfigure routines. In the evolutionary view, routines that require
ongoing cooperation are difficult to exchange through market transactions because of inherent uncertainties in how the routines will work together and in the stability of the cooperating organizations. Organizations provide governance and socialization mechanisms for transferring routines across firms because they act as social communities, which create productive and administrative routines embodied in people and procedures (Kogut and Zander, 1992). The opportunism and coordination forms of market failure tend to arise jointly, as the same factors that give rise to the need for ongoing cooperation typically also create opportunism risks. When firms face high external market failures that arise from the nature of the capabilities, whether the failures arise from opportunism concerns or coordination needs, the firms will tend to turn to internal development as a change mode.

The second form of external market failure has received less attention in mode choice discussions. In addition to differences in the nature of capabilities, differences in firms’ governance skills, which are abilities to manage external exchange, will create market failures that influence change mode choice. Firms provide a means of reducing appropriation risks through appropriate governance abilities, which Liebeskind (1996) refers to as institutional capabilities. Liebeskind (1996) notes that “because property rights in knowledge are weak, and are costly to write and enforce, firms are able to use an array of organizational arrangements that are not available in markets to protect the value of knowledge”. Governance skills include procedures for importing capabilities from exchange partners, protecting against undesired leakage to exchange partners, and combining imported capabilities with capabilities within the firm. The lack of such abilities creates another dimension of market failure, as firms that lack effective governance skills will be less likely to undertake external exchanges than firms that possess the skills. Thus, external market failures, whether arising from the inherent nature of capabilities or from firm-level differences in the ability to govern exchanges, will lead to internal development.

Proposition 2. The greater the external market failure that a firm faces in obtaining new capabilities, the more likely the firm will use internal development to undertake business changes.

The first two predictions emphasize resource gaps and external market failures. We now turn to the impact of internal market failures on mode choice, on the premise that firms differ in their abilities to undertake internal sourcing. Internal market failures can arise from two sources, including conflict between existing capabilities and the lack of availability of internal
reconfiguration routines. The notion of internal market failures echoes the notion of external market failure because a firm, being defined as a social community, faces costs pertaining to screening, trading, and transferring capabilities internally. We argue that the presence of lesser internal market failures will lead to internal development.

Conflict between capabilities can arise from many sources, such as competition for resources and obsolescence of existing skills, and cause both individual and organizational inertia (Stinchcombe, 1995). In general, such conflicts denote lack of social acceptance arising from cognitive sunk costs, which are “social and psychological costs associated with altering firm habits and routines” (Oliver, 1997: 702). Cognitive sunk costs are especially prevalent when the needed capabilities will disrupt familiar routines, or changes patterns of resource allocation or power distribution. Oliver (1997) argues that a firm’s historical cultural and political context, along with the psychological costs associated with organizational change, can constrain capability creation. Ginsberg (1994:158) notes that “strong institutional pressures abide in the evaluation of current resource allocations and in hindering acceptance of knowledge deployments”. At the individual level, employees may have to learn new skills in order to develop new business capabilities, while power may shift to new people within the organization subsequent to capability development. Both vulnerable employees and powerful vested interests are likely to oppose such changes. The presence of cognitive sunk costs will lead managers to reinforce the existing capability position and make internal development less likely. At the organizational level, potential violation of corporate traditions, norms, and culture may dampen internal development. Routines that a firm has accumulated over long periods acquire a taken for granted character within the firm that makes them resistant to change (Oliver, 1997).

When possible, a firm will use internal development for capabilities with features that allow the firm’s existing routines to function smoothly. The fear of disrupting existing routines is a powerful force tending to hold organizations on relatively inflexible paths. This inertia implies that, in order to preserve their routines, people in place within the firms are more likely to use internal development for capabilities that fit the current systems, that is, capabilities that tend not to disrupt current activities. Internal development will be more common 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
turn to external modes of change to gain access to routines that internal people will not or cannot
develop within the firm. External sourcing of capabilities that would conflict with existing
capabilities provides a means of over-coming internal barriers to developing such needed skills.

The notion of internal conflict complements the earlier discussion of capability gaps,
because the conflict involves non-rational, emotional components of the firm’s capacity to
develop new capabilities internally. Internal development of capabilities that build on new
routines meets institutional barriers. The needed capabilities might, in theory, be close to existing
skills of people but may, in practice, violate corporate traditions, break people’s working
routines, and disrupt the organization by bringing about internal competition. When routines
require significant change, and particularly if the needed changes conflict with the existing
routines, firms will tend to use external modes of change. The core reason is that the firm will
have less need to immediately attempt to adjust existing routines in the face of substantial
resistance. Instead, the firm can attempt to obtain new routines from outside the firm and only
then undertake the process of adjusting existing resources. This argument closely parallels
Abernathy and Clark’s (1985) and Tushman and Anderson’s (1986) notion of competence
destruction, which arises when changes will reduce the value of existing resources. The initial
argument concerning competence destruction is that firms will tend to avoid changes that involve
substantial competence destruction. An extension of the argument, though, is that the presence of
competence destruction will influence the mode of change of firms that attempt to change despite
the potential for competence destruction. Most often firms will search externally in such cases,
rather than undertake the immediate risk of attempting to change existing routines.

The second source of internal market failures is the lack of internal reconfiguration
routines. Internal reconfiguration routines are systems that a firm has created that allow it to
recombine and add to existing routines in order to create new capabilities. Examples include
knowledge sharing incentives, hiring routines, and employee integration routines. Firms that
possess effective internal reconfiguration routines are able to reduce the extent of internal
stickiness that interferes with efforts to share knowledge among organizational subunits and
build on a firm’s existing capabilities (Szulanski, 1996). In contrast, firms with weak internal
reconfiguration routines tend to suffer from internal stickiness.

