EXTENDING THE IS STRATEGY TYPOLOGY: AN ASSESSMENT OF STRATEGY IMPACTS ON CAPABILITIES DEVELOPMENT AND PERFORMANCE

Completed Research Paper

Janice Lo
HEC Paris
1 rue de la Libération
78351 Jouy-en-Josas
France
loj@hec.fr

Dorothy Leidner
Baylor University
One Bear Place 98005
Waco, TX 76798-8005
USA
dorothy_leidner@baylor.edu

Abstract

A typology of IS strategy has recently been forwarded in the literature in which IS strategy is categorized into three types: Innovative, Conservative, and Undefined. But more recent investigations in IS found that when firms attempt to take an ambidextrous approach, to some degree exhibiting both moderately innovative and conservative strategy behaviors, firms tend to perform equally well or better than those implementing predominately a single approach. Therefore, this paper proposes an extension to the existing typology by including a fourth strategy—IS Ambidextrous. It contributes by operationalizing and testing the extended typology in a model that assesses IS strategies' impacts on dynamic capabilities development and ultimately on performance. It is found that, in practice, a substantially high percentage of firms strive to be ambidextrous and that this approach to IS is a rewarding strategy and by no means inferior to any of the other IS approaches in the typology.

Keywords: Information systems strategy, IS strategy typology extension, IS Ambidextrous, dynamic capabilities, absorptive capacity, agility, IS performance
Introduction

As business strategy is vital to the success of an organization, so too is IS (information systems) strategy imperative to the success of the IT unit and IS's contribution to the organization's overall objectives. IS strategy, which delineates the perspective the organization takes toward IS and the general attitudes that reflect the organization's intentions regarding IS (Chen et al. 2010), is believed to be a valuable source of stability for many IT departments (Mahoney 2009). An IS strategy provides a focused strategic direction for the department notwithstanding the present state of the economic cycle (Aron 2009). A well-defined strategy can also help stakeholders, such as employees, focus their attention and behaviors in order to make the right decisions in support of the organization's desired strategic directions. It can as well boost employee morale by maintaining employees' focus on organizational goals, especially during unstable economic times when more pressure and uncertainty are present (Aron 2009).

While research attention has been copiously given to the arena relating to the strategic value of IS, much of it focuses on three streams of literature: strategic information systems planning (SISP) (Galliers, 1991; Premkumar and King, 1994), strategic alignment (Chan et al. 1997; Chan and Reich, 2007; Luftman and Kempaiah, 2007), and IS for competitive advantage (Mata et al. 1995; Melville et al. 2004; Wade and Hulland, 2004). Fewer studies have assessed the impact of the IS strategy itself, which can be an important avenue through which performance may be realized.

In addition, despite the significant implications of IS strategies, the concept of an IS strategy has been diversely conceptualized (Chen et al. 2010). This fragmentation of our understanding of IS strategy can render negative consequences in our knowledge building in this domain because of the difficulty in comparing and interpreting findings across studies. To this end, a reconceptualization and operationalization of the concept of IS strategy has recently been forwarded in the literature, which resulted in providing a unifying definition and typology of IS strategy in which IS strategy is categorized into three types: IS Innovator, IS Conservative, and IS Undefined (Chen et al. 2010). Though some strategy scholars (e.g. Galliers 2006; March 1991) have argued that firms should be ambidextrous, that is, to some degree exhibiting both innovative and conservative strategic behaviors in order to derive higher levels of firm performance, few studies have found that organizations are capable of being simultaneously highly innovative and highly conservative (Benner and Tushman 2003; He and Wong 2004). But a more recent investigation in IS found that when firms attempt to be both innovative and conservative to an above average (rather than necessarily outstanding) degree, the performance of these firms, on average, appears to be equal to or better than the performance of firms that exceedingly attempt either one of an innovative or conservative strategy (Leidner et al. 2011). As such, this suggests that the current IS strategy typology is conceivably incomplete and that a fourth strategy, one of ambidexterity, should be included to create a more practical and comprehensive classification.

Therefore, this paper aims to fill some of the research gap in the literature as it relates to IS strategy by proposing an extension to the existing IS strategy typology and assessing the impacts of the extended typology in terms of IS strategy’s ability to contribute to firm performance. However, strategy itself may not necessarily directly lead to performance gains. Alternatively, we contend that it is the IT business unit's consistent enactment of the IS strategy that aids the development of certain dynamic capabilities for the business unit, which in turn create gains in efficiency and effectiveness that contribute to the organization's overall performance. Thus, drawing on the dynamic capabilities perspective, we construct and empirically test a model of strategy impacts using the extended typology. By doing so, we hope to make a two-fold contribution to existing scholarship by 1) proposing and operationalizing an extension to the IS strategy typology, and 2) testing the extended typology in a model that assesses the impacts of strategy on capabilities development and ultimately on IS's ability to contribute to firm performance.

This paper proceeds as follows. The next section summarizes the background literature and proposes the typology extension. The third section justifies and develops the research model. The fourth section describes the method and analysis results. And finally, the last section presents the discussion, future research, limitations, and conclusion.
Background and Proposal of Typology Extension

In this section, we review the literature on the two concepts most central to the paper: IS strategy and dynamic capabilities. Although the term ‘IS strategy’ is commonly used, it is not well understood and thus Chen et al. (2010) forward a definition of and deliver a typology that operationalizes IS strategy in a way that can be applied to an organization holistically.

The second concept central to the paper is dynamic capabilities. Although an organization may have a well-defined IS strategy, a strategy alone may not guarantee superior organizational performance. Rather, according to the dynamic capabilities perspective, which will be reviewed later in this section, firms demonstrating the ability to provide flexible product innovations and timely responses in dynamic business environments will be the ones able to achieve competitive advantage in such settings (Teece et al. 1997). We argue, in essence, that dynamic capabilities will mediate the impact of IS strategy on performance outcomes and therefore review the literature on dynamic capabilities.

IS Strategy Definition and Typology

Based on the context of our study in which the analysis level is the IT department, we define IS strategy as the organization’s perspective on how to invest in, deploy, use, and manage information systems as represented at the IT department level (adapted from Chen et al. 2010). Defining IS strategy as a perspective does not imply that IS strategy is necessarily a realized outcome or that it is a set of formally planned or intended actions. This definition deviates from other conceptions of IS strategy in which strategy is defined as either a formally written plan or a realized outcome (e.g. Denford and Chan 2007; Chan et al. 1998; Mintzberg, 1978). Although we believe that it is useful for organizations to have formally stated IS strategies so that all members understand the approach the organization intends to take toward achieving its goals, sometimes these approaches are not necessarily formally articulated. Thus, defining IS strategy as a shared belief regarding the role of IS provides a more encompassing definition. This conception of IS strategy also deviates from former conceptions because in the current conception, IS strategy does not necessarily depend on nor does it need to be aligned with a firm’s business strategy, as is assumed in much of the extant literature on IT-business strategy alignment.

In the Chen et al. IS strategy typology, IS strategy was categorized into three types—two of which are defined IS strategies (the IS Innovator and the IS Conservative) and one of which is an undefined or ill-defined strategy (the IS Undefined). The basis for the defined IS strategies stems from the explorative-exploitative capability framework (March 1991) in the organizational learning literature, which essentially is comparative to concepts like innovation and efficiency (Sarkees and Hulland 2009) in the marketing literature. Firms that are explorative or innovative often experiment with new, uncertain alternatives while firms that are exploitative or efficiency-seeking often refine and extend existing, stable alternatives (March 1991; Sarkees and Hulland 2009). In addition to the defined strategies, an undefined strategy was introduced. This last type is included to reflect the reality of the existence of firms that do not have formally defined IS strategies (e.g. Slater 2002). Some parallels can be drawn between the current IS strategy typology and the more mature and perhaps also more familiar Miles and Snow (1978) typology of organizational behaviors: the Prospectors, Defenders, and Reactors. The similarities are integrated in the following paragraphs describing each strategy.

We adopt the existing typology of IS strategy, but to make the names more descriptive, we re-label two of the three strategies. The strategies are described as follows. An IS Innovator strategy is defined as an organizational view that continuously aspires to be innovative through new IS initiatives, i.e. this strategy seeks to explore new, uncertain alternatives (Chen et al. 2010). The IS Innovator, like the Prospector, strives to find and exploit new product and market opportunities, and thus is in a continuous state of scanning the environment in search of opportunities (Miles and Snow 1978). The goal of the IS Innovator is to be an IS leader in its industry by striving to be the first to respond to opportunities in which it can capitalize on IS innovations that will create value for the business. Since IS strategy is

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1 It became apparent during discussions with CIOs on a separate project that the labels IS Conservative and IS Undefined carried in some cases unintended connotations. In addition, the label Conservative has caused minor distractions in some academic circles because of its common affiliation with politics. To be more neutral, we re-label the strategies as IS Reserved and IS Amorphous.
defined as a perspective rather than a few distinct actions or decisions that a firm makes, the IS Innovator will not always be the first to adopt each new IS innovation nor will it always be on the leading edge of every area of technology. It is, rather, defined by the consistency in its strategic perspective to aspire to constantly search for ways to innovate with IS and to apply those innovations in ways that give the firm an advantage over its competitors.

