Journal of Strategic Information Systems 20 (2011) 419–437

Contents lists available at SciVerse ScienceDirect

Journal of Strategic Information Systems

journal homepage: www.elsevier.com/locate/jsis

An empirical investigation of the relationship of IS strategy with firm performance

Dorothy E. Leidner [a,*], Janice Lo [a], David Preston [b]

[a] Baylor University, One Bear Place 8005 Waco, Texas 76798-8005, United States
[b] Texas Christian University, TCU Box 298530, Fort Worth, Texas 76129, United States

ARTICLE INFO

Article history:
Received 16 January 2011
Received in revised form 6 September 2011
Accepted 6 September 2011
Available online 5 October 2011

Keywords:
IS strategy
IS innovation
IS performance
IS Innovator
IS Conservative
IS Undefined
IS Ambidextrous
Firm performance
Ambidexterity

ABSTRACT

Given the important impact that an IS strategy has on the potential value IS brings to an organization, we develop and test a model of IS Strategy and Firm Performance. Our survey-based study provides strong evidence that firms with defined IS strategies (either IS Innovator or IS Conservative) perform better than those without defined IS strategies. Organizations without a clearly defined IS strategy actually experienced a negative relationship with firm performance. These organizations should realize the potentially negative outcomes of such a lack of strategy and work to extricate themselves before a consistent pattern of investing in IS without clear organizational benefit develops. Furthermore, the study suggests that the IS Innovator strategy is, in particular, associated with more superior firm performance than the IS Conservative strategy under conditions of environmental dynamism. Organizational leaders need to consider the external environments under which their organizations are operating and evaluate the influence those environments may have on their IS strategy's ability to impact performance. Post hoc analysis results also reveal a fourth potential IS strategy, one that strives for ambidexterity. Ambidextrous firms were found to be associated with the most superior performance, leading to a potential extension of the existing IS strategy typology and a call for future research.

1. Introduction

Without an information system (IS) strategy, the contribution of IS to organizational performance is likely to be a result of serendipity (Galliers, 2007). The IS strategy is so important to the potential value IS brings to an organization that practice and research have widely emphasized the need to carefully construct an IS strategy with a view towards complementing and/or enabling organizational objectives (Reich and Benbasat, 1996). Otherwise, IS solutions might be both misaligned and maligned as they fail to deliver value for the organization. Indeed, information technologies in and of themselves do not provide value or competitive advantage for organizations/firms[1] (Galliers, 2004, 2006). The commodification and standardization of systems ensure that virtually all organizations in an industry have access to similar solutions, at least over time. It is not so much what systems an organization has, but how these systems are employed, that brings value to a firm. As such, it is the act of strategizing about the systems (Galliers, 2007) and the resulting IS strategy, when effectively employed, that may distinguish the performance improvements attributable to IS from one firm relative to others.

* Corresponding author. Tel.: +1 2547103493.
E-mail addresses: dorothy_leidner@baylor.edu (D.E. Leidner), janice_lo@baylor.edu (J. Lo), d.preston@tcu.edu (D. Preston).

[1] An organization or a firm is a legal business entity, such as a corporation (Rumelt, 1991). We use the terms organization and firm interchangeably in this paper.

0963-8687/$ - see front matter © 2011 Elsevier B.V. All rights reserved.
doi:10.1016/j.jsis.2011.09.001

Even while much research and practitioner discourse have focused on the process of strategic IS planning (Premkumar and King, 1994; Ward and Peppard, 2002) and strategic IS alignment (Chan et al., 1997; Chan and Reich, 2007; Henderson and Venkatraman, 1999), less research has delved into the actual content of IS strategy per se. The foundational work on IS strategy, led most notably by Earl (1989) and Galliers (1991), defined IS strategy as comprised of an information strategy, an information technology strategy, an information management strategy, and a change management strategy. Collectively, these components represent the fundamental decision areas entailed in managing IS. Unfortunately, few attempts have been made to operationalize or measure these dimensions of IS strategy. As a result, they have not been widely incorporated into empirical studies, in spite of their extensive influence in conceptual work on IS strategy. Similarly, the strategic alignment research stream has mostly left the IS strategy content unexplored in and of itself, and has focused on the degree to which IS is strategically and structurally (Henderson and Venkatraman 1999; Reich and Benbasat, 1996), and more recently informally (Chan, 2002), aligned with the organization. Few studies carefully defined or operationalized the IS strategy component itself. Sabherwal and Chan (2001) is an important exception. They categorize IS strategy as being IS for flexibility, IS for efficiency, and IS for comprehensiveness. While their work makes important progress in the treatment of IS strategy, the categories themselves are not mutually exclusive and reflect more an emphasis on the attributes of a particular information system than a shared perspective of IS.

Recognizing that IS strategy remains a term that is widely utilized but still not fully understood nor readily measured, Chen et al. (2010) develop and operationalize a typology of three IS strategies. They define IS strategy as the organizational perspective on the investment in, deployment, use, and management of information systems. They suggest that an organization's IS strategy falls into one of three categories: IS Innovator, IS Conservative, or IS Undefined. Ultimately, the aim of any strategy is to guide an organization to achieve desirable performance results in its given business environment. Thus, it is imperative that as we seek to better delineate IS strategies, we also develop an understanding of the impact of IS strategies on the organization's performance and the conditions under which one strategy can outperform another. As such, the purpose of this paper is to develop and empirically test a theory of IS strategy and firm performance using the three IS strategies identified by Chen et al. We investigate the following questions: (1) what is the relationship of IS strategy to firm performance? and (2) under what environmental conditions might one IS strategy outperform another?

In doing so, our study contributes to the literature on IS strategy by identifying an extension to the existing typology, that is, by finding a fourth possible IS strategy, one which we term in the post hoc analysis as 'IS Ambidextrous'[2] and by providing empirical evidence of a relationship between IS strategy and firm performance. In addition to these contributions, we also explore the environmental conditions under which the IS strategies have the most impact on performance. Only in better understanding these relationships can we begin to understand the conditions necessary for the effective application of the strategies.

This paper is organized as follows. The next section provides an overview of the IS strategy typology introduced in Chen et al. (2010). We then develop our model and hypotheses. These are followed by the methodology. In the final section, we discuss the findings, their theoretical and practical implications, and the study's limitations and conclusions.

2. Background

This section proceeds by reviewing the prior definitions and conceptions of IS strategy that are found in the literature. It next summarizes the IS strategy typology proposed by Chen et al. (2010) and finally provides our own assessment of the said typology.

2.1. Definition and three conceptions of IS strategy

The ill-defined use of the term *strategy* has brought about confusion in the management field (Mintzberg, 1987). Mintzberg (1987), in an attempt to clarify the concept of strategy, offered five definitions of strategy, which have become the well-known five Ps for strategy. He defined strategy as (1) a plan – an intended course of action, (2) a ploy – a specific maneuver to outwit a competitor, (3) a pattern – a stream of realized ploys, (4) a position – a means of matching an organization with its external environment to find the right market niche, and (5) *a perspective* – a shared view of the organization that is ingrained among its members. This fifth definition of strategy reflects the organization's norms and values and how codes of behavior become rooted in organizational members (Mintzberg, 1987). While these definitions compete, according to Mintzberg, they also complement each other in that each P adds an important element to understanding strategy and helps address essential questions about organizations in general. The fifth definition, in particular, has the most potential to draw researchers closer to the most fundamental issues about organizations as instruments for collective action and to overcome the existing dilemmas in strategy research, among which is the clash between defining strategy *ex post* as actions and outcomes that have been realized and defining strategy as actions that are formally written and intended (Mintzberg, 1987). Adopting the fifth definition of strategy, Chen et al. (2010) define IS strategy as "the organizational perspective on the investment in, deployment, use, and management of information systems" (p. 237). 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

[2] Several scholars have suggested that firms should strive for ambidexterity (Tushman and O'Reilly, 1996; March, 1991; Galliers, 2006) and have called for exploration alongside exploitation (Galliers, 2004, 2006, 2007).

actions. 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 formally articulated (e.g. Slater, 2002). Even though organizations may not have formal, written IS strategies, they still use IS and make decisions regarding IS and the above definition of IS strategy reflects the belief that is shared among the upper echelon of the organization on how IS should be invested in, deployed, used, and managed (Chen et al., 2010). In this paper, we adopt Chen et al.'s definition of IS strategy as the organization's perspective on how to invest in, deploy, use, and manage information systems.

A review of the articles that specifically study IS strategy suggests that the concept of IS strategy has been inconsistently defined and measured (Chen et al., 2010). However, according to Mocker (2007) and Chen et al., the definitions implicitly employed in the articles can be categorized into three conceptions of IS strategy. The *first conception* is that IS strategy is the use of IS to support the business strategy. This conception answers the question: in what way can IS help the business gain and sustain a competitive advantage? It suggests that an IS strategy must be linked to an existing business strategy, which Mintzberg (1987) calls the fourth P, the position. The *second conception* suggests that IS strategy is the master plan of the IS function. This conception focuses on the strategy to run the IS function efficiently and effectively by identifying the assets, personnel, structures, monetary resources, and technologies that are required to implement the strategy. It is Mintzberg's first P – the plan – of the IS function. Unlike the first conception, the second conception does not require that IS strategy be developed from the business strategy, but rather in isolation and thus independent of the business strategy. Some researchers using this conception of IS strategy regard the strategy as the 'business strategy' of the IS functional unit (e.g. Adler et al., 1992; Ragu-Nathan et al., 2001; Tai and Phelps, 2000) because the IS function is described as itself a business, that is, a "business within a business" (Cash et al., 1992, p. 3) and an "organization within an organization" (Ahituv and Neumann, 1990). Hence, the second conception of IS strategy suggests that the IS strategy is independent and potentially distinct from the firm's overall business strategy.

The *third conception* suggests that IS strategy is the shared view of the role of IS within the organization. The third conception is a higher level conception that views IS strategy as an organizational perspective – Mintzberg's fifth P. In contrast to the first two conceptions where IS strategy is a plan or position, the third conception views IS strategy as a guide for future IS-related decisions and actions and is reflective of the top management's attitudes regarding IS (Chen et al., 2010; Mocker, 2007). This shared view among top management ensures that all organizational members are headed in the same direction (Tai and Phelps, 2000), which leads to general consensus among members regarding IS's role in relation to the rest of the organization (Pyburn, 1983). In this conception, IS strategy is inextricably incorporated into business strategy (Galliers, 2011), rather than aligned to it as in the case of the first conception. Chen et al.'s (2010) definition of IS strategy provided earlier is most in line with the third conception and lends itself to the development of a typology of three IS strategies: (1) IS Innovators, (2) IS Conservatives, and (3) IS Undefined.