Methods of overcoming internal stickiness include two general classes: agency-based
factors and integration mechanisms. First, agency-based factors determine the incentives for
internal people to collaborate (Lenox, 2000). In this view, incentive systems influence the extent to which the people are willing to share their knowledge and time with people engaged in different projects.

Second, integration mechanisms influence the degree to which people are able to collaborate effectively (Szulanski, 1996). Integration mechanisms include active internal labor markets, job rotation, resource allocation processes, tolerance for experiments, transversal committees, and internal consulting services. When a firm enjoys substantial integration mechanisms across units of the firm, it will have more opportunities to draw routines from internal sources and recombine them into novel configurations. Such integration mechanisms help people and organizational units share knowledge. Integration mechanisms also help firms understand what existing capabilities are available internally that could be used for developing future capabilities. These arguments parallel the literatures on intra-firm social networks (Tsai, 2000). For instance, Hansen (1999) shows that the existence of strong ties across business units facilitates intra-organizational transfer of complex knowledge. By contrast, when such mechanisms are weak, the firm will have greater need to turn to external modes if it wishes to attempt to change. Similarly, an emerging stream of literature concerning recombination opportunities argues that firm can undertake Schumpeterian innovation internally by recombining routines in novel ways (Henderson and Clark, 1990; Galunic and Rodan, 1998). Like incentive systems, integration mechanisms tend to mitigate internal stickiness.

In sum, the extent of internal market failure will influence firms’ choices between internal development and external modes of business change. Sources of internal market failure include conflict with existing capabilities and the lack of internal reconfiguration routines. Internal reconfiguration routines include incentives and integration mechanisms. This argument views firms as collections of social communities, in which it is sometimes more difficult to initiate internal capability development than it is to source externally for new capabilities.

Proposition 3. The less the internal market failure that a firm faces in obtaining new capabilities, the more likely the firm will use internal development to undertake business changes.

Our argument so far provides a baseline for the study of the incentives to use internal and external modes of change. The argument focuses on characteristics of capabilities, characteristics of the firms that want to obtain the capabilities, and characteristics of the market for the capabilities. We first argue that the narrower the gap between the needed capabilities and the
firm’s existing capabilities, the more likely the firm will use internal development rather than external modes to undertake changes. We then argue that greater external market failures will lead a firm to undertake internal change rather than external modes. Our third prediction extends the arguments, by positing that internal market failures will lead to greater dependence on external modes of change. Together, the three predictions address “the critical questions of whether internal knowledge transfer is either easier or qualitatively different from external knowledge transfer” (Eisenhardt & Santos, 2000), by identifying contingencies that will affect the prevalence of different types of exchanges.

The final stage in our argument lies in considering how the mode choices will affect the success or failure of a firm’s attempt to change. Our central prediction is that firms that maintain closer alignment among incentives to undertake particular modes and their choice of mode will enjoy greater change success.

At each stage in our preceding discussion, we have argued that mode choices that do not reflect mode incentives will incur problems for the firm, whether due to loss of information or poor coordination. Clearly, of course, firms would prefer not to make misaligned choices. In a world that is both relatively simple, we would expect to see few misaligned choices. However, firms typically face conflicting incentives that interfere with their ability to optimize on individual decisions. Moreover, firms frequently face the risk of path dependence that causes them to replicate past choices in circumstances that might require new means of change. Thus, we expect misaligned choices to occur and, in turn, lead to problems with attempts to change.

Proposition 4. The more a firm’s internal development choices align with the mode incentives, the more successful the firm’s internal development changes will be.

The success of a firm’s attempts to change has multiple dimensions. Elements of capabilities range from specific measures of technical, marketing, and managerial capabilities to more overall measures of capability quality, cost, speed, protection, and effectiveness. In addition, it is useful to consider the success of changes that add substantially new capabilities to a firm’s repertoire, in the sense of March’s (1991) notion of exploratory change. Moreover, how incentive-mode alignment affects a firm’s ability to change is itself an important performance outcome. There may well be differences in how alignment and misalignment of different mode incentive-mode combinations will affect the success of different elements of change, which we will explore empirically.
Overall, then, we propose a set of conceptually-related influences on the modes that firms use to undertake business changes and, in turn, affect the success of the changes. The predictions build on existing literatures concerning business change, while providing a more integrated view of factors that influence the choice between internal and external change modes. The predictions offer several novel conceptual and empirical elements. The knowledge gap prediction has received some discussion as a conceptual argument in the strategy literature, but has received little large-scale empirical testing. External market failures have received substantial conceptual and empirical attention in terms of the nature of capabilities, but market failures stemming from firm-level governance skills for external exchanges have received little discussion or testing. The knowledge gap prediction has received some discussion as a conceptual argument in the strategy literature, but has received little large-scale empirical testing. External market failures have received substantial conceptual and empirical attention in terms of the nature of capabilities, but market failures stemming from firm-level governance skills for external exchanges have received little discussion or testing. The impact of internal market failures on mode choice, too, has received only marginal attention.

DATA AND METHODS

Change in the telecom industry

We chose the international telecom sector as a fruitful arena in which to study business change. Throughout much of the world, telecom network operation and service provision have been changing rapidly during the past decade, owing to changes in the regulatory, technical, competitive, and market environments (Beardsley, Raghunath, and Wilshire, 2000). Deregulation has brought about many changes to network operation. In the U.S. and the European Union, for instance, continental and national regulators are increasingly forcing incumbents to “unbundle” services and allow competitors to use the incumbents’ “local loop” customer-access networks to compete with the incumbents for both traditional and innovative telecommunications services. Meanwhile, traditional telecom companies, spurred by innovative competition and by attempts to capture economies of scale and scope, have invested heavily in new technologies and introduced new infrastructure.