An IS Reserved strategy (formerly labeled ‘IS Conservative’, but will be referred to as ‘IS Reserved’ from this point forward), on the other hand, represents an organizational perspective that strives to create value by gaining efficiency through effectively refining and improving existing IS practices and technologies, i.e. this strategy seeks to exploit existing organizational resources (Chen et al. 2010). The IS Reserved, like the Defender, seeks to maintain stability, control, and cost-efficiency (Miles and Snow 1978). The goal of the IS Reserved is not to establish itself as an IS leader; it instead seeks a more stable approach to IS by exploiting IS innovations only after they have been carefully evaluated and tested by other firms in the industry. This strategy allows the IS Reserved to avoid the risks involved in being early adopters of IS innovations. Although it is conceivable, under certain circumstances, that an IS Reserved is the first to adopt a new technology or process, being a first adopter is not generally the approach of an IS Reserved. Rather, its overall perspective is to follow a reserved stance to exploiting IS for its strategic business purposes.

Lastly, an IS Amorphous strategy (formerly labeled ‘IS Undefined’, but will be referred to as ‘IS Amorphous’ from this point forward) is one that does not have an articulated approach or long-term goals for the firm to either explore or exploit the use of IS for strategic purposes (Chen et al. 2010). The IS Amorphous, like the Reactor, exhibits a pattern of behavior that is neither consistent nor stable (Miles and Snow 1978). It does not follow a consistent behavioral pattern in its investment in, deployment, use, and management of IS; the strategy is therefore shapeless, formless, and unstructured. The firm with an IS Amorphous strategy views IS strategy more as an afterthought. It may initially seem farfetched that any organization would not have a defined strategy for IS, but according to a 2002 study by Cutter Consortium, 39 percent of firms surveyed had no formal IS strategy2 (Slater 2002).

Critique of Existing Typology and Proposal of Extension

We believe that Chen et al. (2010) have forwarded a significant contribution to the IS strategy literature by taking a step back to explicitly provide a definition and operationalization of IS strategy. This was a necessary step because much of the prior literature appears to take for granted that readers and researchers understand what an IS strategy is. However, from the divergent conceptualizations of IS strategy that implicitly exist in the literature, we see that there is actually no general consensus on the concept of IS strategy among the research community. By forwarding a definition of IS strategy that is more inclusive of other conceptualizations, meaning that the definition reflects an overarching strategy rather than, for example, a specific strategy for a specific product or service, Chen et al. provide a conception that unifies other implicit definitions of IS strategy, which contributes to the furtherance of IS strategy research.

However, as with any work, there are some potential limitations. One limitation with the existing IS strategy typology is that the typology may not be comprehensive enough to encompass most noteworthy strategy types in practice. While parsimony is a goal to strive for in categorizations, it should also be counterbalanced with comprehensiveness. As earlier mentioned, some strategy scholars have argued that firms should strive for ambidexterity (Galliers 2006; March 1991), that is, to some degree exhibiting both IS Innovator and IS Reserved behaviors, in order to increase competitiveness. But few studies in the management literature have found that organizations are capable of being at the same time highly innovative and highly conservative (Benner and Tushman 2003; He and Wong 2004; Smith and Tushman 2005). Nevertheless, in a more recent investigation in the IS literature, Leidner et al. (2011) in post-hoc analyses found that when firms attempt to be both innovative and reserved in their IS strategies to an above average (rather than necessarily outstanding) degree, the performance of these firms, on

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2 Even though organizations may not have formal, written IS strategies, they still use IS and make decisions regarding IS. The current definition of IS strategy is more encompassing and reflects the organization’s belief regarding the role of IS and not necessarily the presence of a formally written strategy.
average, appears to be equal to or better than the performance of firms that exceedingly attempt either strategy alone. Using the criteria of classifying firms that are both moderately innovative and reserved in their IS strategies as ‘ambidextrous’, Leidner et al.’s (2011) study of 263 credit unions found that 30 percent of the sample can be classified as ambidextrous. This significant number of firms that, in practice, strive for a hybrid IS strategy should not be ignored—not only because hybrid strategies exist in a large number of firms, but also because these firms, on average, performed better than firms implementing one of the other three strategies in the above mentioned credit union sample.

Moreover, organizations are complex and it is unlikely that any organization would fit “purely” into a strategy type that is completely Innovative or Reserved, or one that is completely non-existent or Amorphous. The existence of hybrid strategies is not uncommon in the literature. For example, in strategic management research, Miles and Snow (1978) and Miles et al. (1978) proposed an Analyzer strategy, which was described as a balance of the extremes of the Prospector and Defender strategies (similar to the Innovator and Reserved strategies, respectively). Marketing research also examines ambidexterity (e.g. Sarkees et al. 2010) as does the management sciences (e.g. Raisch et al 2009). Additionally, similar concepts have been proposed in IS research regarding how IT can be used in support of a firm’s business strategy, that is, for IT-business strategic alignment. For example, Tallon et al. (2000) proposed a ‘dual-focused’ strategy in which firms embrace the use of IT for strengthening both operational effectiveness and strategic positioning. And Sabherwal and Chan (2001) forwarded an ‘IS for comprehensiveness’ profile, a profile in which different information systems—operational support systems, market information systems, interorganizational systems, and strategic decision support systems—are all deemed as important in supporting an Analyzer (Miles and Snow 1978) business strategy.

As such, this suggests that the current IS strategy typology is incomplete and that a fourth strategy, one that strives for ambidexterity, should be included to create a more comprehensive typology that better reflects practice. Hence, in this study, we propose to add to the existing typology the IS Ambidextrous strategy. We define an IS Ambidextrous strategy as an organizational view that consistently endeavors to equally explore new IS initiatives as well as exploit existing IS competencies in the organization. In essence, the IS Ambidextrous seeks to be equally innovative and reserved, a hybrid of the IS Innovator and IS Reserved strategies. The IS Ambidextrous is similar to Miles and Snow’s (1978) Analyzer strategy, combining the strengths of both the Prospector and Defender strategies.

**Dynamic Capabilities**

The other key concept central to the paper is dynamic capabilities. Since the principal purpose of private organizations is to produce profit, the literature on business competition would be an appropriate place in which to draw on theory for the current research focus. An organization may have a shared perspective on how to invest in, deploy, use, and manage IS, but such shared perspective does not alone guarantee superior organizational performance. For the firm to potentially sustain a competitive advantage, it must possess resources that are valuable, rare, inimitable, and nonsubstitutable (Barney 1991). The IS resources that are most able to meet these attributes and likely to sustain a competitive advantage are the organization’s managerial IS knowledge and skills (Mata et al. 1995). These skills are capabilities by which firms integrate and reconfigure competencies, especially to address rapidly changing environments, and become the source for retaining a firm’s competitive advantage (Eisenhardt and Martin 2000).

According to the dynamic capabilities perspective, an extension of the resource-based view, firms demonstrating the ability to provide flexible product innovations and timely responses in dynamic business environments will be the ones able to achieve competitive advantage in such settings (Teece et al. 1997). Dynamic capabilities refer to a firm’s “ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments” (Teece et al. 1997, p. 516). These capabilities evolve through various learning mechanisms, such as through repeated practice, learning from mistakes, the pace at which opportunities come about to learn, and market changes (Eisenhardt and Martin 2000). As one example, firms that have the opportunity to repeatedly practice business acquisitions tend to accumulate both the tacit and explicit knowledge about how best to implement acquisitions in order to achieve superior acquisitions performance (Zollo and Singh 1998). The various learning mechanisms all contribute to the development of dynamic capabilities in a firm.
The concept of dynamic capabilities originated from the strategic management literature (e.g. Eisenhardt and Martin 2000; Helfat and Peteraf 2003; Teece et al. 1997) and as such, much of these capabilities are related to the firm level and may or may not necessarily involve information technologies. For example, recognized in studies as different types of dynamic capabilities are: strategic flexibility—the ability to adapt to changes in the environment by continuously changing the firm’s current strategic actions, asset deployment, and investment strategies (Nadkarni and Narayanan 2007); strategic political management—the ability of firms to plan and act politically in order to maximize economic returns from the political environment (Oliver and Holzinger 2008), strategy formation capability—the ability of firms to effectively and efficiently form its strategy (Slater et al. 2006), and top management team (TMT) polychronicity—the extent to which TMT members engage in multiple tasks simultaneously or intermittently rather than sequentially and believe that this is the best way of doing things (Souitaris and Maestro 2010).