2.2. IS strategy typology

The IS Innovator strives to be a leader in its industry in the development and use of information technology (IT) to solve business problems and create value for the firm. Seeking to capitalize on innovative IS initiatives for its overall benefit, the IS Innovator devotes resources to technology exploration. Although the IS Innovator is heavily involved in exploring the potential of emerging technologies, this does not imply that the IS Innovator is necessarily the first one to adopt each new innovation. As such, the IS Innovator strategy does not imply that a firm is always an early adopter of technology. Instead, the IS Innovator's strategic perspective is to constantly be searching for ways to innovate with IS and to apply those IS innovations that appear to have the highest potential of giving the organization an advantage over the competition. The IS Innovator strategy is likely to be seen in firms where IS is not only enabling business strategy but driving business strategy.

Contrary to the IS Innovator, the IS Conservative approaches IS strategy with less emphasis on exploring new technologies and more emphasis on exploiting existing solutions. The IS Conservative does not desire to establish itself as an IS leader nor does it strive to be the first to develop new IS initiatives within its industry. The IS Conservative eschews the risks associated with innovation by carefully assessing the necessity of an IS innovation and observing the overall tendency of other organizations in its industry. Under certain circumstances, it is possible that an IS Conservative may be the first one to adopt and use a new IS innovative technology or practice; however, this is not the long-term perspective or approach of the IS Conservative. Rather, the IS Conservative's overall goal is to conform to a conservative approach in which innovation is more likely to entail local rather than industry innovation (Leidner et al., 2010). As a result, the success of the IS Conservative strategy may be judged more by the efficiency of the IS department than by its innovativeness.

Finally, the IS Undefined characterizes an IS strategy that is ill-defined or unclear. An organization with an IS Undefined strategy does not have long-term IS goals nor does it consistently follow a set pattern regarding its IS strategy. While it might at first appear implausible that any firm would have an undefined IS strategy, practice suggests otherwise: according to Slater (2002), 39% of US companies have no IS strategy. Organizations with an IS Undefined strategy do not strategically utilize IS for either explorative (IS Innovator) or exploitative (IS Conservative) goals. Rather, these organizations are focused primarily on IS as an operation.

While Chen et al. (2010) propose these three strategies, there is conceivably a fourth strategy involving ambidexterity – both exploration (represented by the IS Innovator strategy) and exploitation (represented by the IS Conservative strategy). Indeed, scholars have suggested that IS should seek to be both explorative and exploitative (Galliers, 2006). While laudable

in principle, organizational research has shown that most organizations are unable to be both highly innovative and highly efficient (Abernathy, 1978; Benner and Tushman, 2003; Smith and Tushman, 2005). Thus, even while firms might seek to do both, it is likely that in practice, they are consistently better at one than the other.

2.3. Assessment of typology

In our study of IS strategy and firm performance, we choose to adopt Chen et al.'s (2010) typology of IS strategy for several reasons. First, it was developed after an extensive literature review and was published in a high impact journal – *MIS Quarterly*. This is a good indication that the typology has been meticulously scrutinized by knowledgeable researchers in the field. Second, it is the most recent conceptualization of IS strategy that takes into account a broad array of past research. Third, the typology does not reflect general business strategy, but is specific to the IS context. Fourth, the typology deals explicitly with IS strategic as opposed to earlier typologies that dealt with the strategic IS planning process (Earl, 1993). Finally, the typology is derived from what Mintzberg (1987) suggests as the definition that has the most potential to overcome the existing dilemmas in strategy research.

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 unifying 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 can 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, Chen et al. provide a conception that unifies other implicit definitions of IS strategy. The proposed conception is inclusive because it is defined as a shared perspective rather than, for example, as an explicit or formally written strategy. A shared organizational view is like an organizational culture; while culture does not necessarily exist in written form, it is a code that is understood by members and which drives their attitudes and behavioral patterns (Schein, 1985). Consistent with other recent work on IS strategy (Galliers, 2011), we believe that by defining IS strategy as a shared perspective, it has the most potential to encompass and unify other conceptions of IS strategy, which contributes to the furtherance of IS strategy research.

The proposed IS strategy typology is also based on prior IS research that has argued that IS basically has two primary functions – that it can be used as an enabler of innovation or that it can be used as a means of cost-reduction by enabling automation (e.g. Aral and Weill, 2007; Heath, 2009; Tai and Phelps, 2000; Weill, 1992). We believe that this typology serves as a parsimonious representation of distinct IS strategies and it is also grounded in the explorative-exploitative capability framework in the organizational learning literature (March, 1991).

Notwithstanding the contributions, there are some potential limitations with the proposed typology. We believe it remains to be seen whether the three types of IS strategies are comprehensive enough to categorize most IS strategies. While parsimony is a goal to strive for in categorizations, it should also be counterbalanced with comprehensiveness. Perhaps an ambidextrous IS strategy, which is a combination of innovative and conservative strategies, exists in a larger percentage of organizations than given credit for. For example, some firms may be middle-of-the-road on being both innovative and conservative; thus, if these firms were categorized as ambidextrous, there may be a larger percentage of ambidextrous firms than the above mentioned organizational studies have observed. Moreover, another potential strategy may exist, one that we might term as a "follow the economic cycle" strategy where a firm does have a well-defined strategy, but is inconsistent in its long-term approach to strategic IS investments and management. This strategy is one in which the firm takes an innovative approach during economic upswings and takes a conservative approach during downturns because many IT departments receive relatively low levels of funding during economic downturns and significantly more funding during upturns (Heath, 2009). Though limitations exist in the Chen et al. IS strategy typology, as with any work, we view this typology as an impetus from which to further the research work on IS strategy.

3. Research model and hypotheses

This section presents the research model and hypotheses development. To understand the impact of an IS strategy on firm performance, we draw upon the IS strategy typology explained above to develop a theory (depicted in Fig. 1) of IS Strategy and Firm Performance. This theory is intended to offer predictions for IS strategy in terms of its relationship with firm performance, a type III theory in Gregor's (2006) classification of theory types. (See Gregor (2006) for a complete description of the five categories of theories she proposes.) The theory is comprised of the three IS strategies and organizational performance under two conditions of environmental uncertainty. To investigate the first research question, we present and test the base model, which is composed of the three IS strategies and firm performance. An extended model, which adds each of the two environmental conditions (technological turbulence and market uncertainty) to the base model, is then provided and tested in response to the second research question. These two environmental conditions were selected in keeping with prior research on environmental dynamism (e.g. Droge et al., 2008; Lichtenthaler, 2009; Song et al., 2005), which will be discussed in the last section of the hypotheses development.

Attributes of IS strategy have been found to have an influence on organizational outcomes. Sabherwal and Chan (2001), for example, looked at the use of IS for efficiency, flexibility, or comprehensiveness and tied these IS attributes to attributes of

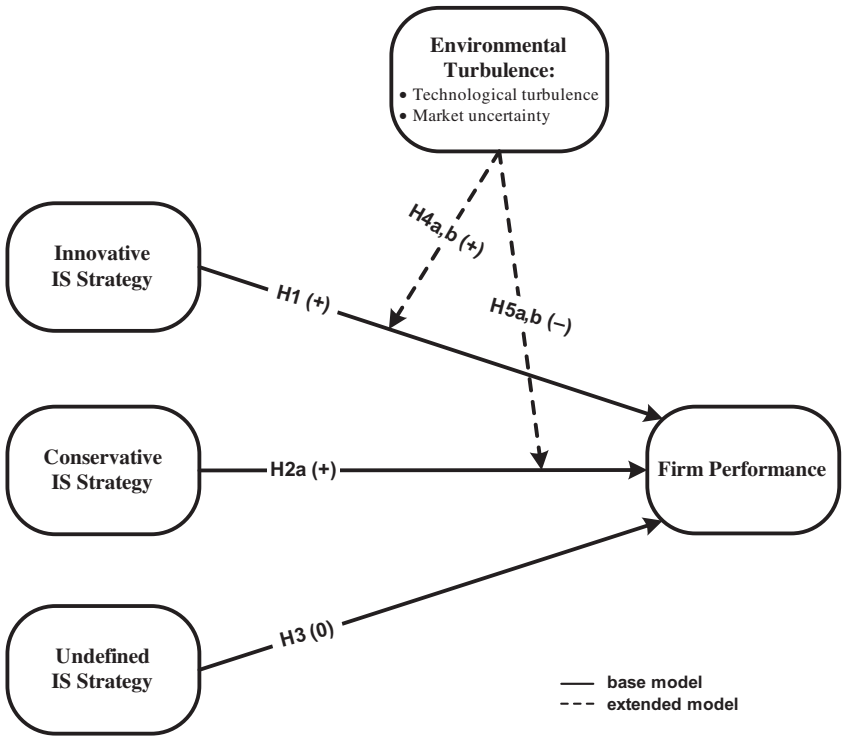

Fig. 1. Research model.

a firm's strategic focus, including defensiveness, risk aversion, aggressiveness, proactiveness, analysis, futurity. While the Sabherwal and Chan (2001) research makes significant head-way into linking IS strategy attributes to organizational strategies, the research stops short of linking IS strategies themselves to performance. Our hypotheses will therefore bridge this gap and link the three IS strategies identified by Chen et al. (2010) to organizational performance, i.e. the performance of the organization relative to its competitors. It should be noted that it is not merely the strategy content or the shared belief on how to manage IS that contributes to firm performance, but rather the consistent execution of that strategy. As we hypothesize the relationships between IS strategies and firm performance, we are assuming that the strategies have been consistently followed by the respective organizations. However, it can be argued that without having a strategy, a firm cannot effectively execute to one and therefore having a strategy is the first step towards achieving performance results.

Since the 1990s, interest in analyzing organizational performance under environments of rapid change has grown (e.g. Eisenhardt and Martin, 2000; Teece et al., 1997; Wheeler, 2002) as researchers feel the need to address firm performance in light of such environments. For example, many firms struggle to assimilate new technology given the rate at which information technologies change (Wheeler, 2002), and as the pace of technology increases, market preferences become increasingly dynamic as well. Recognizing the importance of addressing organizational performance in light of dynamic environmental conditions, our study empirically examines the impact of the three IS strategies on firm performance under two environmental conditions: technological turbulence and market uncertainty. Each of the hypotheses is discussed in the sections to follow.

3.1. The relationship between IS innovative strategy and firm performance

To help establish an association between IS strategy and firm performance, we start by briefly reviewing the link between business strategy and firm performance, which has already been substantiated in prior research. From the strategic management literature, for example, Beard and Dess (1981) found in a sample of US manufacturing firms that business strategy contributed significantly to variations in manufacturers' profitability. Likewise, the business innovation strategy in small and medium-sized enterprises (SMEs) was found to be strongly related to SME firm performance in a sample of 195 Australian firms (Terziovski, 2010). And in general, firms with formalized business strategies tend to perform better than those without strategies (Hahn and Powers, 2010; O'Regan et al., 2006).