Competition in the network operation segment also has implications for the service provision segment of the telecommunications industry. As the battle for the access infrastructure heats up, pure infrastructure providers run the risk of seeing much of the value in the industry
accrue to content providers and aggregators, potentially relegating infrastructure providers to the role of commodity sellers of bandwidth. To prosper, infrastructure providers must secure customer relationships by offering distinctive value-added services. The market for most enhanced services is highly competitive and firms with strong information technology competencies are challenging telecom incumbents (Armstrong, 1998). Therefore, telecom incumbents must undertake substantial business change if they are to survive and prosper.

The desired changes in the industry emphasize four key aspects of Schumpeter’s (1934) change typology: products, production processes, markets, and organization. Most strikingly, changes in the telecom sector entail more than changing a firm’s resource endowment; change also means transforming the firm’s organization and processes needed to integrate new knowledge. Accordingly, business change goes beyond the notion of specific resource exchange and includes the notion of overall firm change processes. As a result, the telecom sector is highly suited to this research.

**Sample and data**

Our data consist of survey responses from 160 telecommunications network firms operating in Europe, North America, South America, or Asia. During late 2000 and early 2001, following detailed in-person pretesting, we mailed the survey to firms throughout the industry. The survey asked senior managers to assess the incentives, prevalence, and success with the four modes of change, as well as answer questions concerning barriers to creating capabilities and general firm demographics. We asked them to answer the survey from either the perspective of their entire corporation or their business unit, depending on the scope of their responsibilities. Owing to senior managerial level from which we needed responses and the length of the survey instrument, which included more than 250 questions and 20 pages of text, we sampled heavily. We were able to obtain names and addresses for about 1,500 firms and senior managers, with about 40% based in the United States, about 40% based in Europe, and the remainder distributed throughout the world. Overall, our response rate is low (about 11%), but the extent of the information that we were able to obtain balances the rate. We caution that, like any survey, the responses must be interpreted in the context of the characteristics of the responding firms.

Table 1 reports demographic characteristics of the respondent firms. The respondents have extensive geographic dispersion of home countries, with about 50% based in the U.S., France, the U.K., Germany, and Belgium (Panel A). The responses provide a reasonable size
distribution, with about 33% having fewer than 500 employees, 27% having 500-5000 employees, and 39% having more than 5,000 employees (Panel B). About half have less then $500 million annual corporate sales, while the other half have up to $60 billion corporate sales (Panel C). Firm profitability also varied widely, in terms of both ROA and ROE (Panel D). Similarly, the geographic scope of the respondent’s activities varied widely (Panel E). Firm age is the main factor that clusters more strikingly, with 69% of the respondents being more than 10 years old (Panel F). In addition, most of the respondents have a high proportion of their sales in the telecom industry (Panel G), often complemented by sales in the information technology (IT) sector (Panel H; there is some overlap of the telecom and IT sectors). Thus, the sample reflects a wide variety of established traditional telecommunications firms. These firms face strong incentives to obtain new capabilities, owing to the extensive environmental changes that are affecting the industry. We discuss data reliability in more detail below.

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

Variables

Table 2 reports summary statistics for the variables that we used in the analysis. Appendices 1 and 2 report the relevant questions from the survey and the analysis that we used to create the variables.

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

The mode incentive propositions required measures for capability gaps, external market failures, and internal market failures. We measured the variables with multi-item constructs. Each construct achieved convergent and discriminant validity at conventional levels.

We created two constructs for the capability gap relationships. We based the items in the constructs on the firms’ responses to questions that asked them to assess the extent to which the factor led them to use internal development rather than external modes of change. “Low gap: Commercial” used six items measuring capability closeness and strength of managerial, marketing, and customer knowledge. “Low gap: Technical” used two items measuring technical capability closeness and strength.

We created two constructs for the external market failure relationships. “External market failure: Uniqueness” used two items to assess the extent to which the needed capabilities would differentiate the firm from its competitors and the extent to which the firm wished to protect its differentiated capabilities, based on the argument that such differentiation tends to involve the
idiosyncratic assets that typically face high levels of market failure. “External market failure: Governance” used three items to assess the extent to which the firm believed it would be able to import, protect, and use external capabilities.

We created two constructs for the internal market failure relationships. “Low internal market failure: Lack of conflict” used three items to assess the extent to which the new capabilities would create competition, resistance, and obsolescence among a firm’s existing capabilities. “Low internal market failure: Reconfiguration routines” used three items to assess the extent to which the firm possessed incentive systems, hiring systems, and employee integration systems that would suit the new capabilities.

We also created three control variables for the mode incentive analysis. “Limited external availability” is a three-item construct assessing the extent to which the firm had access to active external markets, alliance markets, and acquisition markets. “Time pressure” is an item denoting the effect of intense time pressure on the firm’s mode choice. “Imitation” is a single item denoting the tendency for competitors to use internal development rather than external modes.

We created ten variables for the analysis of change success. Five of the success variables are single-item measures that denote the performance of the firm’s experience with internal development during the recent past. The measures include “Capability quality”, “Cost reduction”, “Speed”, “Capability protection”, and “Change effectiveness”.