Therefore, though an assortment of dynamic capabilities exist in the literature, we identified two capabilities based on the dynamic capabilities perspective that are especially related to the abilities created and enabled by IS and are thus particularly relevant to this study of the IT business unit. These are the IT unit’s absorptive capacity and agility. Absorptive capacity refers to an organization’s ability to acquire internal and external information, assimilate it, and apply the new gained knowledge to produce an organizational capability that can effectively respond to turbulent market and industry environments (Cohen and Levinthal 1990; Tu et al. 2006; Zahra and George 2002). Absorptive capacity is considered a major asset to attaining competitive advantage because of the challenges of knowledge transfer, especially those related to acquiring external knowledge (Zahra and George 2002). Agility, on the other hand, refers to an organization’s ability to continuously sense environmental change and respond to market opportunities with speed and surprise (Overby et al. 2006; Sambamurthy et al. 2003) and is considered to be essential for competitive success (Brown and Eisenhardt 1997). Parallels can be drawn between the two components of agility and the characteristics of absorptive capacity—both agility and absorptive capacity consist of some form of sensing or acquiring information and responding to or applying it. Although absorptive capacity and agility are related, the divergence lies in what each is able to manage. Whereas absorptive capacity primarily refers to a firm’s ability to manage knowledge and operates on a more continuous basis, agility refers to a firm’s ability to manage change in the environment and applies more to episodic events resulting from these changes (Overby et al. 2006).

**Hypotheses**

The overall research model, with the proposed typology extension and impacts on dynamic capabilities and performance, is depicted in Figure 1. Two sets of hypotheses are presented—the impact of strategy on dynamic capabilities and the impact of capabilities on performance—and the reasoning for each hypothesis is discussed in this section.
As discussed in the following sections, we believe that it is through the consistent experience of learning from implementations of IS strategies that facilitates a firm's development of both tacit and explicit knowledge and organizational ability, and that this knowledge and ability, known as dynamic capabilities, are the enablers of a firm's competitive advantage. The same is expected to hold true at the IT business unit level. The proposed relationships between IS strategies and dynamic capabilities—IT unit absorptive capacity and agility—are illustrated in the model.

**Development of Dynamic Capabilities**

The IT unit’s absorptive capacity refers to the IT department’s ability to acquire information, assimilate it, and apply the newly gained knowledge to produce an organizational capability that can effectively respond to dynamic environments (Cohen and Levinthal 1990; Tu et al. 2006; Zahra and George 2002). Several types of factors can contribute to the development of absorptive capacity, including prior related knowledge (Cohen and Levinthal 1990), knowledge scanning (Tu et al. 2006; Zahra and George 2002), and experience (Tu et al. 2006; Zahra and George 2002). Each can positively relate to a firm’s learning, which aids the development of dynamic capabilities (Eisenhardt and Martin 2000). Prior literature suggests that the wider and deeper is a firm’s exposure to knowledge, the stronger is its inclination to explore new and related knowledge (Van Wijk et al. 2001), which subsequently improves the firm’s absorptive capacity (Zahra and George 2002).

In this manner, IT departments adopting innovative or ambidextrous IS strategies are more likely to increase their absorptive capacity because they seek to explore new technological innovations to build business advantage. This exploration increases the breadth and depth of their knowledge exposure, which again strengthens their propensity to explore new knowledge in a cyclic pattern of continuous learning (this alludes to H1a and H1b, which will be formally stated later in this section). While IT departments implementing reserved IS strategies can also learn from prior knowledge related to searching for proven technological concepts in the industry, it is less probable that their exposure is as far reaching on the knowledge spectrum as is IS Innovators’ or IS Ambidextrous’ since the primary focus of IS Reserveds is on maintaining stability and exploiting existing IS resources rather than exploring new alternatives. As such, compared to the IS Innovator and IS Ambidextrous, the IS Reserved, while still able to develop absorptive capacity, would be unable to increase its absorptive capacity as much or as rapidly as would the other two
strategy types (this alludes to H1c). Nevertheless, since knowledge complementarity—the extent to which knowledge is both relevant to and different from already existing knowledge—is positively related to organizational learning (Lofstrom 2000), the prior knowledge of the IS Innovator, IS Ambidextrous, and IS Reserved would build absorptive capacity because all three are consistent in their approach to IS and therefore pursue information that complements their preexisting knowledge. Quite differently, the IS Amorphous, due to its lack of long-term goals for IS and its inconsistent behavioral pattern regarding IS, would be least likely to have garnered the prior knowledge related to IS investments and built on this knowledge in organizational learning. Because of its reactive nature and its treatment of IS as an afterthought, the knowledge complementarity of the IS Amorphous is likely to be low, thus bringing about an unrelated association between an amorphous strategy and absorptive capacity (this alludes to H1d).

Other factors related to an organization’s prior knowledge that can contribute to the development of absorptive capacity are the interrelated factors of knowledge scanning and experience. Knowledge scanning refers to organizational mechanisms, such as benchmarking and technology assessments, that monitor the internal and external environments for the purpose of identifying and capturing relevant knowledge (Tu et al. 2006), which all help a firm gain relevant experience (Zahra and George 2002). Experience can also be acquired from learning-by-doing methods that allow firms to develop new routines which in turn guide their future search for relevant knowledge. IT departments adopting innovative or ambidextrous IS strategies are more likely to increase their absorptive capacity through knowledge scanning and experience than those adopting either a reserved strategy or having an amorphous strategy. Research suggests that firms involved in research and development (R&D) activities, a learning-by-doing method, are likely to gain experience and acquire more related knowledge through scanning the environment, which contributes to absorptive capacity (Cohen and Levinthal 1990). Since IS Innovator and IS Ambidextrous strategies more extensively engage in R&D than either reserved or amorphous strategies, the IS Innovator and IS Ambidextrous would generate greater absorptive capacity than either of the other strategies (this again alludes to H1a and H1b). However, in keeping with its defined strategy, the IS Reserved also scans the environment seeking ways to increase its operational efficiency. This knowledge scanning and associated experience also increases the IS Reserved’s absorptive capacity, albeit not to the extent as that of the IS Innovator or IS Ambidextrous (this again alludes to H1c). The IS Amorphous, due to its nebulous approach to IS, does not consistently scan the environment nor is it likely to gain the necessary experience from continuous research and learning to develop absorptive capacity (this again alludes to H1d).

Thus, whether through prior related knowledge, environmental knowledge scanning, or experience, defined IS strategies will lead to the development of an IT department’s absorptive capacity, with the relationship being stronger for the IS Innovator and IS Ambidextrous than the IS Reserved. Amorphous IS strategies, on the other hand, will be unrelated to the development of absorptive capacity. Although statistically non-significant relationships are not typically hypothesized in research, we feel that in a model that assesses the relationships between IS strategy and its impacts, an evaluation and justification of the impacts of all types of IS strategies should be included for completeness. Furthermore, precedence for hypothesizing relationships of null statistical significance exists, for example, in MIS Quarterly (e.g. Ray et al. 2005). For these reasons, we choose to hypothesize the relationships between IS Amorphous and its impacts. Formally, the following are hypothesized:

\( H1a: \) IS Innovator strategy is positively associated with absorptive capacity.

\( H1b: \) IS Ambidextrous strategy is positively associated with absorptive capacity.

\( H1c: \) IS Reserved strategy is positively associated with absorptive capacity, but this association is weaker than the association between IS Innovator and absorptive capacity and between IS Ambidextrous and absorptive capacity.

\( H1d: \) IS Amorphous strategy is unrelated to absorptive capacity.

**IT Unit Agility**

IT unit agility is defined as the IT department’s ability to detect and garner the necessary resources to readily respond to environmental changes and market opportunities (Overby et al. 2006; Sambamurthy et al. 2003). IS can play an important role in enabling both the detecting/sensing and responding components of agility (Overby et al. 2006). To illustrate, IS can directly relate to agility
because firms need to have an adequate level of IS capability in order to detect technological advancements that are relevant to their business. The responding component of agility is also impacted by IS because firms rely on technology systems to support their relationships with customers and suppliers, especially in IT driven industries (Sambamurthy et al. 2003). Since information technologies strengthen work processes and knowledge systems (Alavi and Leidner 2001; Davenport 1993) by enhancing the breadth and richness of the firm’s processes and knowledge (Sambamurthy et al. 2003), they improve the firm’s ability to detect and respond to changes in the environment, thereby making the firm more agile (Overby et al. 2006).