Because IS strategy represents an organizational perspective on how to manage information systems for the organization, it is not farfetched, then, that like business strategy, IS strategy should also have an impact on organization-level outcomes. The past several decades have brought rapid changes in information technologies which have affected a wide range of industries, such as information services, financial institutions, communications, manufacturing, and software solutions. Information technologies have essentially permeated every sector of industry and marketplace, creating fast-paced, highly competitive, and globalized competition (Baskerville, 2006). Since change is increasingly driven by technological advance-

ments, almost notwithstanding industry sector, IS thus takes a leading role in helping to maintain the effectiveness of organizational processes and activities. Therefore, we believe that IS strategy, which guides the organization's management, investment, and use of information systems, should be associated with organizational performance. However, the degree of association between a firm's IS strategy and performance differs depending on strategy type as will be discussed next for each IS strategy in the typology.

The degree to which a firm may benefit from an IS Innovator strategy will depend, in part, on the extent to which a firm is able to usher the necessary skills and resources to successfully mobilize IS innovations to its advantage. It is the organization's ability to take advantage of unique IS opportunities, rather than the characteristics of the technology per se, that enable the organization to achieve performance gains (Chen et al., 2010; Galliers, 2004). Although pursuit of an innovative IS strategy is more expensive, involves greater risks (Chen et al., 2010; Galliers, 2004), and can potentially lead to greater undesirable outcomes (e.g. Leidner and Mackay, 2007) than adopting a conservative IS strategy, organizations that consistently pursue IS innovation as a strategy are more likely to have unique capabilities developed over time through experience or tinkering (Ciborra, 1992) with multifarious technologies that enable them to quickly assess the potential of emerging technologies to contribute to their business strategy. By continually pursuing IS innovation, the organization develops the managerial IS knowledge and skills, which enables the managerial capability to quickly move forward with IS innovation. This managerial IS capability becomes a source of competitive advantage over industry competitors (Li et al., 2006; Mata et al., 1995). Thus, one way that the IS Innovator strategy may be tied to firm performance is through the conferring of competitive advantage from unique IS management capabilities (Barney, 1991; Clemons, 1986; Mata et al., 1995). And because the IS Innovator strategy represents a consistent approach to IS innovation, even as IS Conservatives eventually follow suit by implementing similar systems, the IS Innovator will always be a step ahead, looking for the next innovation. In this way, the IS Innovator is the preferred strategy for an organization desiring a sustained advantage from IS (Piccoli and Ives, 2005).

A second way in which the IS Innovator strategy may be linked to firm performance is through the enablement of business innovations that create performance gains. In this case, the performance gains occur not from the IS innovation per se, but from the business innovations that the IS innovations enable. Similar to the platform organizational model proposed by Agarwal and Sambamurthy (2002), IT provides the assets and resources for business innovations across the organization. For instance, eBay, with its Internet auctions, had superior insight into how IT would fundamentally change an industry. This insight allowed it to stake out commanding positions within its industry (Carr, 2003). Innovative business strategies are often associated with firms that desire to gain competitive advantage and achieve performance goals (Walker, 2006; Walker et al., 2007). The adoption of business process innovations, which can be enabled by IS innovations, is a route to higher levels of organizational performance (Walker et al., 2007). In these firms, one expects to find an organizational culture that encourages risk-taking and exploration not just for the organization as a whole, but in the various business units as well. As a business unit that typically accounts for a large percent of the total capital expenditures of a firm, the IS department, if properly aligned with the business, would also be pursuing innovations that support the business innovations.

Thus, whether through the conference of competitive advantage through the development of unique IS capabilities or through the enablement of business innovations that grow opportunities, the IS Innovator strategy is predicted to be related positively to performance. Stated formally, we hypothesize:

H1. The IS Innovator strategy will be positively related to firm performance.

3.2. The relationship between IS Conservative strategy and firm performance

Conservative IS strategy focuses on maintaining stability and exploiting existing IS resources. Because conservatives are not seeking to be the first in their industry to try an innovation, it is unlikely that they will be able to gain short-term competitive advantage from a new system implementation. However, organizations do often benefit from being late majority adopters of technology (Rogers, 1962). Because the tendency of IS Conservatives is to wait for a technology to be proven efficient before they invest in it, they benefit from investing in established technology since waiting is likely to reduce the risk of investing in something that is technologically flawed or doomed to rapid obsolescence (Carr, 2003). IS Conservatives reap the benefits from vanilla solutions, less customization and standardized applications. Among the major benefits is that once solutions have become commonplace in an industry, they are often less expensive (Carr, 2003). The costs of acquiring solutions from the market are therefore less for the IS Conservative than the IS Innovator. Moreover, IS Conservatives can learn from the successes and failures of IS Innovators, implementing the best practices of the industry without incurring the costs of discovering the best practices since second-adopters of technologies benefit from the information gained based on the experiences of the early adopters (Hoppe, 2000). Thus, the overall costs of implementing IS should be less for the IS Conservative than for the IS Innovator.

While the IS Conservative strategy is not as glamorous as the IS Innovator, it is by no means inferior in terms of its potential impacts on firm performance. The IS Conservative strategy is tied to performance by (1) enabling an efficient, low-cost (relative to competitors) IS operation that continuously looks for ways to cut costs out of the delivery of IS systems and services and by (2) helping the organization itself create efficiency gains through the implementation of proven systems that enable an organization to achieve business efficiencies with IS solutions. Given the focus on exploiting technologies to reduce costs, it is expected that IS Conservatives will regularly revisit their infrastructure and look for ways to cut costs from the IS infrastructure without decreasing service levels.

For IS Conservatives to succeed, they must carefully monitor the IS Innovators in their industry and maintain awareness of technology developments. Due to its exploitative rather than explorative nature, the IS Conservative strategy is better served by formalized planning approaches (Philip, 2007). Prior research suggests that formalized planning processes, while often considered a bane for innovation, are advantageous for achieving gains in efficiency and control for an organization (Dawes et al., 1999). These efficiency gains reduce costs and allow for higher profit margins, therefore contributing to firm performance. Stated formally,

H2a. The IS Conservative strategy will be positively related to firm performance.

While H1 and H2a hypothesize positive performance effects from two different IS strategies, the means through which the two strategies are linked to performance are markedly different: the IS Innovator strategy is linked to firm performance through effectiveness gains whereas the IS Conservative strategy is linked to organizational performance through efficiency gains. Even though both strategies have a positive impact on performance, we believe that the IS Innovator strategy will have a stronger relationship with firm performance than the IS Conservative strategy will have. Because the IS Innovator strategy represents a consistent approach to IS innovation, whether through the development of unique IS capabilities or through the enablement of business innovations that grow opportunities, the IS Innovator will always be a step ahead, looking for the next performance-enhancing innovation. As such, the IS Innovator is more likely to provide an organization a sustained advantage within its market. Moreover, the impact that the introduction of a radical innovation with IT has on the value of a firm is likely to exceed that of the implementation of a standardized, off-the-shelf solution that is commonplace in an industry regardless of the efficiency that it brings. Prior research has shown that investors react positively to organizational announcements of investments in innovative types of IT, but not to investments in IT that have been commodified, regardless of the industry in which the organization belongs (Dos Santos et al., 1993). Therefore, innovative types of IT investments tend to increase the market value of a firm. Thus, we hypothesize

H2b. The relationship between IS Innovator strategy and firm performance will be stronger than the relationship between IS Conservative strategy and firm performance.

3.3. The relationship between IS Undefined strategy and firm performance

Unlike the Innovator or Conservative, the Undefined IS strategy is unclear and lacks order. An organization that does not have a well-defined strategy is not equipped with either explorative (innovative) or exploitative (conservative) goals for IS (Chen et al., 2010). Any observable pattern in IS expenditure is random rather than volitional. Although lacking foresight, it is possible that fortuitous circumstances create a situation where an IS Undefined is able to achieve major performance gains from IT. Indeed, much of the early case studies on IS for competitive advantage highlighted organizations whose desperate attempt to solve a local operational problem resulted in a system that changed, and in some cases redefined almost entirely, competition in an industry. For example, the Sabre system, initially developed to help American Airlines improve the way in which it managed reservations and allocated capacity, radically altered the nature of competition in the airline industry, even contributing to the bankruptcy of several airlines that could not compete quickly enough (Copeland and McKenney, 1988). However, while such serendipitous competitive advantages may be created through IS without intent, there are inherent risks in being an IS Undefined that render it highly problematic to expect a consistent relationship of IS Undefined to firm performance.

Because there is no strategy, firms that are IS Undefined do not, or cannot, consider the necessary human and technology resources needed to effectuate their IS strategy. Thus, when an opportunity does arise to apply a new IS solution, firms may find themselves without the necessary skills or knowledge to apply the solution effectively or to even understand the potential of the IS. Without the requisite knowledge and skills, IS Undefined organizations will be unable to capitalize on IS investments (Galliers, 2004). An ill-defined IS strategy is also likely to create chaos and uncertainty within the organization. Business units will not know what to expect of IS given that there does not appear to be a consistent pattern of IS investment. In such organizations, Chief Information Officers (CIOs) will then be challenged to nurture relationships with business units that lack understanding and appreciation for the potential of IS. It will be almost impossible to establish alignment with the business absent the shared understanding between the business units and IS (Reich and Benbasat, 1996) and without the alignment, it is not likely that the firm will experience performance gains from IS (Chan et al., 1997). We thus hypothesize:

H3. The IS Undefined strategy will be unrelated to firm performance.

3.4. The moderating effect of environmental conditions on IS strategy and firm performance

The past two decades have brought rapid changes in technology which has affected a wide range of industries, such as information services, financial institutions, communications, software solutions. Due to the rapidly changing technology and the subsequent changes in market dynamics, it is important to consider environmental dynamism in a theory involving IS strategy and firm performance. Environmental dynamism, elsewhere referred to as environmental turbulence (Slater et al., 2006), competitive uncertainty (Simerly and Li, 2000), and industry clockspeed (Fines, 1998; Nadkarni and Narayanan,

2007), characterizes the degree and instability of changes that a firm must face in its competitive environment (Eisenhardt and Martin, 2000; Simerly and Li, 2000). Two broad types of dynamic environmental conditions have been alluded to in the literature – one relating to the market and another relating to technology changes in the industry (Eisenhardt and Martin, 2000; Fines, 1998; Lichtenthaler, 2009; Teece et al., 1997). We capture these two components of environmental dynamism in our study by examining technological turbulence and market uncertainty. In this study, technological turbulence refers to the extent to which the technological environment is rapidly changing, while market uncertainty refers to the extent to which customer preferences and needs are dynamic. The dynamic capabilities theory provides insights into the relationship between environmental dynamism and firm performance.

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 environments (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.

In terms of IS strategy, organizations that have opportunities to consistently pursue the IS Innovator strategy will be more likely to develop unique capabilities over time through experience or tinkering (Ciborra, 1992) with multifarious technologies. This experience is a learning mechanism that facilitates their development of both the tacit and explicit knowledge and organizational capability to quickly assess the potential of emerging technologies to contribute to their business strategy. In this way, a continuous pursuit of an innovative IS strategy would enable an organization to develop dynamic capabilities, which is then used to respond to rapidly changing environments, whether those environments are characterized by high technological turbulence or highly uncertain markets. IS Innovators will thus be more prepared to grasp the changes, turn them into opportunities, and thrive in such environments, even while their competitors may not have the capabilities to respond to such dynamic environments. We thus hypothesize:

H4a. The relationship between the IS Innovator strategy and firm performance will be moderated by technological turbulence such that the relationship will be more pronounced in an environment with greater technological turbulence.