Three of the success variables are constructs that measure specific functional capabilities. “Technical skill enhancement” is a three-item construct assessing effectiveness in developing R&D, information technology, and manufacturing capabilities. “Marketing skill enhancement” is a two-item construct assessing effectiveness in developing marketing and sales capabilities. “Managerial skill enhancement” is a three-item construct assessing effectiveness in developing project management, network management, and general management capabilities.

The “Capability change process” success variable provides a measure of how a firm’s change activities affected its ability to change. The variable is a three-item construct assessing how effectively a firm changed its incentives, increased its firm’s entrepreneurial emphasis, and speeded its change processes.

Finally, the “Capability exploration” success variable provides a measure of how internal development led to a degree of exploration of new skills rather than exploitation of existing capabilities. The variable is a three-item construct assessing the degree to which internal
development led to restructuring, investment in new areas, and hiring people with new backgrounds.

We created three additional control variables for the analysis of change success. “Frequency of internal development” denotes the extent to which the firm used internal development during the past three to five years. “Firm size” denotes the response for the number of employees of the firm or of the relevant business unit that was affected by the changes. “U.S. firm” records whether the company was based in the United States.

**Data Reliability**

Several steps assess the quality of the survey instrument and measures: 1) content validity of our measures through an extensive pre-testing process based on expert panel assessment, cross validation with interviews of senior executives, and a pilot test; 2) careful design of the survey through the sequence of questions and use of multiple items; 3) analysis of reliability and discriminant validity of the measures, and 4) analysis of respondent bias.

**Content validity.** The survey process proceeded in four phases. In the first phase, we developed measurement scales by reviewing the relevant literature and by conducting 25 on-site interviews with CEOs from large firms, academics, and consultants in the telecommunications and IT industries. This first phase led us to generate a rich list of items pertaining to our core theoretical constructs. In the second phase, we pre-tested the preliminary version of the questionnaire in site interviews and with senior executives who were attending telecommunications executive education programs at our business schools located in the United States and in Europe. The executives had a wide range of backgrounds, including finance, marketing, and production. The pretests aimed at ensuring that the respondents understood the questions in the context that we intended. This second phase led us to clarify some questions and to add items that the executives suggested. Our third stage consisted of a pilot survey using the revised survey instrument during on-site interviews with CEOs and executives in charge of corporate development. This resulted in the final version of the questionnaire. We base the content validity of our measures on this careful process of developing the categories and pre-testing the questions. In the fourth stage of the data collection process, we designed and administered the mail survey under guidelines established in Dillman’s (1978) Total Design Method. We addressed the surveys to the chief executives in charge of corporate development.
We also sent two follow-up letters and two replacement questionnaire within the three weeks following the first mail.

**Survey design.** In our survey design, we separated the items specific to constructs from each other to minimize consistency bias. We also introduced several control questions at different points. For example, for the use of a specific sourcing mode, we introduced questions pertaining to the frequency, the ranking of that mode compared to other modes, and the degree of investment in that mode. We deleted the few cases that exhibited a lack of convergence across similar questions.

To deal with some biases generated by response styles, we introduced many different items that were heterogeneous in content. The second precaution we took, applicable to acquiescence and disacquiescence responding, was to word some items in a scale positively and other items negatively. This provides a built-in control for stylistic responding because a high (low) score cannot be obtained simply because of yea-saying (nay-saying) (Baumgartner and Steenkamp, 2001). We also performed paired-samples T-test to compare the means across pairs of drivers (market failures versus strategic gap, for example). This procedure computes the differences between values of the two variables for each respondent and tests whether the average differs from 0. For the nine pairs of drivers, seven exhibited significant differences, which suggest that respondents were able to discriminate between the questions.

Finally, we asked the respondents to reflect on their practices of internal development and external sourcing modes of the last three to five years to avoid requiring that they select a successful transaction, which would introduce sample selection bias. Thus, we require them to analyze their own practices and draw general rules and patterns of behavior.

**Measure reliability and discriminant validity.** To examine the drivers of internal development vs. external sourcing, we use multiple scale measures to enrich the reliability of our data. Cronbach’s alpha ranged from 0.65 to 0.95. We also performed a factor analysis to ensure that each item was associated with its appropriate construct. We find support for discriminant analysis. Table 2 reflects the low correlations across the theoretical constructs.

**Respondent bias.** Respondent bias also arises as an issue in survey research. We performed several tests to address this. We compared the industry and geographical profile of the respondent and non-respondent samples. The data set has a broad distribution of acquiring and target firms across all the countries in the sample, although Western European firms and U.S.
firms are somewhat over-represented in the data set and Asian firms are somewhat under-represented.

Finally, we found no material differences in the responses of early and late respondents, on the assumption that later respondents will tend to share characteristics with non-respondents (Armstrong and Overton, 1977). Overall, we believe that the data reflect representative characteristics of established firms in the telecommunications industry and, in turn, of firms that operate in rapidly changing and technologically-intensive industries.

**Statistical Methods**

We used two statistical methods for the analysis. To test the propositions concerning mode choice (Propositions 1 to 3), we used t-tests of the responses for each construct that recorded the firms’ rationales for choosing internal development rather than external modes. We then used multivariate regression analyses to test Proposition 4, using the change success variables as dependent variables and the responses concerning mode choice incentives as independent variables. These methods provide straightforward means of assessing the expected relationships among the variables.

**ANALYSES**

Table 3 reports the analysis of mode choices. The results support Propositions 1 to 3. Five of six internal mode choice incentives take their predicted relationships with the respondents’ internal development choices.