Not only can information technologies enable agility as argued in prior research, but we postulate that a firm’s IS strategy also has the potential to accentuate the development of the unit’s agility depending on the approach the firm takes towards IS. Firms taking an innovative or ambidextrous position to IS should expect greater agility than firms taking a more reserved or amorphous approach. For the IS Innovator and even the IS Ambidextrous, R&D efforts are central to their explorative and experimental nature. Such efforts in practice should increase the firm’s awareness and ability to sense technological and other changes in the environment because the firm is constantly probing for novel ways to leverage technology to gain competitive edge. As such, exploration and experimentation, in effect, cultivate the detection component of a department’s agility. Furthermore, due to its constant R&D efforts, the IS Innovator and IS Ambidextrous should also experience an improvement in the response component of agility. R&D activities are learning-by-doing methods of explorative learning, which have been suggested in prior literature as ways to gain experience and acquire knowledge (Cohen and Levinthal 1990). This wide-ranging experience that is gained provides the IS Innovator and IS Ambidextrous a multitude of ways from which to respond to environmental stimuli, thereby augmenting response agility. The general concept that R&D increases agility is confirmed in a study of 600 global manufacturing firms of durable goods (Ettlie 1998). The study found that R&D was significantly correlated with manufacturing agility, such that as R&D intensity increased, manufacturing agility also increased (Ettlie 1998).

Unlike that of the IS Innovator or IS Ambidextrous, the approach of the IS Reserved is less likely to lend itself to the development of agility. Because of its exploitative rather than explorative nature, the IS Reserved will likely have built systems of codified knowledge and routinized processes that increase its operating efficiency, but it would not have gained the experience of “explorative” learning in pursuing innovative IS initiatives. Although codification and routinization can assist in maintaining stability for the IS Reserved, they can also cause rigidity, which runs counter to agility (Seo and La Paz 2008). Due to the narrow scope of exploitative learning and the rigidity caused by process codes and strict routines, the IS Reserved would experience a low ability to detect and respond to environmental changes. While the IS Reserved can manage change on its own timetable by developing absorptive capacity, it would be less able to manage change on the timetable of contingency occurrences. Thus, not only is it dubious that the IS Reserved develops agility, but it is more probable that the reserved approach thwarts the development of agility. The relationships between IS strategies and agility are therefore hypothesized as follows:

\( H2a: \) IS Innovator strategy is positively associated with IT unit agility.

\( H2b: \) IS Ambidextrous strategy is positively associated with IT unit agility.

\( H2c: \) IS Reserved strategy is negatively associated with IT unit agility.

However, it can also be argued that the IS Ambidextrous, because of its equal focus on exploitation as well as exploration, to a certain extent would encounter some problems of rigidity. But we believe that its equal focus on exploration will counteract the negative effects of possible rigidity resulting from routinized processes. Therefore, the relationship between IS Ambidextrous and agility would be positive, but perhaps not as strongly positive as the relationship between IS Innovator and agility.

The IS Amorphous is different from defined strategies in terms of its relationship with agility. Since its approach to IS is inconsistent, there may be certain periods of time when it attempts to be innovative and other periods when it attempts to be reserved. This inconsistency in learning and pursuing a strategy is likely to cause lapses in its ability to sense and respond to environmental changes. These lapses suggest that the IS Amorphous strategy and agility are likely to be unrelated. Therefore, the relationship between IS Amorphous and agility is hypothesized as:

\( H2d: \) IS Amorphous strategy is unrelated to IT unit agility.
Impacts of IS Strategy through Dynamic Capabilities

We further draw on the dynamic capabilities perspective to explain the indirect impact of IS strategy on IS performance through the development of dynamic capabilities. IS performance is measured by the contribution that IS makes to the firm’s overall performance. We propose to link IS strategy to IS performance through two dynamic capabilities (IT unit absorptive capacity and IT unit agility). The dynamic capabilities perspective postulates that dynamic capabilities will allow firms to build competitive advantage in turbulent environments (Cohen and Levinthal, 1990; Overby et al., 2006; Sambamurthy et al., 2003; Teece et al., 1997). However, information technologies have pervaded every sector of industry and marketplace, creating fast-paced, highly competitive, and globalized competition (Baskerville, 2006). Therefore, we posit that IT unit absorptive capacity and IT unit agility, both of which are dynamic capabilities, also will enable IS to contribute to the firm’s gain in competitive positioning, almost notwithstanding industry sector.

As previously suggested, continuous pursuit of certain IS strategies can lead to the enhancement of the IT department’s absorptive capacity, which contributes to its ability to innovate. This cycle of continuous improvement and innovation can potentially support the firm’s achievement of sustained competitive impacts because the IT unit’s absorptive capacity provides the firm with the degrees of freedom to adapt and evolve in its market environment (Zahra and George 2002). For example, in a study of 143 biopharmaceutical firms involved in strategic alliances, George et al. (2001) found that absorptive capacity, along with certain characteristics of alliance portfolios, worked jointly to enhance the firms’ financial performance. Similarly, a study of international joint ventures found that firms’ ability to apply knowledge, a component of absorptive capacity, significantly increased firm performance in terms of increasing business volume, increasing market share, achieving planned goals, and making profits (Lane et al. 2001). Likewise, we propose that the IT unit’s absorptive capacity, generated from choice of its IS strategy, will be positively associated with IS contribution to the firm’s performance.

\[ H3a: \text{IT unit absorptive capacity is positively associated with IS contribution to firm performance.} \]

Like IT unit absorptive capacity, IT unit agility is also a significant determinant of firm success, especially as environmental conditions become increasingly unstable (Overby et al. 2006; Sambamurthy et al. 2003). Sambamurthy et al. (2003) have argued that agility is an important factor in effectuating a firm’s competitive performance by continually enhancing and redefining the firm’s value creation. Agility spawns a multitude of options in a firm’s repertoire that it can take to respond to market opportunities, which leads to competitive performance (Sambamurthy et al. 2003). For example, a study of 600 global manufacturing firms of durable goods showed that an increase in manufacturing agility was significantly and positively associated with market share increase (Ettlie 1998). It is subsequently hypothesized that:

\[ H3b: \text{IT unit agility is positively associated with IS contribution to firm performance.} \]

Method

To empirically examine the proposed model, we conducted a survey-based study targeted to CIOs and other senior IT executives as primary respondents since these executives were thought to have the best overview of their IT departments’ strategy, capabilities, and performance. Following the precedents of prior studies of a similar nature (e.g. Bajjaly 1998; Braunscheidel and Suresh 2009; He and Wong 2004; Leidner et al. 2011), survey responses from single respondents were deemed appropriate for this study.

Data was collected using an online-based survey. Over the course of a month, a total of 4346 emails were sent to CIOs and other senior IT executives of organizations in a variety of industries. The emails were sent in batches of approximately 150 to 300 per night so that they would reach the intended recipients during a weekday. Contact information for most public organizations and institutions were found through a search of online directories, for example, university system directories and state government directories. The contact information for most private organizations was derived from several sources, for example, Dun & Bradstreet Million Dollar Database, Hoovers Database. Of the total emails sent, 824 emails (18.96%) were returned as undeliverable and therefore 3522 emails were considered delivered to recipients. No bias was found in terms of company size for those recipients whose emails...
were delivered and those whose emails were undeliverable. A total of 289 survey responses were received for a response rate of 8.21% of the emails that were actually delivered. Response rates of 5 to 12% are typical for studies involving high level executives and the rate is consistent with previous studies targeting similar respondents in which the researchers have little or no special social, business, or communications connections with the targeted respondents (e.g. Braunscheidel and Suresh 2009; Leidner et al. 2011; Pervan 1998; Preston et al. 2008).

**Measures**

All measures were either adopted or adapted from prior literature, except the items for IS Ambidextrous, which were developed by the researchers for this study based on the definition provided earlier. The items that required adaptation were ones that referred to firms in general rather than the IT department in particular; these needed to be adjusted to wording that would be relevant for the department. The first item for IS Reserved was significantly changed because it was thought that the original phrase, “a safe and stable approach”, was somewhat vague and that a rephrasing would have been more appropriate so that the three items for IS Reserved would better encompass the definition of IS Reserved overall. Items were then face validated by two senior executives, one of whom was from a large firm and one from a small firm. Constructs were measured using multi-item, 5-point response scales ranging either from “strongly disagree” to “strongly agree” or from “no extent” to “very great extent”. Items and their sources can be found in the Appendix. All variables were modeled as reflective constructs.

**Analysis and Results**

**Sample Characteristics**

After data cleansing, a total of 271 usable responses were retained for further analysis. Respondents included Chief Information Officers, Chief Technology Officers, Vice Presidents of Technology, IT Directors, and other senior IT executives. In fact, 82% of respondents identified themselves as the highest ranking IT executive in their organizations and therefore this sample provides an excellent representation of the target respondents for the study. On average, respondents had been in their current positions for 6 years and with their organizations for almost 10 years. The organizations represented in the sample are heterogeneous in size and industry, as can be seen in Table 1.