H4b. The relationship between the IS Innovator strategy and firm performance will be moderated by market uncertainty such that the relationship will be more pronounced in an environment with greater market uncertainty.

Unlike firms that consistently pursue the IS Innovator strategy, firms that steadily pursue the IS Conservative strategy will have fewer opportunities to develop unique capabilities over time since the focus of the IS Conservative is on maintaining stability and exploiting existing IS resources. Although the IS Conservative will likely have built a system of codified knowledge and routinized processes that increase the firm's operating efficiency, it would not have gained the experience of "explorative" learning in dealing with innovative IS initiatives as would the IS Innovator. As such, the IS Conservative is not as likely to develop the dynamic capabilities that the IS Innovator is to face rapidly changing environments. Furthermore, as previously mentioned, the IS Conservative strategy is well suited to formalized planning approaches. Formalized planning approaches are often accompanied by formalized rules and procedures that are followed when considering new IS projects. Yet such rules and procedures can militate against the development of an organization's dynamic capabilities in that they force standardization and routinization, both of which run counter to dynamism. While companies with greater dynamic capabilities are able to quickly respond to changes and thrive in turbulent environments, firms with less dynamic capabilities would be less able to quickly respond to such environments. Thus, the performance gains that IS Conservatives are able to reap in less dynamic environments would be reduced in more dynamic environments. We hypothesize the following:

H5a. The relationship between the IS Conservative strategy and firm performance will be moderated by technological turbulence such that the relationship will be reduced in an environment with greater technological turbulence.

H5b. The relationship between the IS Conservative strategy and firm performance will be moderated by market uncertainty such that the relationship will be reduced in an environment with greater market uncertainty.

4. Research methodology

To test the research model and hypotheses, we collected survey data from chief executive officers (CEOs) from US based credit unions using a questionnaire. We contend that the methodological approach undertaken for the current research study is appropriate to understand the outlined phenomenon of interest. Quantitative research methods (e.g., survey methods analyzed via structural equation modeling) are highly useful for evaluating and testing empirical models such as the pro-

posed research model in the current study. However, quantitative methods have intrinsic limitations with regard to uncovering richer insight into research phenomenon that can be better addressed via qualitative research. We acknowledge that qualitative methods in conjunction with quantitative methods would provide an optimal approach to study the phenomenon of interest. However the application of pluralistic methods can be difficult to achieve (Mingers, 2001). As such, as such researchers must often choose the most appropriate and practical approach with regard to research methodology. A single industry study was chosen to control for exogenous factors that could vary across industry. For instance, prior research has found that the influence of an organization's business strategy on firm performance can vary according to industry (Hambrick, 1983). Although credit unions are non-profit institutions that differ in several aspects from for-profit institutions, these financial institutions also are required to continually seek higher levels of organizational performance (Brannen and Ibrahim, 2010).

Surveys were sent to a list of credit union CEOs within US-based organizations via electronic mail (from June through August 2010). The name of selected credit union CEOs and credit union's website address were derived from the National Credit Union Administration (NCUA) online directory and the Dun & Bradstreet Million Dollar Database (D&B Database). CEO email addresses were derived either directly from the credit union website or indirectly by requesting the CEO's email address through a general information email address when provided on the credit union website. General information email addresses were used in other cases. A total 283 of 5598 sent surveys were returned for a response rate of 5.1%. Of the 283 returned surveys, 263 were considered complete and usable based on the following criteria: the survey items were answered for the constructs in the model; the respondent was identified as the highest-ranking executive within the organization; and the respondent had worked in his/her current position within the organization for a minimum of 6 months. Appendix B presents the characteristics of the CEOs and credit unions in the sample and a summary of the descriptive statistics of the variables used in the study. The CEO was chosen as the respondent for this study to provide respondent validity and reduce bias. Credit unions tend to be small to mid-sized organizations and as such, the CEO tends to have a hands-on approach. Credit union CEOs are well positioned to understand core operations and phenomenon related to strategy including IS strategy. Furthermore, the CEO should be at a good vantage point to provide an informed yet unbiased account of the organization's IS strategy.

While the response rate is typical of research involving high ranking executives, (Braunscheidel and Suresh, 2009), we examined the potential of non-response bias through two approaches. We first assessed the non-response bias (via ANOVA) by comparing the assets, number of members, and number of full-time employees for the 263 responding organizations to that of the average for all listed organizations in the NCUA Database. The results of this process revealed no significant differences between responding and non-responding organizations and thereby suggest that responding organizations are representative of other firms in the same industry. Next, we compared the average measures (via ANOVA) for each of the study's constructs between early and late respondents. This assessment revealed no differences between early and late respondents.

The questionnaire contains a number of existing validated instruments that were adapted to the current context. The IS strategy items were adapted from Chen et al. (2010) who developed and validated the items using a sample of CIOs and top business executives from 174 organizations and shown to exhibit construct validity. Items measuring environmental turbulence and organizational performance were also adapted from existing sources, as shown in Appendix A. All constructs were measured using multi-item scales. We discuss the definition, operationalization, and source of each construct in the following section.

An *Innovative IS Strategy* is defined as an IS strategy that represents an organizational perspective to be an IS leader within its industry by continuously seeking to be innovative through new IS initiatives. This construct is measured through the following three items: (1) Our organization is a leading IS Innovator in our industry; (2) Our organization believes in being first in the industry in developing new IS initiatives even if not all of these efforts prove to be highly profitable; (3) Our organization responds rapidly to early signals concerning areas of opportunity for IS (Chen et al., 2010).

A *Conservative IS Strategy* is defined as IS strategy that represents an organizational perspective to create value through a safe and stable approach by effectively refining and improving existing IS practices. This construct is measured though the following three items: (1) Our organization follows a safe and stable approach to developing new IS initiatives; (2) Our organization 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 organization (Chen et al., 2010).

An *Undefined IS Strategy* is defined as an IS strategy that represents an organizational perspective which does not have clear long-term IS goals nor does it have a consistent pattern of behavior. This construct is measured though the following three items: (1) Our organization does not have definitive long-term IS goals; (2) Our organization does not have an articulated IS strategy; (3) Our organization does not have a consistent pattern of behavior regarding IS (Chen et al., 2010).

Organizational Performance is defined as the performance of the organization relative to industry competitors. This construct is measured though the following three items: (1) effectiveness of strategic planning; (2) revenue growth; (3) market growth. These components of performance have been documented within the extant IS literature (Chan et al., 1997; Nandakumar et al., 2010).

Market Uncertainty, defined as the extent to which the customer preferences and needs are dynamic, is measured via the following questions: (1) In our local market, customer preferences change often over time; and (2) Our customers tend to look for new services all the time (Jaworski and Kohli, 1993; Sethi and Iqbal, 2008). *Technology Turbulence*, defined as the extent to which the technological environment is rapidly changing, is measured via the following questions: (1) The technology in our market is changing rapidly; and (2) Competitors in our local market have been aggressively adopting advanced information technologies (Jaworski and Kohli, 1993; Sethi and Iqbal, 2008).

5. Data analysis and results

To establish the nomological validity of the research model, we employed PLS (using the SmartPLS software; Ringle et al., 2005), a latent structural equations modeling technique that utilizes a component-based approach to estimation. The PLS technique was chosen to conduct the analyses because of its ability to handle a wide range of sample sizes and constructs with fewer items (Hair et al., 2009). The psychometric properties of all scales were assessed within the context of the structural model through assessment of discriminant validity and reliability. All variables in the research model were modeled as reflective constructs. The psychometric properties of the scales were assessed in terms of item loadings, internal consistency, and discriminant validity. Item loadings and internal consistencies greater than 0.70 are generally considered acceptable (Fornell and Larcker, 1981). As can be observed from the factor analysis results in Table 1 and composite reliability scores in Table 2, scales used in the study largely meet these guidelines. We note that one item for the Conservative IS strategy construct (ConservStrat1 – our organization follows a safe and stable approach to developing new IS initiatives) was dropped due to an insufficient loading on its respective construct. We observe that the other two items for this construct have sufficient loading levels. To assess discriminant validity (Chin, 1998), (1) indicators should load more strongly on their corresponding construct than on other constructs in the model and (2) the square root of the average variance extracted (AVE) should be larger than the inter-construct correlations. As can be seen by the factor analysis results, items load more highly on their own construct than on other constructs. Furthermore, as shown by comparing the inter-construct correlations and AVE (italicized leading diagonal) in Table 2, all constructs share more variance with their indicators than with other constructs. Thus, these results point to the discriminant validity of the constructs in the model.

Since the measurement validity and reliability were supported, in the next step, we also used SmartPLS (Ringle et al., 2005) to test the structural model. The significance of the paths was determined using the *t*-statistic calculated with the bootstrapping technique. We included a series of organizational characteristics (total assets, number of members, number of employees, and geographic location) and individual characteristics of the responding CEO (age, gender, organizational tenure, and tenure in the CEO position) as control variables for organizational performance. When included in the model, none of these control variables were observed to have a significant impact on organizational performance and were thereby dropped from the model. The results of the direct relationship of each of the IS strategies and organizational performance are presented in Fig. 2.

We tested H2b, which stated that the relationship between the IS Innovator strategy and firm performance will be stronger than the relationship between the IS Conservative strategy and firm performance, using hierarchical linear regression. The standardized beta is .182 for the IS Conservative strategy's relationship with firm performance and .271 for the IS Innovator. The analysis showed a change in R^2 of .073 (F change = 21.287, p = .000) when the IS Innovator strategy was added to

Table 1
Results of factor analysis.

	InnovStrat	ConservStrat	UndefStrat	OrgPerf	MarkUncert	TechTurb
InnovStrat1	*0.897*	0.078	−0.414	0.334	0.136	0.063
InnovStrat2	*0.867*	0.010	−0.313	0.211	0.151	0.156
InnovStrat3	*0.868*	0.061	−0.403	0.236	0.153	0.133
ConservStrat2	0.077	*0.834*	−0.190	0.221	−0.012	−0.013
ConservStrat3	0.017	*0.774*	−0.211	0.150	−0.042	0.042
UndefStrat1	−0.391	−0.213	*0.924*	−0.280	−0.117	−0.128
UndefStrat2	−0.436	−0.217	*0.906*	−0.288	−0.163	−0.108
UndefStrat3	−0.344	−0.238	*0.855*	−0.229	−0.060	−0.024
OrgPerf1	0.289	0.192	−0.282	*0.830*	−0.043	−0.049
OrgPerf2	0.164	0.122	−0.146	*0.712*	−0.016	−0.085
OrgPerf3	0.227	0.215	−0.238	*0.794*	−0.094	−0.209
MarkUncert1	0.135	−0.090	−0.101	−0.059	*0.864*	0.239
MarkUncert2	0.154	0.032	−0.119	−0.061	*0.872*	0.309
TechTurb1	0.119	−0.033	−0.077	−0.082	0.290	*0.888*
TechTurb2	0.107	0.065	−0.097	−0.175	0.261	*0.859*

Table 2
Inter-construct correlations.