********** Table 3 about here **********

Proposition 1, concerning resource gaps, receives strong support. Rows A and B of Table 3 show that both the technical and commercial resource gaps take the expected relationship with internal development. That is, firms that already possess resources that are strong and/or are close to the needed resources tend to choose internal development rather than external modes of change. This is a starting-point result that reflects common sense as well as conceptual motivation, although the prediction has received little large-scale empirical analysis. The results provide confidence in the measures as well as support for the proposition.

Proposition 2, concerning external market failures, receives partial support. Row C of Table 3 shows that the “Uniqueness” dimension of external market failure takes the expected relationship with internal development. As expected, firms that are changing in attempts to create and protect differentiated resources often do so via internal development. Presumably, internal
development provides greater potential for protecting such unique resources than do external modes of change.

Conversely, row D shows that the “Governance” dimension of external market failure does not lead to internal development. Instead, the mean value of the “Governance lack” measure is below the scale’s median value. Thus, the respondents reported that a lack of skills to manage external exchanges did not tend to lead to internal development. The result for the governance variable suggests that firms sometimes use external modes even if they lack skills needed to manage external exchanges effectively, possibly because they also lack the ability to undertake internal development for the needed capabilities. Such misalignment of mode incentives and choices might lead to subsequent problems in change outcomes.

Proposition 3, concerning internal market failures, receives strong support. Row E of Table 3 shows that firms often use internal development for changes that will create little conflict with existing capabilities. Firms frequently can integrate internal development of such complementary changes with ongoing activities, benefiting from coordination between the new and established activities.

Also consistent with Proposition 3, Row F shows that firms that possess effective reconfiguration routines such as incentive, hiring, and integration systems often use internal development to undertake changes. This result speaks to a key source of firm-level heterogeneity in the ability to change, as some firms develop reconfiguration routines while others do not. In turn, firms that possess internal reconfiguration routines will be better positioned to undertake internal development when their competitive environments force them to attempt to change.

The three control variables in Table 3 provide useful information about the choice of internal development. The respondents reported that neither limited external availability nor imitation of competitors were important factors in their firms’ internal development choices. By contrast, though, time pressure did have a significant impact on the choice of internal development, presumably because firms believe that they can change internally more quickly than when they must first negotiate with alliance partners or acquire other businesses. The control variable results provide further reassurance that the respondents discriminated among the different incentives to undertake internal development.

Table 4 reports the change outcome results, which test Proposition 4. We considered ten aspects of change outcome. The models assess the alignment between the internal mode
incentives and the firms’ choice of internal development to undertake changes. The dependent variable for each model is the firms’ responses concerning the success of their internal development change activities. The independent variables are the firms’ ratings of the incentives to undertake internal development. A positive coefficient in the analysis means that successful internal development outcomes tended to occur when the firms rated an internal development incentive highly. A negative coefficient means that internal development suffered when the firms rated a particular incentive highly. Each of the models achieved reasonable overall explanatory power, based on the R-squared statistics.

********** Table 4 about here **********

The results in Table 4 support Proposition 4. All ten of the outcome variables had a significant positive relationship with at least one incentive variable (the columns of Table 4), while eight of ten had significant relationships with at least two incentives. In addition, all six incentive variables had significant relationships with at least one of the outcome dimensions (rows A through F of Table 4), although sometimes in surprising directions. We will address the positive and negative relationships between internal development incentives and outcomes in the following discussion.

The technical gap incentive, which Row A of Table 4 reports, affected three success dimensions, two positively and one negatively. Firms that developed new technical capabilities internally when technical gaps were low, rather than seek external sources, tended to benefit in terms of enhancing technical skills and capability protection (models 1 and 6). Conversely, though, such changes sometimes came at the cost of poorer marketing outcomes (model 2). The negative marketing result in model 2 must be interpreted cautiously, because there is a moderate correlation (r=0.43) between technical and commercial gaps (row B shows that the commercial gap incentive leads to superior marketing outcomes). The technical gap result becomes insignificant when we drop the commercial gap variable in sensitivity analysis (the commercial gap coefficient in row B of model 2 remains significant when we drop the technical gap variable), so that the reported relationship between the technical gap incentive and poorer marketing outcomes is an off-diagonal outcome that holds when the technical gap is low and the commercial gap is high. That is, firms with low technical gaps also often have low commercial gaps, which reinforce each other in change attempts, but those firms that are strong in technology while being weak in commercial capabilities may encounter marketing-technology conflicts in
their attempts to change. This set of results reinforces the important role in resource strength and
closeness in facilitating internal change.

The commercial gap incentive, in Row B of Table 4, had a positive influence on seven
success dimensions. Firms that developed new commercial capabilities internally when
commercial gaps were low tended to benefit in terms of enhancing marketing and managerial
capabilities (models 2 and 3; recall that the commercial gap incentive combines marketing and
managerial closeness and strength), capability quality (model 4), change effectiveness (model 5),
protection (model 6), speed (model 7), and change processes (model 10). Thus, changes for
which there is a close commercial fit, in terms of a firm’s existing customer skills and
managerial practices, tend to be suited to many dimensions of successful internal development.

The uniqueness dimension of the external market failure incentive, in Row C of Table 4,
affected three outcome dimensions, one positively and two negatively. The uniqueness incentive
led to greater protection (model 6), but somewhat poorer cost and change process outcomes
(models 8 and 10). The negative result for cost may stem from a lesser focus on cost issues when
firms are creating capabilities that will differentiate them from their competitors. The negative
change process result, meanwhile, may arise because creating unique capabilities often interferes
with existing ways of developing routines and resources. In general, the uniqueness results
suggest internal development offers protection benefits for unique capabilities, consistent with
common arguments in transaction cost economics and other literatures, but that simply wanting
to develop and protect differentiated capabilities internally does not lead to success on other
dimensions; instead, a firm must possess relevant capabilities and experience.