**Table 1. Sample Characteristics**

<table>
<thead>
<tr>
<th>Organization Characteristics</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>49</td>
<td>18.1%</td>
</tr>
<tr>
<td>Colleges &amp; universities</td>
<td>42</td>
<td>15.5%</td>
</tr>
<tr>
<td>Medical &amp; health services</td>
<td>30</td>
<td>11.1%</td>
</tr>
<tr>
<td>Financial services</td>
<td>28</td>
<td>10.3%</td>
</tr>
<tr>
<td>Wholesale/retail trade &amp; distribution</td>
<td>26</td>
<td>9.6%</td>
</tr>
<tr>
<td>Others</td>
<td>96</td>
<td>35.4%</td>
</tr>
<tr>
<td><strong>Organization size (number of employees)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-100</td>
<td>14</td>
<td>5.2%</td>
</tr>
<tr>
<td>101-500</td>
<td>54</td>
<td>19.9%</td>
</tr>
<tr>
<td>501-1000</td>
<td>38</td>
<td>14.0%</td>
</tr>
<tr>
<td>1001-5000</td>
<td>67</td>
<td>24.7%</td>
</tr>
<tr>
<td>5001-10,000</td>
<td>31</td>
<td>11.4%</td>
</tr>
<tr>
<td>10,001-50,000</td>
<td>42</td>
<td>15.5%</td>
</tr>
<tr>
<td>50,001-100,000</td>
<td>12</td>
<td>4.4%</td>
</tr>
<tr>
<td>More than 100,000</td>
<td>11</td>
<td>4.1%</td>
</tr>
<tr>
<td>No response</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td><strong>IT department size (number of employees)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-50</td>
<td>124</td>
<td>45.8%</td>
</tr>
<tr>
<td>51-100</td>
<td>33</td>
<td>12.2%</td>
</tr>
<tr>
<td>101-500</td>
<td>75</td>
<td>27.7%</td>
</tr>
<tr>
<td>501-1000</td>
<td>13</td>
<td>4.8%</td>
</tr>
<tr>
<td>More than 1000</td>
<td>23</td>
<td>8.5%</td>
</tr>
<tr>
<td>No response</td>
<td>3</td>
<td>1.1%</td>
</tr>
</tbody>
</table>
Data Validations and PLS Measurement Model

The data was examined for potential response biases. No response bias was found in terms of the number of responses received from large, medium, or small companies compared to the pool of all potential respondents (for testing response bias, company size was the only analyzable and appropriate data point we possessed for the list of CIOs/IT executives who were emailed). Because we guaranteed respondents anonymity (no tracking of their responses) and emails were sent in small batches per night over the course of several weeks, we are unable to determine early versus late responses. Common method bias was also examined using Harman’s single-factor test according to Podsakoff et al. (2003) and no substantial amount of common method variance was found. As an additional check, we assessed self-selection bias because it can be argued that CIOs of higher performing departments are more likely to respond than those of lower performing departments. But the performances were found to be normally distributed, which indicates that CIOs tend to respond regardless of performance and that in general they are not overestimating IT’s performance.

Since items for IS Ambidextrous were developed for this study, we wished to first examine their distinctiveness from the other strategies in the typology. Thus, SPSS was used to factor analyze the four IS strategies together to determine whether the IS Ambidextrous items loaded well on its own factor and did not cross-load onto other factors; this was the initial convergent and discriminant validity assessment. Results showed that items for the four strategies have for the most part both convergent and discriminant validity; this will be further tested and presented in the upcoming stages of analysis. Next, control variables were tested prior to analyzing the research model to determine whether any were significant predictors of the dependent variable, IS contribution to firm performance: job tenure, organization tenure, industry, organization size, IT department size. None of these variables were found to be significant predictors. In addition, since it can be argued that smaller departments may be more agile, the relationship of department size to the two dynamic capabilities was tested and was not found to significantly relate to either absorptive capacity or agility.

The PLS (partial least squares) approach was used to analyze the research model because it focuses on maximizing explained variance, that is, prediction of the constructs (Hair et al. 2009), which is consistent with the partial objectives of this study to explore IS strategies’ impact on dynamic capabilities and the capabilities’ impact on performance. The PLS measurement model was first analyzed to validate the measurement items for each construct used in the model. Two validations should be performed: reliability/convergent validity and discriminant validity. Reliability/convergent validity were confirmed in two ways. First, all composite reliability (CR) measures were greater than .70, which provides support for acceptable internal consistency (Chin 1998). Second, the average variance extracted (AVE) for each factor was greater than .50, indicating acceptable reliability and convergent validity (Chin 1998; Fornell and Larcker 1981). Table 2 lists the CRs and AVEs for each factor. Discriminant validity was also assessed in two ways. First, as illustrated in Table 2, the square root of the AVE for each factor was higher than the correlations with other factors, indicating that each factor shares higher variance with items in its own factor than with items in other factors (Chin 1998). Second, as shown in Table 3, the loadings and cross-loadings indicate that each item loads higher on its own construct than on other constructs (Chin 1998). In the process of achieving satisfactory reliability and validity, two items with loadings less than 0.60 were dropped from the measurement model (noted in the Appendix). The two items both represented the IS Reserved construct, which left only one item to represent this construct. While this may reduce the reliability of the measure (Robins et al. 2001), unlike formative measures, the dropping of items for reflective measures should not significantly alter the meaning of the construct (Jarvis et al. 2003; Petter et al. 2007).
Table 2. Measurement Validations and Correlations

<table>
<thead>
<tr>
<th></th>
<th>AVE</th>
<th>CR</th>
<th>IS Ambidextrous</th>
<th>IS Amorphous</th>
<th>IS Innovator</th>
<th>IS Reserved</th>
<th>IS contrib to perf</th>
<th>IT unit ACAP</th>
<th>IT unit agility</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS Ambidextrous</td>
<td>0.70</td>
<td>0.88</td>
<td>0.837</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IS Amorphous</td>
<td>0.72</td>
<td>0.89</td>
<td>-0.483</td>
<td>0.850</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IS Innovator</td>
<td>0.60</td>
<td>0.81</td>
<td>0.574</td>
<td>-0.401</td>
<td>0.773</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IS Reserved</td>
<td>1.00</td>
<td>1.00</td>
<td>0.202</td>
<td>-0.158</td>
<td>0.074</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IS contrib to perf</td>
<td>0.50</td>
<td>0.88</td>
<td>0.398</td>
<td>-0.415</td>
<td>0.390</td>
<td>0.132</td>
<td>0.710</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT unit ACAP</td>
<td>0.66</td>
<td>0.90</td>
<td>0.524</td>
<td>-0.446</td>
<td>0.503</td>
<td>0.131</td>
<td>0.821</td>
<td>0.809</td>
<td>0.803</td>
</tr>
<tr>
<td>IT unit agility</td>
<td>0.65</td>
<td>0.88</td>
<td>0.479</td>
<td>-0.343</td>
<td>0.503</td>
<td>0.100</td>
<td>0.834</td>
<td>0.838</td>
<td>0.803</td>
</tr>
</tbody>
</table>

Note: Diagonal shaded cells are the square roots of the average variance extracted (AVE) for each factor.