	Composite reliability (# items)	InnovStrat	ConservStrat	UndefStrat	OrgPerf	MarkUncert	TechTurb
InnovStrat	0.909 (3)	*0.877*					
ConservStrat	0.785 (2)	0.061	*0.804*				
UndefStrat	0.924 (3)	−0.436	−0.248	*0.896*			
OrgPerf	0.823 (3)	0.302	0.233	−0.297	*0.781*		
MarkUncert	0.860 (2)	0.167	−0.032	−0.127	−0.069	*0.868*	
TechTurb	0.867 (2)	0.129	0.015	−0.099	−0.144	0.316	*0.874*

Note: The italicized numbers on the leading diagonal are the square root of the AVE.

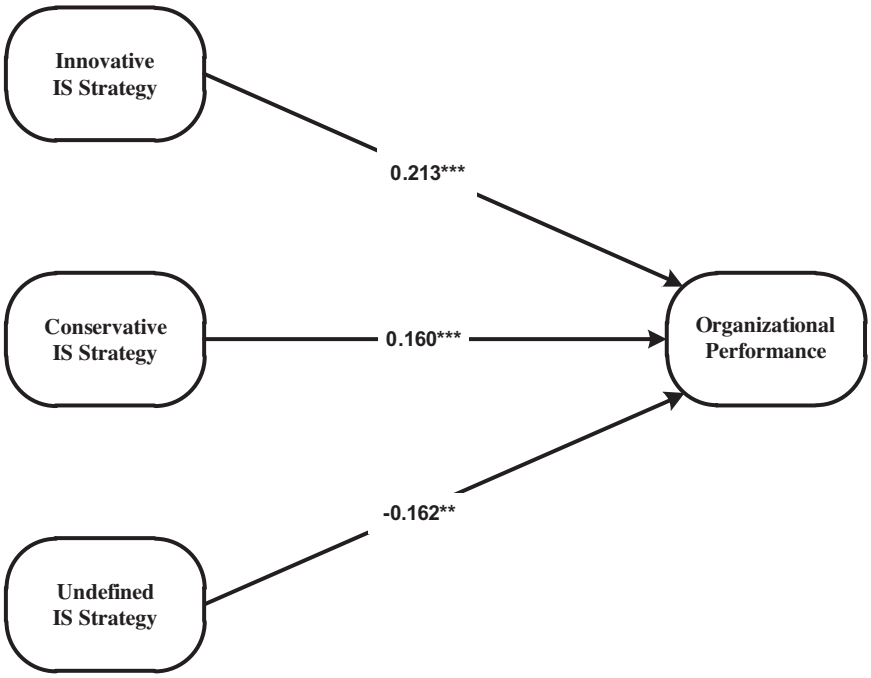

Fig. 2. Structural model.

the model with the IS Conservative strategy (original R^2 of .031). This signifies that the IS Innovator strategy explains above and beyond what the IS Conservative strategy can explain for firm performance, thereby supporting H2b.

In addition to testing the direct main effects of each IS strategy on organizational performance, we also examined the influence of two aspects of environmental turbulence as potential moderators to the relationship between IS strategy and firm performance. These moderating effects were tested as part of the structural model. Testing the moderating effect of environmental turbulence involves a comparison of a main effect model versus a moderating effect model. To conduct this analysis, we examine each moderating variable separately with an interaction term that was individually added to the structural model. For instance, for the examination of technological turbulence, we conducted two separate moderating tests, which included the introduction of an interaction term between technological turbulence and the Innovative and Conservative IS strategy. The same process was conducted to assess market uncertainty as a moderating variable. The interaction (or moderating) variable between each aspect of environmental turbulence and each IS strategy was computed in SmartPLS (Ringle et al., 2005). The results indicated that technological turbulence does not moderate the relationship between either the Innovative or Conservative IS strategy on organizational performance. In comparison, market uncertainty was observed to have a moderating effect on one aspect of the relationship between IS strategy and organizational performance. While market uncertainty was not observed to moderate the IS Innovator – firm performance relationship, market uncertainty does moderate the relationship between the IS Conservative and firm performance. In accordance with our hypothesis, we observed that this is a negative interaction effect ($\beta = -0.140$, $p < .05$, $\Delta R^2 = 1.7\%$). To further examine this interaction effect, we tested whether the variance explained due to the moderated effect is significant beyond the main effects using the following F-statistic (Carte and Russell, 2003): $F[df_{\text{interaction}} - df_{\text{main}}, N - df_{\text{interaction}} - 1] = [\Delta R^2/(df_{\text{interaction}} - df_{\text{main}})]/F[(1 - R^2_{\text{interaction}})/(N - df_{\text{interaction}} - 1)]$. The F-statistic was found to be significant (5.29; $p < 0.01$). Therefore, these findings show that the interaction term between market uncertainty and the Conservative IS strategy significantly increases the model R^2 from that found with just the main effects. As we hypothesized, this interaction is negative; therefore, the results indicate that the impact of an IS Conservative strategy on organizational performance will be reduced in an environment with greater market uncertainty. Table 3 provides a summary of the hypotheses results for this study.

5.1. Post hoc analysis

Even though scholars have suggested that firms should seek to be ambidextrous (Galliers, 2006), organizational research has shown that in practice most organizations are unable to be simultaneously both highly innovative and highly efficient (Abernathy, 1978; Benner and Tushman, 2003; Smith and Tushman, 2005). Indeed, in our current sample, only 16% or 6% of the 263 firms rated high on being both IS Innovative and IS Conservative (4 or more on a 1–5 scale). It is possible that while a firm seeking to be ambidextrous may be moderate in both exploration and exploitation, i.e. both a moderate IS Innovator and

Table 3
Summary of hypotheses tests.

Hypotheses	Support for hypotheses
Direct effects	
H1: The IS Innovator strategy will be positively related to firm performance	Finding Supported
H2a: The IS Conservative strategy will be positively related to firm performance	Finding Supported
H2b: The relationship between IS Innovator strategy and firm performance will be stronger than the relationship between IS Conservative strategy and firm performance	Finding Supported
H3: The IS Undefined strategy will be unrelated to firm performance	Negative Relationship Observed
Moderating effects	
H4a: The relationship between the IS Innovator strategy and firm performance will be moderated by technological turbulence such that the relationship will be more pronounced in an environment with greater technological turbulence	No Relationship Observed
H4b: The relationship between the IS Innovator strategy and firm performance will be moderated by market uncertainty such that the relationship will be more pronounced in an environment with greater market uncertainty	No Relationship Observed
H5a: The relationship between the IS Conservative strategy and firm performance will be moderated by technological turbulence such that the relationship will be reduced in an environment with greater technological turbulence	No Relationship Observed
H5b: The relationship between the IS Conservative strategy and firm performance will be moderated by market uncertainty such that the relationship will be reduced in an environment with greater market uncertainty	Finding Supported

IS Conservative, rather than high on both. Therefore, classifying these middle-of-the-road firms as ambidextrous could produce a larger, distinct group of hybrid organizations than suggested in the organizational research. Using this conceptualization of IS ambidexterity, we conducted a post hoc analysis to determine how many firms in our sample could be considered ambidextrous and how these ambidextrous firms performed in relation to firms employing the three IS strategies in the typology.

We classified a firm as IS Undefined if it rated, on average, highest on the IS Undefined items. The remaining firms are classified as IS Innovator, IS Conservative, or IS Ambidextrous. Firms were classified as ambidextrous if their ratings for both the innovator and conservative strategy items were, on average, above the sample means for IS Innovator and IS Conservative, respectively. Otherwise, they were classified as either innovator or conservative depending on the strategy on which they rated higher. (See Appendix A for the list of items measuring IS strategies adopted from Chen et al.). From our sample of 263 organizations, the classification resulted in 26 IS Innovators, 132 IS Conservatives, 80 IS Ambidextrous, and 25 IS Undefined. The average firm performance of each IS strategy group varied as well, with the IS Undefined having the lowest average performance, as expected. However, the highest performance is found for the IS Ambidextrous group, followed by the IS Innovators, and then the IS Conservatives. Perhaps this indicates that firms with an IS Ambidextrous strategy spend more effort planning in order to achieve both exploration and exploitation; more intense planning efforts have been shown to generate higher success of the IS plan (Earl, 1993). Table 4 provides descriptive statistics and compares the results of the four IS strategies discussed.

To determine whether the differences in the means of firm performance for each group of IS strategies were statistically significant, we used an ANOVA test with Scheffé's method. The Scheffé method is used for multiple comparisons and is suitable whether sample sizes are equal or unequal (Garson, 2009). 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 Conservatives was statistically significant, as was the difference between IS Ambidextrous and IS Undefined. Table 4 summarizes the results of the comparison.

6. Discussion

Given the influence that an IS strategy has on the potential value IS brings to an organization and the nebulous understanding of the concept of IS strategy, it is important to conceptualize, operationalize, and empirically test the various types of IS strategy. In this paper, we have built upon a recent typology of IS strategy and are the first to empirically test this typology of IS strategy and incorporate the typology into a model of IS Strategy and Firm Performance. We are also the first to explore the moderating effect of environmental conditions on the relationship between IS strategy and firm performance.

Table 4
Summary of post hoc analysis.

IS strategy	Count	% of sample	Comparison of firm performance			
			Mean	Std. dev.	IS strategy	Sig.
IS Innovator	26	9.9	3.45	0.525		
IS Conservative	132	50.2	3.25	0.685		
IS Undefined	25	9.5	2.80	0.827		
IS Ambidextrous	80	30.4	3.58	0.672	IS Conservative	0.009
					IS Undefined	0.000

Furthermore, this study contributes to the literature on IS strategy by offering a promising extension to the existing typology, that is, by identifying a fourth possible IS strategy – the IS Ambidextrous strategy.

In general, we found that a defined IS strategy is positively associated with organizational performance. As hypothesized, both an Innovative and a Conservative IS strategy are positively related to firm performance thus providing support to H1 and H2a, respectively. However, we found that, as hypothesized in H2b, an IS Innovator strategy is more strongly related to firm performance than is an IS Conservative strategy ($\beta = 0.213$ versus $\beta = 0.160$, respectively). In contrast to the IS Innovator and IS Conservative strategies, we hypothesized (H3) that an Undefined IS strategy would be unrelated to firm performance. The results indicate that instead of no relationship, the Undefined IS strategy has a negative relationship with firm performance ($\beta = -0.162$).

In addition, based on our examination of the potential moderating effects of environmental dynamism, we found that an external environment with technological turbulence has no discernable effect on the way in which IS strategy relates to organizational performance (H4a and H5a). However, an external environment characterized as high in market uncertainty did influence the relationship of strategy to performance: although market uncertainty does not appear to augment the relationship between the IS Innovator and firm performance (H4b), it does appear to hinder the ability of the IS Conservative to positively relate to firm performance (H5b).