The governance lack dimension of external market failure incentives, in Row D of Table
4, had substantial impact on several dimensions of change success, but in an unexpected negative
direction. Firms that tend to internalize change activities because they lack the skills needed to
manage external modes of change often fare poorly, with negative outcomes arising for
technical, marketing, and managerial skills (models 1, 2, and 3), as well as for quality,
effectiveness, and cost (models 4, 5, and 8). This unexpected negative pattern suggests that firms
that attempt to use internal development to compensate for a lack of external management skills
often struggle. This reinforces the point we made above, that a firm must possess needed skills as
well as incentives in order to change successfully.
The conflict dimension of internal market failure incentives, in Row E of Table 4, had one positive impact on change success, along with several negative influences. Low internal conflict was positive for protection (model 6). At the same time, though, the impact was negative for managerial skills, quality, and exploration (models 3, 4, and 9). The negative exploration outcome in model 9 is particularly striking, because it suggests that firms that undertake internal development because the changes will be consistent with their existing practices tend to maintain existing skills rather than change their skills. In this way, a firm’s existing absorptive capacity may limit its ability to undertake different types activities. This, of course, is a common argument in studies of business evolution. Indeed, if this were the primary result of the study, we could claim little conceptual or empirical advance. Fortunately, in addition to identifying factors that constrain firms’ ability to undertake exploratory change, we also identify factors that help the firms overcome constraints on exploration.

The reconfiguration routines dimension of internal market failures, in Row F of Table 4, has a major impact on multiple dimensions of successful change, including exploration. Indeed, this is the strongest set of results in the outcomes analysis, with positive impact on nine of the ten change dimensions. Thus, firms that undertake internal development because they possess effective internal reconfiguration routines tend to be successful on many change dimensions. Strikingly, the reconfiguration routine incentive is the only incentive that leads to successful cost reductions (model 8) and exploratory change (model 9), and has the strongest impact in improving change processes (model 10). In addition, the reconfiguration routine incentive leads to changes in functional skills (models 1 to 3), as well as quality, effectiveness, and speed (models 4, 5, and 7).

The impact of reconfiguration routines on exploratory change and change processes is particularly interesting. These are particularly difficult aspects of change for firms to undertake successfully, typically requiring firms to both adapt existing routines and develop new routines. The contribution of reconfiguration routines to these difficult changes underscores the importance of internal organizational processes in business evolution.

The six control variables in Table 4 provide interesting insights concerning successful change. Four factors provide mixed benefits and interferences with internal changes. First, internal changes that firms undertake owing to limited external availability of resources have mixed success, providing better protection (model 6), while interfering with exploration attempts
Second, the imitation incentive has positive influences on managerial skills and on quality (models 3 and 4), but a negative influence on technical skills (model 1). Third, large firms find it more difficult to change successfully on several dimensions. Fourth, U.S. firms have no greater or lesser difficulty changing than firms based in other countries, other than a quality advantage (model 4).

Two control factors provide substantial change benefits. First, firms that undertake changes internally owing to time pressure do so successfully on multiple dimensions, possibly because the time pressure causes the firms to devote substantial resources to the changes. Second, firms that use internal development frequently also gain multiple benefits, presumably because they learn through their experience.

We also undertook sensitivity analyses concerning two additional control variables that might influence the success of internal changes. “Firm age” denoted the survey response for the age of the company, while “telecom share” recorded the proportion of the responding corporation’s sales that exist in the telecommunications industry. Neither variable was statistically significant when we added them to the ten models in Table 4.

Overall, the results offer striking implications concerning firms’ incentives to undertake internal changes and for the outcomes of the changes. Resource gaps, external market failures, and internal market failures strongly influence firms’ choice of internal development. In turn, firms that align their mode choices with the internal development incentives often change more successfully. The strongest alignment influences arise from the internal factors of low resource gaps and the reconfiguration routine dimension of low internal market failures. Not surprisingly, firms that possess specific resources that are relevant for the desired changes tend to change more successfully. More intriguingly, the presence or lack of internal reconfiguration routines such as incentives, hiring, and integration systems had a particularly strong influence on successful or unsuccessful change. In general, the results speak to the importance of complex organizational factors in shaping firms’ change decisions and outcomes.

**DISCUSSION AND CONCLUSIONS**

This work demonstrates that resource gaps and market failures influence how firms change and whether the changes succeed. The work integrates prior studies, while offering conceptual and empirical implications on several fronts. The work builds on arguments that knowledge gaps and external market failures stemming from the nature of capabilities will
influence mode choice and success, which have received substantial discussion but little large-
scale empirical testing. In addition, we develop and test more nascent firm- specific arguments
that external market failures stemming from governance skills and internal market failures
stemming from conflict and reconfiguration routines influence choice and success.

Key implications of the results arise on three fronts. First, the results point to the strong
relationship between business change and firm-specific factors, particularly the presence or lack
of reconfiguration routines and the frequency of internal development experience. Although
general characteristics of capabilities, such as external market failures stemming from resource
uniqueness, influence change incidence and some dimensions of success, the firm-specific
factors tend to have more sweeping influences on change success. The central point here is that
firms can learn to change, based on their experience and on their creation of organizational
practices.