Table 3. Loadings and Cross Loadings

<table>
<thead>
<tr>
<th>IS</th>
<th>IS Ambidextrous</th>
<th>IS Amorphous</th>
<th>IS Innovator</th>
<th>IS Reserved</th>
<th>IS contrib to perf</th>
<th>IT unit ACAP</th>
<th>IT unit agility</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACAP</td>
<td>0.442</td>
<td>-0.385</td>
<td>0.408</td>
<td>0.122</td>
<td>0.512</td>
<td>0.774</td>
<td>0.514</td>
</tr>
<tr>
<td>ACAP</td>
<td>0.416</td>
<td>-0.318</td>
<td>0.416</td>
<td>0.084</td>
<td>0.492</td>
<td>0.783</td>
<td>0.531</td>
</tr>
<tr>
<td>ACAP</td>
<td>0.456</td>
<td>-0.408</td>
<td>0.429</td>
<td>0.099</td>
<td>0.501</td>
<td>0.830</td>
<td>0.472</td>
</tr>
<tr>
<td>ACAP</td>
<td>0.402</td>
<td>-0.321</td>
<td>0.390</td>
<td>0.094</td>
<td>0.496</td>
<td>0.819</td>
<td>0.490</td>
</tr>
<tr>
<td>ACAP</td>
<td>0.400</td>
<td>-0.369</td>
<td>0.391</td>
<td>0.128</td>
<td>0.511</td>
<td>0.838</td>
<td>0.575</td>
</tr>
<tr>
<td>Agility</td>
<td>0.342</td>
<td>-0.295</td>
<td>0.358</td>
<td>0.119</td>
<td>0.545</td>
<td>0.481</td>
<td>0.754</td>
</tr>
<tr>
<td>Agility</td>
<td>0.438</td>
<td>-0.310</td>
<td>0.460</td>
<td>0.086</td>
<td>0.516</td>
<td>0.552</td>
<td>0.846</td>
</tr>
<tr>
<td>Agility</td>
<td>0.449</td>
<td>-0.289</td>
<td>0.488</td>
<td>0.076</td>
<td>0.538</td>
<td>0.573</td>
<td>0.859</td>
</tr>
<tr>
<td>Agility</td>
<td>0.285</td>
<td>-0.192</td>
<td>0.278</td>
<td>0.032</td>
<td>0.425</td>
<td>0.425</td>
<td>0.748</td>
</tr>
<tr>
<td>ISAmbidex</td>
<td>0.818</td>
<td>-0.370</td>
<td>0.489</td>
<td>0.182</td>
<td>0.341</td>
<td>0.420</td>
<td>0.387</td>
</tr>
<tr>
<td>ISAmbidex</td>
<td>0.852</td>
<td>-0.453</td>
<td>0.443</td>
<td>0.233</td>
<td>0.321</td>
<td>0.424</td>
<td>0.398</td>
</tr>
<tr>
<td>ISReserv</td>
<td>0.840</td>
<td>-0.390</td>
<td>0.507</td>
<td>0.098</td>
<td>0.337</td>
<td>0.468</td>
<td>0.418</td>
</tr>
<tr>
<td>ISReserv</td>
<td>0.202</td>
<td>-0.158</td>
<td>0.074</td>
<td>1.000</td>
<td>0.132</td>
<td>0.131</td>
<td>0.100</td>
</tr>
<tr>
<td>ISInnov</td>
<td>0.480</td>
<td>-0.308</td>
<td>0.809</td>
<td>0.033</td>
<td>0.285</td>
<td>0.330</td>
<td>0.377</td>
</tr>
<tr>
<td>ISInnov</td>
<td>0.262</td>
<td>-0.134</td>
<td>0.608</td>
<td>0.018</td>
<td>0.064</td>
<td>0.211</td>
<td>0.225</td>
</tr>
<tr>
<td>ISInnov</td>
<td>0.530</td>
<td>-0.410</td>
<td>0.878</td>
<td>0.095</td>
<td>0.436</td>
<td>0.535</td>
<td>0.497</td>
</tr>
<tr>
<td>ISInnov</td>
<td>0.259</td>
<td>-0.328</td>
<td>0.287</td>
<td>0.141</td>
<td>0.779</td>
<td>0.448</td>
<td>0.509</td>
</tr>
<tr>
<td>ISInnov</td>
<td>0.294</td>
<td>-0.323</td>
<td>0.279</td>
<td>0.019</td>
<td>0.720</td>
<td>0.443</td>
<td>0.417</td>
</tr>
<tr>
<td>ISInnov</td>
<td>0.307</td>
<td>-0.256</td>
<td>0.286</td>
<td>0.068</td>
<td>0.741</td>
<td>0.469</td>
<td>0.469</td>
</tr>
<tr>
<td>ISInnov</td>
<td>0.239</td>
<td>-0.289</td>
<td>0.252</td>
<td>0.098</td>
<td>0.673</td>
<td>0.415</td>
<td>0.440</td>
</tr>
<tr>
<td>ISInnov</td>
<td>0.250</td>
<td>-0.254</td>
<td>0.201</td>
<td>0.187</td>
<td>0.674</td>
<td>0.398</td>
<td>0.385</td>
</tr>
<tr>
<td>ISInnov</td>
<td>0.308</td>
<td>-0.297</td>
<td>0.289</td>
<td>0.078</td>
<td>0.683</td>
<td>0.440</td>
<td>0.381</td>
</tr>
<tr>
<td>ISInnov</td>
<td>0.316</td>
<td>-0.311</td>
<td>0.331</td>
<td>0.076</td>
<td>0.698</td>
<td>0.470</td>
<td>0.525</td>
</tr>
<tr>
<td>ISAmorph</td>
<td>-0.390</td>
<td>0.860</td>
<td>-0.311</td>
<td>-0.134</td>
<td>-0.345</td>
<td>-0.357</td>
<td>-0.257</td>
</tr>
<tr>
<td>ISAmorph</td>
<td>-0.419</td>
<td>0.883</td>
<td>-0.342</td>
<td>-0.106</td>
<td>-0.322</td>
<td>-0.343</td>
<td>-0.272</td>
</tr>
<tr>
<td>ISAmorph</td>
<td>-0.415</td>
<td>0.805</td>
<td>-0.361</td>
<td>-0.155</td>
<td>-0.379</td>
<td>-0.422</td>
<td>-0.333</td>
</tr>
</tbody>
</table>

PLS Structural Model

The standard bootstrap resampling procedure was used to test the significance of the structural research model. Figure 2 illustrates the overall model results from the structural analysis, with explanatory powers (R²) and standardized path coefficients (β).
The results show that seven of the hypotheses were supported. A significant negative relationship—rather than no relationship, as hypothesized—was found for H1d (stated as: IS Amorphous strategy is unrelated to absorptive capacity). The IS strategies together explained 36.9% of the variance for absorptive capacity and 31.4% of the variance for agility. And the two dynamic capabilities explained 48.1% of the variance for IS contribution to performance. Table 4 summarizes the hypotheses results.

**Table 4. Summary of Hypotheses Results**

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a: IS Innovator strategy is positively associated with absorptive capacity.</td>
<td>Supported</td>
</tr>
<tr>
<td>H1b: IS Ambidextrous strategy is positively associated with absorptive capacity.</td>
<td>Supported</td>
</tr>
<tr>
<td>H1c: IS Reserved strategy is positively associated with absorptive capacity.</td>
<td>Not supported</td>
</tr>
<tr>
<td>H1d: IS Amorphous strategy is unrelated to absorptive capacity.</td>
<td>Negative relationship found</td>
</tr>
<tr>
<td>H2a: IS Innovator strategy is positively associated with IT unit agility.</td>
<td>Supported</td>
</tr>
<tr>
<td>H2b: IS Ambidextrous strategy is positively associated with IT unit agility.</td>
<td>Supported</td>
</tr>
<tr>
<td>H2c: IS Reserved strategy is negatively associated with IT unit agility.</td>
<td>Not supported</td>
</tr>
<tr>
<td>H2d: IS Amorphous strategy is unrelated to IT unit agility.</td>
<td>Supported</td>
</tr>
<tr>
<td>H3a: IT unit absorptive capacity is positively associated with IS contribution to firm performance.</td>
<td>Supported</td>
</tr>
<tr>
<td>H3b: IT unit agility is positively associated with IS contribution to firm performance.</td>
<td>Supported</td>
</tr>
</tbody>
</table>

**Mediation Tests**

Mediation tests were conducted to determine whether the dynamic capabilities were mediators between the IS strategies and IS contribution to firm performance. To establish mediation, the indirect effect of the independent variable to the outcome variable must be significant (Helm et al. 2010). Independent PLS models were run and Sobel (1982) test calculations were applied. The resulting Sobel z-statistics were then assessed using the standard p ≤ .05 criteria to determine the significance of the mediation. Table 5 provides the results of the mediation tests.

Full mediation through the dynamic capabilities was found for 5 of the 8 indirect relationships between the IS strategies and performance, and partial mediation was found for 2 of the 8 relationships. As shown, the VAFs (Variance Accounted For) are especially large for the indirect effects of the innovative and ambidextrous strategies on performance, mediated through dynamic capabilities. For example, approximately 94% of the total effect of the IS Innovator strategy on performance is explained by its indirect effect through either absorptive capacity or agility. For the IS Ambidextrous, this is about 90%.
These findings lend support to our contention that IS strategies themselves may not necessarily directly lead to performance, but rather performance is achieved through the development of dynamic capabilities by the consistent pursuit of IS strategies.