Finally, the post hoc analysis revealed that when firms that are both moderately innovative and conservative are considered ambidextrous, they compose a large proportion of the sample and, on average, tend to perform better than firms that implement any other IS strategy in the typology.

6.1. Implications and future research

Since our analysis demonstrates that having a defined IS strategy (e.g. the IS Innovator or IS Conservative), as opposed to not having a defined strategy (e.g., the IS Undefined), is positively associated with firm performance, one might wonder why any firm might have an undefined IS strategy. We suggest several explanations. Organizations that pursue an IS Innovator strategy but are unable to derive advantages relative to competitors are unlikely to continue very long with this strategy and may well find themselves in a state of indecision if they are unable to devote the resources and managerial skills necessary to support the IS Innovator strategy. The IS Innovator carriers a risk of failure which can create backlash for the IS department and the CIO (Leidner and Mackay, 2007). Thus, one possibility is that firms that attempt an IS Innovator strategy, and fail, find themselves at least temporarily in a state of IS Undefined. It is also possible that firms with relatively recent CIO appointments are also in a state of strategic uncertainty until the CIO has had time to address the most pressing of problems facing the IS department. Firms that have experienced consistently poor performing IS operations or Big Bang failures frequently respond by bringing in a new CIO to implement radical change (Leidner and Mackay, 2007). Strategy might be the very last thing on the CIO's mind as he/she struggles to bring operations to satisfactory levels and improve the morale of IS personnel. Only after the CIO has been able to provide solutions to the operational and personnel problems, as well as establish relationships with business units, can he/she focus on the strategic aspect (Leidner and Mackay, 2007).

Other possible explanations for the lack of a defined IS strategy include mergers and acquisitions (Robbins and Stylianou, 1999; Merali and McKleman, 1993), which often leave IS departments facing an operational chaos as they strive to consolidate systems, and inadequate decision making authority, or ability, on the part of the CIO (Preston et al., 2008). Moreover, some organizations might not have well defined organizational strategies, making it all the more likely that a firm's IS strategy will also be ill-defined. In such cases, it might be difficult if not impossible for the CIO to spearhead an IS strategy because the IS strategy, by nature, must take into account the organizational strategy. Some evidence of this was provided in the interviews reported by Leidner and Mackay (2007) in which a CIO new to his position quickly discovered that the organization itself had such an ill-defined strategy that he was unable to craft an IS strategy until he had convinced the CEO of the need for a more clearly defined organizational strategy. Finally, the economy might explain some of the occurrence of IS Undefined. Perhaps during the weak economy, firms are in such a state of uncertainty about their future that they have abandoned existing IS strategies, or essentially put them on hold (Leidner et al., 2003) and are in a "wait and see" mode. Ironically though, the data suggest that this is possibly the worst approach to take during the recession because undefined or inconsistent IS strategies are negatively associated with firm performance.

Future research could examine these, and other, explanations for the presence of IS Undefined strategies in organizations as well as examine the consequences of being IS Undefined for short versus long periods of time. Practice-oriented research could focus on research that helps us understand the steps CIOs can take to ensure successful development of, and effectuation of, IS strategies. Both streams of work would benefit from field studies of CIOs that had overseen periods where their departments were in a state of strategic uncertainty with no clearly defined strategy. Another fruitful avenue for examining the reasons for and consequences of being IS Undefined would be to perform case studies of IS departments over time, looking for changes in IS strategies.

Not only do the reasons behind the IS Undefined strategy warrant further research, but so too does the negative relationship observed between the IS Undefined strategy and performance merit further exploration. Perhaps the relationship is negative, as opposed to simply being unrelated, because firms with IS Undefined strategies mismanage resources more so than they lack resources: for example, firms might invest substantial amounts in a certain new technology that never gets used, and hence lose money. Or firms that are IS Undefined might not be investing in something that would be extremely useful

and thereby letting the opportunity be lost even as competitors invest in the technology. This mismanagement of resources and opportunities might then be detrimental to performance.

The current study has assumed that the IS strategies have been consistently followed by their respective organizations. Even though it does not establish that the sheer presence of a strategy can benefit an organization, it does find that significant relationships exist between IS strategy and performance since a firm is unlikely to effectively execute to a strategy without first having one. The finding that a negative relationship exists between the IS Undefined strategy and firm performance circumstantiates this – firms without a defined IS strategy are at a disadvantage. Further research is needed to identify the mechanisms through which the relationship between IS strategies and firm performance exists, that is, the mediators of this relationship. A simple starting point to this investigation may lie in the dynamic capabilities perspective, which can be used to identify the particular organizational capabilities that mediate IS strategy and performance. It is true that strategy itself does not necessarily directly lead to performance gains, but that it is the firm's consistent enactment of the IS strategy that aids the development of certain dynamic capabilities for the firm, which in turn create gains in efficiency and effectiveness that contribute to the firm's overall performance. For instance, absorptive capacity (Cohen and Levinthal, 1990) and agility (Brown and Eisenhardt, 1997; Overby et al., 2006; Sambamurthy et al., 2003) are two dynamic capabilities through which IS strategy can impact firm performance and these capabilities then contribute to the firm's competitive advantage, according to the dynamic capabilities perspective.

The environmental conditions of technological turbulence and market uncertainty were not found to significantly moderate the relationship between the IS Innovator strategy and firm performance. Although a significant finding was not observed as had been hypothesized, the non-finding nevertheless sheds light on the resilience of the IS Innovator strategy. It suggests that whether the external environment is technologically turbulent or the market is highly uncertain, the performance of the firm employing an IS Innovator strategy will be virtually unaffected. That is, the IS Innovator strategy will be strongly positively related to firm performance regardless of the external environment in which the firm is operating. On the contrary, the story is somewhat different for the IS Conservative. Although technological turbulence did not significantly moderate the relationship between the IS Conservative strategy and firm performance, market uncertainty was a significant moderator on this relationship. This suggests that the IS Conservative strategy is not as resilient as the IS Innovator strategy in the face of dynamic environmental conditions, specifically under conditions of market uncertainty. When the market is highly uncertain, the performance of the firm employing an IS Conservative strategy will be impeded.

The non-significant moderator relationships potentially lead to an interesting area for future research. In the hypotheses development, we had argued that the innovative IS strategy enhances an organization's development of dynamic capabilities, thus leading to significantly better performance in highly dynamic environments as opposed to stable environments. However, without the evolution of dynamic capabilities from activities relating to the IS strategy, it is understandable that the moderating relationships would be non-significant. As such, dynamic capabilities would act as a mediator between IS strategy and performance. This leads to such questions as: How do the IS strategies influence the organization's development of dynamic capabilities? According to dynamic capabilities theory, firms with these capabilities are more likely to maintain a sustained competitive advantage in uncertain environments. Therefore, a closer examination of this mediating concept is warranted. Future research should also assess whether different dynamic capabilities, such as absorptive capacity and agility, differentially impact performance in dynamic environments, which capability is better at sustaining performance, and under what conditions might one capability be more useful than another?

Although the two conditions of environmental turbulence, according to some literature on organizational economics, can potentially be treated as mediators or antecedents of IS strategy (e.g. Aldrich and Wiedenmayer, 1993; Mason, 1939), we elected to treat them as moderators, in accordance with much of the literature on the dynamic capabilities perspective. Future research should test the direct effect of environmental conditions and also identify and test other possible antecedents to IS strategy.

Additionally, the results of the post hoc analysis revealed some interesting insights regarding IS strategies and firm performance. The finding that only 6% of the sample can be classified as both highly innovative and highly conservative is consistent with extant organizational research; however, if firms that are both moderately innovative and conservative are considered ambidextrous, then the percentage of firms in the sample meeting this criterion increases to 30%. Thus, it appears that firms *do* seek to be ambidextrous, as some scholars have recommended, but are unable to excel at both simultaneously. Future research might seek to compare via surveys or case studies those firms that are able to achieve ambidexterity with those that try but fail. Such work would be helpful in understanding the resources and capabilities necessary to be ambidextrous. Notwithstanding most firms' inability to be excellent at both strategies, if they merely rank above average on both innovative and conservative strategies, they will tend to perform better than firms that focus on either one or the other, as shown in Table 4 of the post hoc analysis results. Therefore, firms that attempt to be both innovative and conservative appear to outperform those that do not. Future research should extend the Chen et al. IS strategy typology to reconsider the fourth potential strategy – the ambidextrous IS strategy – and offer some leniency in classifying firms as ambidextrous because, as we have observed in the current sample, moderately ambidextrous firms are surprisingly the highest performers.

Lastly, future studies should include CIOs and other senior business executives as respondents to confirm the consistency of relationships in the research model. It is possible that the perceptions between the CEO and CIO are somewhat different in regards to their views on IS strategy. However, it was found in a sample of 45 companies, using CIOs as respondents, that the relationships between firm performance and the three IS strategies in the typology are consistent with the findings in the

current study (Leidner, 2011). This provides evidence that perhaps CEOs and CIOs are both appropriate respondents for studies involving IS strategy and performance.

6.2. Limitations

This paper was motivated by an interest in investigating the impacts of IS strategies on firm performance. Several limitations warrant mention. First, as already noted, this work has the normal limits of survey research. The cross-sectional design does not allow us to fully establish the causality between the independent variables and the dependent variable. A carefully designed longitudinal study could more successfully address this question. Second, though the response rate for the study is comparable with that of other studies that require responses from top executives, it raises the issue of non-response bias. Even though no significant differences (in annual sales and number of employees) were found between responding and non-responding organizations or between early and late respondents, respondent bias may still exist. For example, CEOs in organizations that employ a more innovative IS strategy or have greater organizational performance may perhaps be more likely to answer the survey. However, we note the mean value for an Innovator IS strategy was 2.77 with a standard deviation of 0.80 and a range extending from 1 to 5. Also the mean value for organizational performance was 3.33 with a standard deviation of 0.71 and a range extending from 1.3 to 5. Therefore, we found that the organizations in our sample tend to be normally distributed with respect to the degree to which they pursue an innovative IS strategy and have diverse organizational performance. Third, the sampling frame for the study was not perfectly random because the difficulty of collecting data from corporate executives precluded full randomization. Furthermore, the data collection focused on a single industry, which hinders the ability for generalization across other industries. However, this is an advantage in that it enables to see variation within a single industry, thereby ruling out industry effects on IS strategy. Fourth, credit unions are non-profit, which leads to potential generalization issues to for-profit industries. Nevertheless, non-profit organizations, as do for-profit organizations, face continual competitive pressures for organizational performance (Brannen and Ibrahim, 2010). In addition, we note that our results indicate that the financial services industry faces substantial technological turbulence and that IS is key to deriving customer value.