Second, the results point to the relative importance of uniqueness-based external market
failures in influencing change modes, coupled with the relative unimportance of the same factor
in determining the success of the changes. Firms commonly undertake internal development
when they want to develop unique capabilities. In turn, the uniqueness incentive does lead to
greater protection, consistent with common arguments. However, the uniqueness incentive has
little effect on other dimensions, other than interfering with cost reduction and change processes.
The central point here is that firms may use internal development to create unique capabilities,
but will gain little benefit unless they also possess relevant resources and reconfiguration
routines.

Third, the results also identify factors that commonly interfere with attempts to change.
Perhaps most strikingly, firms that turn to internal development because they lack the ability to
govern external exchanges often suffer. In addition, firms commonly turn to internal
development because the changes will have little conflict with existing routines, but will gain
few benefits and incur problems on several fronts if this is the primary incentive for mode
choice. Indeed, the lack of conflict incentive for internal development has particularly weak
outcomes on dimensions that embody discrete changes such as new managerial skills, better
quality, and exploratory changes. Thus, again, mode choice that aligns with general incentives
such as lack of conflict and uniqueness goals alone cannot substitute for a lack of skills that firms
need to undertake change.
In future work, we plan to discriminate among different forms of external change. As we noted earlier, market failures arise from several types of problems, including appropriation concerns and coordination difficulties. In this paper, we focused on internal versus external modes of change. In addition, though, we note that, among external modes of change, exchanges characterized by a high degree of market failure require safeguarding and coordinating mechanisms that firms often find more possible to create via acquisitions rather than through discrete exchange or alliances. The acquisitions literature recognizes that acquisitions represent a means to acquire capabilities that face discrete exchange difficulties (Hitt, Hoskisson, Ireland, and Moesel, 1996; Capron, Dussauge and Mitchell, 1998). Nelson and Winter (1982: 65) note that acquisitions can bring whole packages of capability under unified control. Through acquisitions, firms both acquire unfamiliar new capabilities and learn how to use their existing capabilities in new organizational settings and competitive conditions (Penrose, 1959; Mitchell, 1994; Singh and Zollo, 1997).

This work develops and tests several novel aspects of the relationship between business change, resource gaps, external market failures, and internal market failures. The work identifies factors that constrain firms’ attempts to change, while also pointing to factors and experience that helps firms overcome the constraints. The work lies in the midpoint of research concerning organizational adaptation and inertia, showing that firms sometimes change their capabilities, even though they face strong internal and external inertial pressures that they must overcome in order to do so.
References


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<th>%</th>
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<th>%</th>
<th>F. Corporate age</th>
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Table 2. Variable summary statistics and product-moment correlations (n=160)

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| Mean | 5.06 | 4.76 | 5.08 | 3.74 | 4.83 | 5.52 | 5.02 | 4.56 | 4.21 | 4.90 | 4.92 | 4.53 | 4.71 | 4.78 | 4.67 | 4.35 | 3.37 | 5.03 | 3.49 | 5.96 | 3.17 | 0.21 |
| Standard deviation | 1.27 | 1.06 | 1.50 | 1.32 | 1.19 | 1.18 | 1.17 | 1.51 | 1.49 | 1.41 | 1.15 | 1.10 | 1.31 | 1.04 | 1.23 | 1.02 | 1.58 | 1.75 | 1.71 | 1.24 | 1.60 | 0.40 |
| Minimum | 1 | 2.2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1.5 | 2 | 1.5 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 |
| Maximum | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 5 | 1 |
Table 3. T-tests of factors influencing choice of internal development as a mode of change
(mean values above 4 indicate influence on choice of internal development; n=160)

<table>
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<th>Mean</th>
<th>Mean difference (a)</th>
<th>t-value</th>
<th>Proposition</th>
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<td>1.06</td>
<td>10.5</td>
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</tr>
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<td>0.76</td>
<td>9.0</td>
<td>P1 supported</td>
</tr>
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(a) Test value = 4, from a 1-7 scale ranging from “Strongly disagree” to “Strongly agree”
Table 4. Regression analysis of impact of alignment of internal development incentives and choices on internal change outcomes
(positive coefficient = positive outcome from alignment of mode choice & incentives; **bold face** = statistically significant; n=160)

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<th>Dependent variables</th>
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<th>6</th>
<th>7</th>
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<td>0.005</td>
<td>0.52 ***</td>
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<td>0.23 ***</td>
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<td>0.35 ***</td>
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<td>-0.08</td>
<td>0.16 **</td>
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<td>-0.06</td>
<td>-0.01</td>
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<td>-0.03</td>
<td>-0.13 *</td>
<td>-0.05</td>
<td>-0.09 *</td>
</tr>
<tr>
<td>Governance lack</td>
<td>Capability quality</td>
<td>(6)</td>
<td>-0.12 **</td>
<td>-0.12 **</td>
<td>-0.15 **</td>
<td>-0.15 ***</td>
<td>-0.15 **</td>
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<td>0.10</td>
<td>-0.13 *</td>
<td>0.07</td>
<td>-0.05</td>
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<td>Change effectiveness</td>
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<td>-0.10 *</td>
<td>-0.10 *</td>
<td>-0.03</td>
<td>0.14</td>
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<td>0.28 ***</td>
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<td>0.25 ***</td>
<td>0.12 *</td>
<td>-0.07 *</td>
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<td>0.23 ***</td>
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<tr>
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<td>-0.02</td>
<td>-0.05</td>
<td>-0.05</td>
<td>0.02</td>
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<td>-0.10 **</td>
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<tr>
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<td>Cost reduction</td>
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<td>0.05</td>
<td>0.13 ***</td>
<td>0.13 ***</td>
<td>0.04</td>
<td>-0.05 **</td>
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<td>0.15 **</td>
<td>0.21 ***</td>
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<td>-0.004</td>
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* p<.10, ** p<.05, *** p<.01 (one-tailed tests)
Appendix 1: Questions and factor analysis of drivers of internal versus external development