Table 5. Mediation Test Results

<table>
<thead>
<tr>
<th>Mediating Relationship</th>
<th>Sobel z-Statistic</th>
<th>Sobel p Value</th>
<th>VAF</th>
<th>Direct Path p Value</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS innovator -&gt; ACAP -&gt; performance</td>
<td>5.226</td>
<td>0.000</td>
<td>0.936</td>
<td>0.414</td>
<td>full mediation</td>
</tr>
<tr>
<td>IS innovator -&gt; agility -&gt; performance</td>
<td>5.637</td>
<td>0.000</td>
<td>0.941</td>
<td>0.414</td>
<td>full mediation</td>
</tr>
<tr>
<td>IS ambidextrous -&gt; ACAP -&gt; performance</td>
<td>5.122</td>
<td>0.000</td>
<td>0.899</td>
<td>0.336</td>
<td>full mediation</td>
</tr>
<tr>
<td>IS ambidextrous -&gt; agility -&gt; performance</td>
<td>5.441</td>
<td>0.000</td>
<td>0.899</td>
<td>0.336</td>
<td>full mediation</td>
</tr>
<tr>
<td>IS reserved -&gt; ACAP -&gt; performance</td>
<td>1.962</td>
<td>0.025</td>
<td>0.510</td>
<td>0.162</td>
<td>full mediation</td>
</tr>
<tr>
<td>IS reserved -&gt; agility -&gt; performance</td>
<td>1.533</td>
<td>0.063</td>
<td>0.473</td>
<td>n/a</td>
<td>no mediation</td>
</tr>
<tr>
<td>IS amorphous -&gt; ACAP -&gt; performance</td>
<td>-4.385</td>
<td>0.000</td>
<td>0.492</td>
<td>0.003</td>
<td>partial mediation</td>
</tr>
<tr>
<td>IS amorphous -&gt; agility -&gt; performance</td>
<td>-4.050</td>
<td>0.000</td>
<td>0.482</td>
<td>0.003</td>
<td>partial mediation</td>
</tr>
</tbody>
</table>

Post-Hoc Analyses

Three types of post-hoc analyses were conducted for further validation, comparison, and confirmation. First, to further confirm the overall validity of the model, we analyzed only those organizations that have implemented the same strategy, or lack thereof in the case of IS Amorphous, for more than two years (n=153) since executing to the same IS strategy for two years should be ample time to produce results. It was found that the model predominantly remained stable with the exception of H1c, which became supported, and H2d, in which a negative relationship was found. The post-hoc finding supporting H1c suggests that, over time, even implementing a reserved IS strategy would help the IT unit develop its absorptive capacity. On the other hand, the post-hoc finding for H2d suggests that having an amorphous strategy will, over time, become a detriment to the IT unit’s development and maintenance of agility.

Second, because it can be argued that non-profit organizations do not have the same performance indicators as for-profits and that some of the measurement items for performance do not apply to non-profits, the model was tested with the exclusion of organizations that might be considered as non-profits. This was done by removing colleges and universities and medical and health services from the sample. The overall results of the model did not change for the remaining 199 data points.

Third, we wished to compare the performance consistency of the current sample to that of the previous study (i.e. Leidner et al. 2011) that found that firms implementing ambidextrous IS strategies fared as well or better than those implementing innovative IS strategies. As a first step to doing so, we followed the same approach as the previous study to distinctly categorize the sample into those implementing each of the four IS strategies. Organizations were classified as IS Amorphous if they rated, on average, highest on the IS Amorphous items. They were classified as IS Ambidextrous if their ratings for both the IS Innovator and IS Reserved items were, on average, above the sample means for IS Innovator and IS Reserved, respectively. Otherwise, they were classified as either IS Innovator or IS Reserved depending on the strategy on which they rated higher. From the 271 organizations in our sample, the classification resulted in 61 IS Innovators, 58 IS Ambidextrous, 138 IS Reserveds, and 14 IS Amorphous. The average performance of each IS strategy group varied, with the IS Amorphous having the lowest average performance, as expected, and the IS Ambidextrous group having the highest performance, followed by the IS Innovators, and then the IS Reserveds. These performance findings are consistent with Leidner et al.’s (2011) study, which further confirms the importance of including the IS Ambidextrous strategy in the typology. Table 6 provides descriptive and comparison statistics for the results of the four IS strategies discussed.

To determine whether the differences in the means of performance for each group of IS strategies were statistically significant, we used an ANOVA test with Scheffe’s method. The Scheffe method is used for multiple comparisons and is suitable whether sample sizes are equal or unequal (Garson 2011). Results from this analysis revealed that the mean performance between IS Ambidextrous and IS Innovator organizations was not statistically significant but that the difference between IS Ambidextrous and IS Reserved was statistically significant, as was the difference between IS Ambidextrous and IS Amorphous. Results are summarized in Table 6.
Table 6. Extended Typology with Performance Comparison using Former Categorization Approach

<table>
<thead>
<tr>
<th>IS Strategy</th>
<th>Count</th>
<th>% of Sample</th>
<th>Mean</th>
<th>St. Dev.</th>
<th>IS Strategy</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS Innovator</td>
<td>61</td>
<td>22.5%</td>
<td>3.77</td>
<td>0.708</td>
<td>IS Innovator</td>
<td>0.011</td>
</tr>
<tr>
<td>IS Ambidextrous</td>
<td>58</td>
<td>21.4%</td>
<td>3.86</td>
<td>0.610</td>
<td>IS Ambidextrous</td>
<td>0.023</td>
</tr>
<tr>
<td>IS Reserved</td>
<td>138</td>
<td>50.9%</td>
<td>3.51</td>
<td>0.669</td>
<td>IS Innovator</td>
<td>0.011</td>
</tr>
<tr>
<td>IS Amorphous</td>
<td>14</td>
<td>5.2%</td>
<td>3.16</td>
<td>0.578</td>
<td>IS Ambidextrous</td>
<td>0.006</td>
</tr>
</tbody>
</table>

Note: Only strategy comparisons that have significant differences at .05 using the Scheffé method are shown.

However, since the former study did not actually operationalize IS Ambidextrous but the current study does, we use the new operationalization in categorizing the strategies to examine consistency against the former approach. In our new categorization approach, firms are simply classified as the IS strategy type in which they rated highest on average. Table 7 shows the results of this categorization. The performance of each strategy is about the same as that resulting from the above-mentioned categorization approach, but a much larger percentage of the firms can now be considered ambidextrous (105 or 38.8%) because they rated highest on the IS Ambidextrous items. Results confirm that the performance of IS strategies, on average, is consistent regardless of categorization approach and that the IS Ambidextrous tends to be a top performer. This further supports the argument for the need to extend the existing IS strategy typology. The high performance observed for the IS Ambidextrous also supports strategy scholars’ calls for firms to strive for ambidexterity.

Table 7. Extended Typology with Performance Comparison using New Categorization Approach

<table>
<thead>
<tr>
<th>IS Strategy</th>
<th>Count</th>
<th>% of Sample</th>
<th>Mean</th>
<th>St. Dev.</th>
<th>IS Strategy</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS Innovator</td>
<td>44</td>
<td>16.2%</td>
<td>3.72</td>
<td>0.744</td>
<td>IS Innovator</td>
<td>0.034</td>
</tr>
<tr>
<td>IS Ambidextrous</td>
<td>105</td>
<td>38.8%</td>
<td>3.74</td>
<td>0.644</td>
<td>IS Ambidextrous</td>
<td>0.013</td>
</tr>
<tr>
<td>IS Reserved</td>
<td>109</td>
<td>40.2%</td>
<td>3.53</td>
<td>0.675</td>
<td>IS Innovator</td>
<td>0.034</td>
</tr>
<tr>
<td>IS Amorphous</td>
<td>13</td>
<td>4.8%</td>
<td>3.09</td>
<td>0.546</td>
<td>IS Amorphous</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Note: Only strategy comparisons that have significant differences at .05 using the Scheffé method are shown.

Discussion

In this paper, we have developed and tested a model of the impact of IS strategy on dynamic capabilities and the eventual contribution of IS to firm performance. To our knowledge, we are the first to propose and test the relationship between IS strategy and dynamic capabilities and the mediating effect of dynamic capabilities on the relationship between strategy and performance. Our model extends the existing conceptualization of IS strategy offered by Chen et al. (2010) to include a fourth strategy—IS Ambidextrous. Collectively, our model explains 48% of the variance in IS contribution to firm performance via the IS department’s development of two dynamic capabilities.

Perhaps most intriguing is the unexpected finding that, rather than being unrelated, amorphous IS strategies were in fact significantly negatively associated with absorptive capacity (result for H1d) and over time, also negatively associated with agility (result for post-hoc analysis of H2d). In other words, having little or no definitive long-term goals or formally defined strategies for IS tends to prove detrimental to the IT department’s dynamic capabilities development. One major reason for this negative impact might be that an amorphous strategy is potentially indicative of a larger issue in the department or organization. For instance, departments without an IS strategy may reside in organizations without well-defined strategies, making it difficult if not impossible for IT managers to take a long term focus with an emphasis on developing the skills and capabilities needed to support the organization. Or departments with the IS Amorphous strategy may suffer from poorly motivated IT personnel who are unable to see the bigger picture of how their specific work is tied toward an important organizational goal. Regardless of the reason for the IS Amorphous strategy, it behooves IT departments to move quickly out of such a state in order to be able to become more agile and to be able to acquire and apply new knowledge and skills.