Finally, there is the possibility of common method bias in this study since we collected our data on both independent and dependent measures through self-reporting at a single point in time. Since we used the CEO as the respondent for each of the variables in our research model, we assessed potential common method variance following the guidelines suggested by (Podsakoff et al., 2003). In accordance with these established guidelines, we conducted a Harman's one-factor test (Harman, 1967; Podsakoff and Organ, 1986). Results of the Harman's one-factor test using principal component factor analysis did not reveal the presence of a general factor in the unrotated factor structure that accounts for the majority of covariation in the variables, indicating that there is not a significant level of common method variance in our model. Results of the principal components factor analysis reveal that there are six factors with eigenvalues greater than 1.0, which account for 71.2% of the total variance. Furthermore, the first factor accounted for only 24.7% of the total variance. In accordance with Podsakoff and Organ (1986), common method variance does not appear to be problematic in either data set since: (1) several factors were identified; (2) the first factor did not account for the majority of the variance; and (3) there is no general factor in the unrotated factor structure. Although response bias cannot be ruled out with same source data, this analysis suggests that common method variance is not a probable substantial explanation for the findings of this study (Podsakoff et al., 2003). Furthermore, the anonymous nature of the survey may mitigate the likelihood that respondents provided self-serving answers or answers they believed we expected. Although prior research has found that subjective performance measures (when derived from top executives) may serve as valid indicators of a firm's performance (Rowe and Morrow, 1999), future research should seek to include objective measures of firm performance when available. Despite these limitations, our study is the first to attempt to develop and empirically test a theory of IS strategy and firm performance using the IS strategies identified by Chen et al. (2010).

6.3. Conclusion

Notwithstanding the limitations, our study provides strong evidence that firms with defined IS strategies perform better than those without defined IS strategies. Noteworthy is the post hoc finding that firms that attempt to be ambidextrous are associated with the most superior performance. This is a potential extension to the Chen et al. (2010) IS strategy typology and a contribution of our study. In addition, organizations without a clearly defined IS strategy actually experienced a negative relationship with firm performance. These organizations should realize the potentially negative outcomes of such a lack of strategy, as observed in the relationship found between IS Undefined and performance, and work to extricate themselves before a consistent pattern of investing in IS without clear organizational benefit develops. Furthermore, the study provides evidence that the IS Innovator strategy is, in particular, associated with more superior firm performance than the IS Conservative strategy under normal environmental conditions as well as under conditions of environmental dynamism. Organizational leaders need to consider the external environments under which their organizations are operating and evaluate the influence those environmental factors may have on their IS strategy's ability to impact performance. Studying the nature and content of IS strategy is important both theoretically and practically. Quantitative and qualitative studies are needed to uncover the reasons why firms choose a particular IS strategy, how they effectuate the IS strategy, how they change the IS strategy, and under what circumstances the IS strategy contributes to firm performance.

Acknowledgement

This manuscript is a revised and extended version of a paper presented at the International Conference on Information Systems, 2010.

Appendix A. Construct operational definitions and scales

Innovative IS Strategy[a]: An organization with an IS strategy that represents an organizational perspective to be an IS leader within its industry by continuously seeking to be innovative through new IS initiatives (Source: Chen et al. (2010))
InnovStrat1: Our organization is a leading IS Innovator in our industry
InnovStrat2: Our organization believes in being first in the industry in developing new IS initiatives even if not all of these efforts prove to be highly profitable
InnovStrat3: Our organization responds rapidly to early signals concerning areas of opportunity for IS

Conservative IS Strategy[a]: An organization with an IS strategy that represents an organizational perspective to create value through a safe and stable approach by effectively refining and improving existing IS practices (Source: Chen et al. (2010))
ConservStrat1: Our organization follows a safe and stable approach to developing new IS initiatives (dropped)
ConservStrat2: Our organization adopts promising IS innovations once these initiatives have been proven in our industry
ConservStrat3: IS innovations are carefully examined before they are chosen by our organization

Undefined IS Strategy[a]: An organization which does not have clear long-term IS goals nor does it have a consistent pattern of behavior regarding its IS strategy (Source: Chen et al. (2010))
UndefStrat1: Our organization does not have definitive long-term IS goals
UndefStrat2: Our organization does not have an articulated IS strategy
UndefStrat3: Our organization does not have a consistent pattern of behavior regarding IS

Organizational Performance[b]: The performance of the organization relative to industry competitors. (Source: Chan et al. (1997), Nandakumar et al. (2010))
OrgPerf1: effectiveness of strategic planning; OrgPerf2: revenue growth
OrgPerf3: market growth

Market Uncertainty[a]: The extent to which the customer preferences and needs are dynamic (Source: Jaworski and Kohli (1993), Sethi and Iqbal (2008))
MarkUncert1: In our local market, customer preferences change often over time
MarkUncert2: Our customers tend to look for new services all the time

Technology Turbulence[a]: The extent to which the technological environment is rapidly changing (Source: Jaworski and Kohli (1993), Sethi and Iqbal (2008))
TechTurb1: The technology in our market is changing rapidly
TechTurb2: Competitors in our local market have been aggressively adopting advanced information technologies

[a] 5-Point scale ranging from "strongly disagree" (1) to "strongly agree" (5).
[b] 5-Point scale ranging from "much lower" (1) to "much greater".

Appendix B. Summary statistics

Variable	*N*	Mean	Std. dev.	Min	Max
Constructs					
Innovative IS Strategy[a] (3 questions)	263	2.77	0.80	1	5
Conservative IS Strategy[a] (3 questions)	263	3.88	0.46	2.3	5
Undefined IS Strategy[a] (3 questions)	263	2.59	0.93	1	5
Organizational Performance[b] (3 questions)	263	3.33	0.71	1.3	5
Market Uncertainty[a] (2 questions)	263	3.22	0.80	1.5	5

Appendix B (*continued*)

Variable	*N*	Mean	Std. dev.	Min	Max
Technological Turbulence[a] (2 questions)	263	3.76	0.76	1.5	5
Executive characteristics					
CEO Age[c]	258	54.19	7.60	34	75
CEO Organizational Tenure[c]	261	15.50	10.07	0.5	45
CEO Positional Tenure[c]	260	11.80	8.39	0.5	43
CEO Gender	259	78% male/22% female			
Organizational characteristics					
Assets (million $)	263	37.0	93.2	0.2	860.5
Number of Members	263	33,910	71,611	652	685,751
Number of Employees	263	85	139	10	1115

[a] 5-Point scale ranging from "strongly disagree" (1) to "strongly agree" (5).
[b] 5-Point scale ranging from "much lower" (1) to "much greater" (5).
[c] Years.

References

Abernathy, W., 1978. The Productivity Dilemma. John Hopkins University Press, Baltimore, MD.
Adler, P.S., McDonald, D.W., MacDonald, F., 1992. Strategic management of technical functions. Sloan Management Review 33 (2), 19–37.
Agarwal, R., Sambamurthy, V., 2002. Principles and models for organizing the IT function. MIS Quarterly Executive 1 (1), 1–16.
Ahituv, N., Neumann, S., 1990. Principles of Information Systems for Management. W.C. Brown Publishers, Dubuque, IA.
Aldrich, H.E., Wiedenmayer, G., 1993. From traits to rates: an ecological perspective on organizational foundings. In: Katz, J., Brockhaus, R.H. (Eds.), Advances in Entrepreneurship, Firm Emergence, and Growth, vol. 1. JAI Press, Greenwich, CT, pp. 145–195.
Aral, S., Weill, P., 2007. IT assets, organizational capabilities, and firm performance: how resource allocations and organizational differences explain performance variation. Organization Science 18 (5), 763–780.
Barney, J.B., 1991. Firm resources and sustained competitive advantage. Journal of Management 17 (1), 99–120.
Baskerville, R.L., 2006. Artful planning (editorial). European Journal of Information Systems 15 (2), 113–115.
Beard, D.W., Dess, G.G., 1981. Corporate-level strategy, business-level strategy, and firm performance. Academy of Management Journal 24 (4), 663–688.
Benner, M.J., Tushman, M.L., 2003. Exploitation, exploration, and process management: the productivity dilemma revisited. Academy of Management Journal 28 (2), 238–256.
Brannen, D.E., Ibrahim, N.A., 2010. The role and level of involvement of credit union directors in strategic management: a research agenda. International Journal of Management 27, 680–692.
Braunscheidel, M.J., Suresh, N.C., 2009. The organizational antecedents of a firm's supply chain agility for risk mitigation and response. Journal of Operations Management 27 (2), 119–140.
Brown, S.L., Eisenhardt, K.M., 1997. The art of continuous change: linking complexity theory and time-paced evolution in relentlessly shifting organizations. Administrative Science Quarterly 42 (1), 1–34.
Carr, N.G., 2003. IT doesn't matter. Harvard Business Review 81 (5), 41–49.
Carte, T.A., Russell, C.J., 2003. In pursuit of moderation: nine common errors and their solutions. MIS Quarterly 27 (3), 479–501.
Cash, J.I., McFarlan, F.W., McKenney, J.L., Applegate, L.M., 1992. Corporate Information Systems Management: Texts and Cases. Richard D. Irwin Inc., Homewood, IL.
Chan, Y., 2002. Why haven't we mastered alignment? The importance of the informal organization structure. MIS Quarterly Executive 1 (2), 97–112.
Chan, Y., Reich, H., 2007. IT alignment: what have we learned? Journal of Information Technology 22 (4), 297–315.
Chan, Y.E., Huff, S.L., Barclay, D.W., Copeland, D.G., 1997. Business strategic orientation, information systems strategic orientation, and strategic alignment. Information Systems Research 8 (2), 125–150.
Chen, D.Q., Mocker, M., Preston, D.S., Teubner, A., 2010. Information systems strategy: reconceptualization, measurement, and implications. MIS Quarterly 34 (2), 233–259.
Chin, W.W., 1998. The partial least squares approach for structural equation modeling. In: Marcoulides, G.A. (Ed.), Modern Methods for Business Research. Lawrence Erlbaum Associates, Mahwah, pp. 295–336.
Ciborra, E.U., 1992. From thinking to tinkering: the grassroots of IT and strategy. The Information Society 8 (4), 297–309.
Clemons, E.K., 1986. Information systems for sustainable competitive advantage. Information & Management 11, 131–137.
Cohen, W.M., Levinthal, D.A., 1990. Absorptive capacity: a new perspective on learning and innovation. Administrative Science Quarterly 35 (1), 128–152.
Copeland, D.G., McKenney, J.L., 1988. Airline reservations systems: lessons from history. MIS Quarterly 12 (3), 353–370.
Dawes, P.L., Lee, D.Y., Dowling, G.R., 1999. Informal information control in complex technological purchase situations. Journal of High Technology Management Research 10 (2), 377–402.
Dos Santos, B.L., Peffers, K., Mauer, D.C., 1993. The impact of information technology investments on the market value of the firm. Information Systems Research 4 (1), 1–23.
Droge, C., Calantone, R., Harmancioglu, N., 2008. New product success: is it really controllable by managers in highly turbulent environments? Journal of Product Innovation Management 25, 272–286.
Earl, M.J., 1989. Management Strategies for Information Technology. Prentice Hall, London.
Earl, J.J., 1993. Experiences in Strategic Information Systems Planning. MIS Quarterly 34 (2), 1–24.
Eisenhardt, K.M., Martin, J.A., 2000. Dynamic capabilities: what are they? Strategic Management Journal 21 (10), 1105–1121.
Fines, C.H., 1998. Clockspeed: Winning Industry Control in the Age of Temporary Advantage. Perseus, Reading, MA.
Fornell, C., Larcker, D.F., 1981. Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research 18 (1), 39–50.
Galliers, R.D., 1991. Strategic information systems planning: myths, reality and guidelines for successful implementation. European Journal of Information Systems 1 (1), 55–64.
Galliers, R.D., 2004. Reflections on information systems strategizing. In: Avgerou, C., Ciborra, C., Land, F. (Eds.), The Social Study of Information and Communication Technology: Innovation, Actors, and Contexts. Oxford University Press, pp. 231–262.