<table>
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<th>Variable: Survey question (responses are 1-7 scales: &quot;Fully disagree&quot; to &quot;Fully agree&quot;)</th>
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<td>In the past three to five years, what has driven your firm to chose internal development rather than external modes of capability acquisition?</td>
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<td>Low gap: Technical</td>
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<tr>
<td>Our existing technical capabilities were close to the needed technical capabilities</td>
<td>0.77</td>
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<tr>
<td>We had a very strong competitive position in the technical area</td>
<td>0.67</td>
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<tr>
<td>Low gap: Commercial</td>
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<tr>
<td>Our existing marketing capabilities were close to the needed marketing capabilities</td>
<td>0.73</td>
</tr>
<tr>
<td>We had a very strong competitive position in the marketing area</td>
<td>0.74</td>
</tr>
<tr>
<td>Our existing managerial capabilities were close to the needed managerial capabilities</td>
<td>0.67</td>
</tr>
<tr>
<td>We had a very strong competitive position in the managerial area</td>
<td>0.59</td>
</tr>
<tr>
<td>We already knew the customers in the targeted capability area</td>
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<tr>
<td>We already had market credibility in the targeted capability area</td>
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<td>External market failure: Uniqueness</td>
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</tr>
<tr>
<td>We wanted to develop different products and services than those of our competitors</td>
<td>0.79</td>
</tr>
<tr>
<td>We wanted to protect our differentiation and unique capabilities</td>
<td>0.69</td>
</tr>
<tr>
<td>External market failure: Governance lack</td>
<td></td>
</tr>
<tr>
<td>We lacked skills to manage external modes of capability acquisition</td>
<td>0.74</td>
</tr>
<tr>
<td>We feared information leakage when negotiating with external partners</td>
<td>0.67</td>
</tr>
<tr>
<td>We lacked skills to learn and import the needed capabilities from external partners</td>
<td>0.77</td>
</tr>
<tr>
<td>Low internal market failure: Lack of conflict</td>
<td></td>
</tr>
<tr>
<td>Developing the needed capabilities created little or no internal competition</td>
<td>0.83</td>
</tr>
<tr>
<td>Developing the needed capabilities triggered little or no internal resistance</td>
<td>0.78</td>
</tr>
<tr>
<td>Developing the needed capabilities did not make our existing capabilities obsolete</td>
<td>0.68</td>
</tr>
<tr>
<td>Low internal market failure: Reconfiguration routines</td>
<td></td>
</tr>
<tr>
<td>The needed capabilities fitted our systems of incentives and culture</td>
<td>0.74</td>
</tr>
<tr>
<td>Our system of incentives suited hiring the needed people</td>
<td>0.78</td>
</tr>
<tr>
<td>We had systems in place to integrate newly hired people</td>
<td>0.71</td>
</tr>
<tr>
<td>Limited external availability</td>
<td></td>
</tr>
<tr>
<td>There was no active external capability/technology/knowledge market</td>
<td>0.68</td>
</tr>
<tr>
<td>There was no active alliance market</td>
<td>0.87</td>
</tr>
<tr>
<td>There was no active M&amp;A market</td>
<td>0.84</td>
</tr>
</tbody>
</table>

* Component matrix obtained with principal component analysis & rotated via Varimax with Kaiser normalization.
Appendix 2: Questions and factor analysis of internal development change outcomes

Variable: Survey question (responses are 1-7 scales: "Fully disagree" to "Fully agree")

Technical skill enhancement
In the past 3 to 5 years; internal development has been effective in developing:
- R&D capabilities 0.77
- IT capabilities (IT staff; IT applications; billing system) 0.63
- Manufacturing/engineering know-how 0.73

Marketing skill enhancement
In the past 3 to 5 years; internal development has been effective in developing:
- Marketing expertise (customer knowledge; branding; pricing) 0.87
- Sales and distribution relationships 0.92

Managerial skill enhancement
In the past 3 to 5 years; internal development has been effective in developing:
- Managerial skills 0.79
- Project management skills 0.83
- Network management skills 0.69

Capability exploration
In the past 3 to 5 years; internal development has led to:
- Restructuring our capabilities 0.64
- Investing in capabilities and technologies in new areas 0.79
- Hiring people with new backgrounds 0.79

Capability change process
In the past 3 to 5 years; internal development has led to:
- Changing our systems of incentives and culture 0.76
- Becoming more entrepreneurial and responsive to market changes 0.83
- Speeding up our learning and change process 0.84

In the past 3 to 5 years; internal development has been effective in terms of:
- Capability quality: Quality of the capabilities created by internal development 1 item
- Cost reduction: Cost efficiency 1 item
- Speed: Speed of development 1 item
- Capability protection: Protection of the value of the capabilities created by internal development 1 item
- Change effectiveness: Internal development has been effective in acquiring the needed capabilities 1 item

Control variables (responses are 1-7 scales: "Fully disagree" to "Fully agree"; except as noted)
- Imitation: Competitors tended to use internal development to acquire the needed capabilities 1 item
- Time pressure: Time pressure was intense 1 item
- Frequency of internal development: We have frequently used internal development 1 item
- Firm size: No. of employees (5 response categories: < 200; 200-500; 501-1000; 1001-5000; > 5000) 1 item
- U.S. firm (Based on country of headquarters address) 1 item

* Component matrix obtained with principal component analysis & rotated via Varimax with Kaiser normalization.