The hypotheses positing that IS Reserved will be positively related to absorptive capacity (H1c), but negatively related to agility (H2c) were likewise unsupported. While we expected the IS Reserved’s rigid systems of routinization and codification to run counter to the development of agility, the study did...
not support this hypothesis. Rather, the IS Reserved is unscathed in terms of its agility development. This raises the question of whether IS Reserveds really develop systems and processes that are rigid, or whether rigid systems and processes are actually antagonistic to agility as suggested by Seo and La Paz (2008). We suspect that the IS Reserved does not have all its processes codified and routinized to the point of rigidity, and therefore the hypothesized relationship was not found. However, in terms of absorptive capacity, the post-hoc analysis found that the association between IS Reserved and absorptive capacity becomes significant and positive, which suggests that given time, a consistent but cautious approach to IS, as that taken by the IS Reserved, can still contribute to the development of its absorptive capacity.

Lastly, as we had denoted, IS strategy does not directly lead to performance gains, but rather it is the IT department’s consistent enactment of its IS strategy that develops certain dynamic capabilities, which in turn create efficiency and effectiveness gains that contribute to firm performance. Indeed, we found empirical support for this assertion via the mediation test results. For the most part, the two dynamic capabilities either fully or at least partially mediated the relationships between the IS strategies and performance. The mediation finding suggests that of the strategic IS approaches, the IS Innovator’s and IS Ambidextrous’ ability to contribute to performance is almost fully dependent on its formation of dynamic capabilities. These capabilities are the factors really driving the performance gains for the IS Innovator and IS Ambidextrous. Contrarily, the partial mediation for the IS Amorphous strategy implies that its low absorptive capacity and agility levels only partially explain its poorer performance. Other factors outside of the scope of this study, such as poor management and organization and lack of enforcement of policies and procedures, may also be contributing negatively to its performance.

Our findings extend earlier work that found relationships between IS strategy and performance without identifying the mechanisms through which these relationships occurred (Leidner et al. 2011). Our model thus offers a richer and more complete understanding of the role of IS strategy in organizations.

**Future Research**

We acknowledge that the addition of an IS Ambidextrous strategy deviates from having a typology that is truly mutually exclusive, as implied in the original definition (though not the actual operationalization) of the original typology. Although introducing the new strategy type will deviate from having mutually exclusive categories, we believe that the outcomes of such a strategy merit attention. Future research should perhaps explore how the two ‘true’ dimensions of strategy—IS Innovative and IS Reserved—can be better operationalized. For example, the scale can potentially be turned into a continuum between the Innovative and Reserved approaches. Perhaps organizations that lean slightly more to one side will achieve better results than those that lean to the other side or in the middle. Or perhaps the optimal strategic balance depends on other factors such as the industry in which an organization is based and strategies of its direct competitors. Further research is needed to evaluate these considerations. Related to the first direction for future research, a second possibility for research is to assess optimal IS strategies for non-profit organizations. Non-profits have performance indicators, but these indicators differ from those of for-profits and thus the strategies should be re-evaluated in light of the new performance criteria. For example, hospitals use performance measures such as mortality rate and revenue per admission (e.g. Devaraj and Kohli 2003), so a measure of how IT might contribute to these may be more appropriate. A third area for further research is perhaps the more rigorous development and refining of items for the IS Ambidextrous construct. A future study might follow comprehensive item development methods as suggested by Rossiter (2002) and MacKenzie et al. (2011). The current items for the IS Ambidextrous construct should be re-evaluated in future research to determine their appropriateness and accuracy based on the definition of the concept.

**Limitations and Conclusion**

These findings should be interpreted with an awareness of the study’s limitations. One limitation is that causal relationships cannot be tested because of the cross-sectional nature of the data collected. A second limitation is the use of self-reported data. As with any survey-based study, the accuracy of self-reported data is subject to the perspective of the individual participants responding to the survey. This is the case not only with surveys, but with interviews and other studies involving human subjects in which
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humans must make subjective judgments; these are nevertheless commonly accepted methods of research. In our case, since a single respondent—the CIO or other senior IT executive—was used to assess each department represented in the sample, the data would be internally consistent, which was confirmed in the factor analysis. Data that is internally consistent allows us to assess the degree or strength of the relationships among concepts and as such, self-reported data is appropriate for the method of data analysis used in this study. A third limitation is the use of a single item to represent the IS Reserved strategy due to the low loadings of two items. The findings of the model for this strategy type should be confirmed in a future study with more items to assess the consistency of the single item representation.

In conclusion, this paper has contributed to existing scholarship in two ways. The first contribution is the proposal and operationalizing of an extension to the IS strategy typology to account for the substantially high percentage of firms (39% in this sample) that, in practice, do strive for an ambidextrous approach in their strategies. Previous work has alluded to the possibility of an IS ambidextrous strategy (Chen et al. 2010; Leidner et al. 2011) but had either assumed that such a strategy was rarely, if ever, achieved or had failed to operationalize the strategy in order to formally test its relationship to performance. Our study demonstrates that such a strategy is in fact achievable and desirable. The second contribution is the testing of the extended typology in a model that assesses the impacts of strategy on performance, mediated through capabilities development. The overall model findings suggest that since dynamic capabilities are major assets to any organization, the pursuit of a strategy that helps enhance an organization’s dynamic capabilities would be substantially advantageous to its performance capability. And one way in which dynamic capabilities can be developed and sustained is through the consistent implementation of innovative or ambidextrous IS strategies. IT departments that strive to take an innovative or ambidextrous approach to IS would be in better positions to achieve continuous competitive advantage. Conversely, departments characterized by a predominantly amorphous IS strategy must recognize the damaging nature of such a lack of strategy and quickly take action to remove themselves from the amorphous state. CIOs of such departments should work steadfastly to draft a strategic IS approach, even a reserved one, have it ratified, and follow through consistently to this approach even as a short-term solution until a longer-term solution can be arrived at.

References


Mahoney, J. 2009. IT strategy review 'lite': For turbulent times or when business strategy is unclear. November 9, ID: G00169537. Retrieved from Gartner database.


# Appendix

## Construct Items and Sources

### IT unit absorptive capacity
(Source: adapted from Pavlou and El Sawy 2006)

*Please rate the extent to which each of the following describes the IT department.*

1. Our IT department is able to identify and acquire internal (e.g. within the department) and external (e.g. market) knowledge.
2. We are effective in developing new knowledge or insights that have the potential to influence product development.
3. We have effective routines to identify, value, and assimilate new information and knowledge.
4. We are effective in transforming existing information into new knowledge.
5. We can successfully exploit internal and external information and knowledge into concrete applications.

### IT unit agility
(Source: adapted from Tallon 2008 based on Overby et al.’s 2006 definition and description of agility)

*Please rate the extent to which the IT department is able to do each of the following.*

1. Quickly detect changes in customer demand.
2. Swiftly detect advances in technology that are relevant to the business.
3. Rapidly respond to advances in technology that are relevant to the business.
4. Promptly adjust to economic shifts that have the potential to impact the department.

### IS contribution to firm performance
(Source: adopted from Preston et al. 2008)

*Please assess the extent to which IT has contributed to each of the following in your organization.*

1. Return on investment
2. Sales revenue increase
3. Market share increase
4. Cost savings
5. Operating efficiency
6. Process improvement
7. Customer satisfaction

### IS Innovator
(Source: adapted from Chen et al. 2010)

*Please assess the following about your organization’s general, long-term information systems (IS) strategy.*

1. Our IT department strives to be a leading IS innovator in our industry.
2. Our IT department seeks to explore new IS initiatives even if not all of these efforts prove to be highly profitable.
3. Our IT department responds rapidly to early signals concerning areas of opportunity for IS.

### IS Ambidextrous
(developed)

*Please assess the following about your organization’s general, long-term information systems (IS) strategy.*

1. Our IT department equally endeavors to explore new IS practices and technologies while concurrently refine existing ones.
2. Both taking the time to cautiously examine new technologies and being able to rapidly respond to new IS opportunities are equally emphasized by our IT department.
3. Our IT department strives to be equally innovative and efficient.

### IS Reserved
(Source: adapted from Chen et al. 2010)

*Please assess the following about your organization’s general, long-term information systems (IS) strategy.*

1. Our IT department mainly seeks to gain efficiency by refining existing IS practices and technologies.
2. Our IT department adopts promising IS innovations once these initiatives have been proven in our industry.
3. IS innovations are carefully examined before they are chosen by our IT department.

### IS Amorphous
(Source: adapted from Chen et al. 2010)

*Please assess the following about your organization’s general, long-term information systems (IS) strategy.*

1. Our IT department mainly seeks to gain efficiency by refining existing IS practices and technologies.
2. Our IT department adopts promising IS innovations once these initiatives have been proven in our industry.
3. IS innovations are carefully examined before they are chosen by our IT department.
1. Our IT department does not have definitive long-term IS goals.
2. Our IT department does not have an articulated IS strategy.
3. Our IT department does not have a consistent pattern of behavior regarding IS.

Scales: a: 5-point scale ranging from (1) no extent, to (5) very great extent; b: 5-point scale ranging from (1) strongly disagree, to (5) strongly agree