Galliers, R.D., 2006. Strategizing for agility: confronting information systems inflexibility in dynamic environments. In: Desouza, K. (Ed.), Agile Information Systems. Butterworth-Heinemann, pp. 1–15.
Galliers, R.D., 2007. On confronting some of the common myths of Information Systems strategy discourse. In: The Oxford Handbook of Information and Communication Technology. Oxford University, Oxford, pp. 225–243.
Galliers, R.D., 2011. Further developments in information systems strategising: unpacking the concept. In: Galliers, R.D., Currie, W.L. (Eds.), The Oxford Handbook of Information Systems: Critical Perspectives and New Directions. Oxford University Press, Oxford, pp. 329–345.
Garson, G.D., 2009. Univariate GLM, ANOVA, and ANCOVA, from Statnotes: topics in multivariate analysis. <http://faculty.chass.ncsu.edu/garson/pa765/statnote.htm>.
Gregor, S., 2006. The nature of theory in information systems. MIS Quarterly 30 (3), 611–642.
Hahn, W., Powers, T.L., 2010. Strategic plan quality, implementation capability, and firm performance. Academy of Strategic Management Journal 9 (1), 63–81.
Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., 2009. Multivariate Data Analysis, seventh ed. Prentice Hall, Upper Saddle River, NJ.
Hambrick, D.C., 1983. Some tests of the effectiveness and the functional attributes of Miles and Snow's strategic types. Academy of Management Journal 26, 5–26.
Harman, H.H., 1967. Modern Factor Analysis. University of Chicago Press, Chicago.
Heath, N., 2009. Five technologies for 2010 investment. Business Week. December 17. <http://www.businessweek.com/globalbiz/content/dec2009/gb20091217_780884.htm>.
Henderson, J.C., Venkatraman, N., 1999. Strategic alignment: leveraging information technology for transforming organizations. IBM Systems Journal 38 (2/3), 472–485.
Hoppe, H.C., 2000. Second-mover advantages in the strategic adoption of new technology under uncertainty. International Journal of Industrial Organization 18 (2), 315–338.
Jaworski, B.J., Kohli, A.K., 1993. Market orientation: antecedents and consequences. Journal of Marketing 57 (3), 53–70.
Leidner, D.E., 2011. The benefits of IS strategy and IS strategizing. Cutter Benchmark Review 11 (2), 5–12.
Leidner, D.E., Mackay, J.M., 2007. How incoming CIOs transition into their new jobs. MIS Quarterly Executive 6 (1), 17–28.
Leidner, D.E., Beatty, R.C., Mackay, J.M., 2003. How CIOs manage IT during economic decline: surviving and thriving amid uncertainty. MIS Quarterly Executive 2 (1), 1–14.
Leidner, D., Preston, D., Chen, D., 2010. An examination of the antecedents and consequences of organizational IT innovation in hospitals. Journal of Strategic Information Systems 19 (3), 154–170.
Li, Y., Tan, C.-H., Teo, H.-H., Tan, B.C.Y., 2006. Innovative usage of information technology in Singapore organizations: do CIO characteristics make a difference? IEEE Transactions on Engineering Management 53 (2), 177–190.
Lichtenthaler, U., 2009. Absorptive capacity, environmental turbulence, and the complementarity of organizational learning processes. Academy of Management Journal 52 (4), 822–846.
March, J.G., 1991. Exploration and exploitation in organizational learning. Organization Science 2 (1), 71–87.
Mason, E.S., 1939. Price and production policies of large scale enterprise. American Economic Review 29 (1), 61–74.
Mata, F.J., Fuerst, W.L., Barney, J.B., 1995. Information technology and sustained competitive advantage: a resource-based analysis. MIS Quarterly 19 (4), 487–505.
Merali, Y., McKleman, P., 1993. The strategic positioning of information systems in post-acquisition management. Journal of Strategic Information Systems 2 (2), 105–124.
Mingers, J., 2001. Combining research methods: towards a pluralistic methodology. Information Systems Research 12 (3), 240–259.
Mintzberg, H., 1987. The strategy concept I: five Ps for strategy. California Management Review 30 (1), 11–24.
Mocker, M., 2007. Defining the content of information strategy: linking theory and practice. Doctoral dissertation.
Nadkarni, S., Narayanan, V.K., 2007. Strategic schemas, strategic flexibility, and firm performance: the moderating role of industry clockspeed. Strategic Management Journal 28, 243–270.
Nandakumar, M.K., Ghobadian, A., O'Regan, N., 2010. Business-level strategy and performance: the moderating effects of environment and structure. Management Decision 48 (6), 907–939.
O'Regan, N., Ghobadian, A., Gallear, D., 2006. In search of the drivers of high growth in manufacturing SMEs. Technovation 26 (1), 30–41.
Overby, E., Bharadwaj, A., Sambamurthy, V., 2006. Enterprise agility and the enabling role of information technology. European Journal of Information Systems 15 (2), 120–131.
Philip, G., 2007. IS strategic planning for operational efficiency. Information Systems Management 24 (3), 247–264.
Piccoli, G., Ives, B., 2005. Review: IT dependent strategic initiatives and sustained competitive advantage: a review and synthesis of the literature. MIS Quarterly 29 (4), 747–776.
Podsakoff, P.M., Organ, D.W., 1986. Self-reports in organizational research: problems and prospects. Journal of Management 12 (4), 531–544.
Podsakoff, P.M., Scott, B.M., Lee, J.-Y., Podsakoff, N.P., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. Journal of Applied Psychology 88 (5), 879–903.
Premkumar, G., King, W.R., 1994. Organizational characteristics and Information Systems planning: an empirical study. Information Systems Research 5 (2), 75–109.
Preston, D., Leidner, D.E., Chen, D., 2008. CIO leadership profiles: implications of matching CIO authority and leadership capability on IT impact. MIS Quarterly Executive 7 (2), 57–69.
Pyburn, P.J., 1983. Linking the MIS plan with corporate strategy: an exploratory study. MIS Quarterly 7 (2), 1–14.
Ragu-Nathan, B., Ragu-Nathan, T.S., Tu, Q., Shi, Z., 2001. Information management (IM) strategy: the construct and its measurement. Journal of Strategic Information Systems 10 (4), 265–289.
Reich, B.H., Benbasat, I., 1996. Measuring the linkage between business and Information Technology objectives. MIS Quarterly 20 (1), 55–81.
Ringle, C.M., Wende, S., Will, A., 2005. SmartPLS 2.0 (beta). University of Hamburg, Hamburg, Germany. <http://www.smartpls.de>.
Robbins, S., Stylianou, S., 1999. Post-merger system integration: the impact on IS capabilities. Information & Management 36 (4), 205–212.
Rogers, E.M., 1962. The Diffusion of Innovation. Simon & Schuster, New York.
Rowe, W.G., Morrow, J.L., 1999. A note on the dimensionality of the firm financial performance construct using accounting, market, and subjective measures. Canadian Journal of Administrative Sciences 16 (1), 58–71.
Rumelt, R.P., 1991. How much does industry matter? Strategic Management Journal 12 (3), 167–185.
Sabherwal, R., Chan, Y.E., 2001. Alignment between business and IS strategies: a study of prospectors, analyzers, and defenders. Information Systems Research 12 (1), 11–33.
Sambamurthy, V., Bharadwaj, A., Grover, V., 2003. Shaping agility through digital options: reconceptualizing the role of information technology in contemporary firms. MIS Quarterly 27 (2), 237–263.
Schein, E.H., 1985. Organizational Culture and Leadership. Jossey-Bass, San Francisco, CA.
Sethi, R., Iqbal, Z., 2008. Stage-gate controls, learning failure, and adverse effect on novel new products. Journal of Marketing 72, 118–134.
Simerly, R.L., Li, M., 2000. Environmental dynamism, capital structure and performance: a theoretical integration and an empirical test. Strategic Management Journal 21, 31–49.
Slater, D., 2002. Mistakes: strategic planning: don'ts (and do's). CIO.com.
Slater, S.F., Olson, E.M., Hult, T.M., 2006. The moderating influence of strategic orientation on the strategy formation capability-performance relationship. Strategic Management Journal 27, 1221–1231.

Smith, W.K., Tushman, M.L., 2005. Managing strategic contradictions: a top management model for managing innovation streams. Organization Sciences 16 (5), 522–536.
Song, M., Droge, C., Hanvanich, S., Calantone, R., 2005. Marketing and technology resource complementarity: an analysis of their interaction effect in two environmental contexts. Strategic Management Journal 26, 259–276.
Tai, L.A., Phelps, R., 2000. CEO and CIO perceptions of information systems strategy: evidence from Hong Kong. European Journal of Information Systems 9 (3), 163–172.
Teece, D.J., Pisano, G., Shuen, A., 1997. Dynamic capabilities and strategic management. Strategic Management Journal 18 (7), 509–533.
Terziovski, M., 2010. Innovation practice and its performance implications in small and medium enterprises (SMEs) in the manufacturing sector: a resource-based view. Strategic Management Journal 31 (8), 892–902.
Tushman, M.L., O'Reilly, C., 1996. Ambidextrous organizations: managing evolutionary and revolutionary change. California Management Review 38 (1), 8–30.
Walker, R.M., 2006. Innovation type and diffusion: an empirical analysis of local government. Public Administration 84 (2), 311–335.
Walker, R.M., Damanpour, F., Avellaneda, C.N., 2007. Combinative effects of innovation types on performance: a longitudinal study of public services. In: Academy of Management Proceedings. Philadelphia, pp. 1–6.
Ward, J., Peppard, J., 2002. Strategic Planning for Information Systems. John Wiley & Sons, New York.
Weill, P., 1992. The relationship between investment in information technology and firm performance: a study of the valve manufacturing industry sector. Information Systems Research 3 (4), 307–333.
Wheeler, B.C., 2002. NEBIC: a dynamic capabilities theory for assessing net-enablement. Information Systems Research 13 (2), 125–146.
Zollo, M., Singh, H., 1998. The impact of knowledge codification, experience trajectories and integration strategies on the performance of corporate acquisitions. In: Academy of Management Best Paper Proceedings, San Diego, CA.