MIS Quarterly

RESEARCH NOTE

HOW INFORMATION TECHNOLOGY GOVERNANCE MECHANISMS AND STRATEGIC ALIGNMENT INFLUENCE ORGANIZATIONAL PERFORMANCE: INSIGHTS FROM A MATCHED SURVEY OF BUSINESS AND IT MANAGERS[1]

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Previous research has proposed different types for and contingency factors affecting information technology governance. Yet, in spite of this valuable work, it is still unclear through what mechanisms IT governance affects organizational performance. We make a detailed argument for the mediation of strategic alignment in this process. Strategic alignment remains a top priority for business and IT executives, but theory-based empirical research on the relative importance of the factors affecting strategic alignment is still lagging. By consolidating strategic alignment and IT governance models, this research proposes a nomological model showing how organizational value is created through IT governance mechanisms. Our research model draws upon the resource-based view of the firm and provides guidance on how strategic alignment can mediate the effectiveness of IT governance on organizational performance. As such, it contributes to the knowledge bases of both alignment and IT governance literatures. Using dyadic data collected from 131 Taiwanese companies (cross-validated with archival data from 72 firms), we uncover a positive, significant, and impactful linkage between IT governance mechanisms and strategic alignment and, further, between strategic alignment and organizational performance. We also show that the effect of IT governance mechanisms on organizational performance is fully mediated by strategic alignment. Besides making contributions to construct and measure items in this domain, this research contributes to the theory base by integrating and extending the literature on IT governance and strategic alignment, both of which have long been recognized as critical for achieving organizational goals.

Keywords: IT governance mechanisms, strategic alignment, organizational performance, degree-symmetric measures

[1]Rajiv Kohli was the accepting senior editor for this paper. Sid Huff served as the associate editor.

The appendices for this paper are located in the "Online Supplements" section of the *MIS Quarterly*'s website (http://www.misq.org).

Introduction

That information technology (IT) enhances the ability of enterprises to survive in the highly competitive global marketplace of the 21st century has become more and more evident. The effective use of information technology, however, relies heavily on good IT governance. When IT and corporate governance go awry, the results can be devastating. The bankruptcy of Enron in 2001 and the enactment in the United States of the Sarbanes-Oxley Act in 2002 are manifestations of the simple truth of this viewpoint and these events from the past have today elevated IT governance to a high position of relevance within business and IT management research.

Demonstrating the value of IT investment is fundamental to the contribution of the information systems discipline, as noted by Agarwal and Lucas (2005). In particular, IT governance is critically important because of its substantial impact on the value generated by the investment in IT. In fact, Weill and Ross (2004, pp. 3-4) argue that "effective IT governance is the single most important predictor of the value an organization generates from IT." Indeed, Weill and Ross's (2004, 2005) research shows that top-performing firms generate returns on their IT investments up to 40 percent higher than their competitors because companies can get more value from IT by well designing and communicating IT governance processes. In other words, business value can be created by implementing an effective IT governance framework (Kearns and Sabherwal 2007).

The impact of IT governance on firm performance have been well established in previous studies, yet there still remains a gap explaining exactly how IT governance influences firm performance. Different perspectives have been adopted with regard to the relationship between IT governance and firm performance. For example, Tanriverdi (2006) studied how IT governance moderates the influence of IT relatedness on firm performance. Lazic et al. (2011) found that IT governance is positively related to business performance through IT relatedness and business process relatedness. Prasad et al. (2012) suggest that IT governance structures contribute to firm performance through IT-related capabilities which improve the effectiveness and efficiency of the internal business processes. Yet, among these few works on the governance–performance link, there is no consensus as to exactly how IT governance enhances performance and it is still unclear by which precise mechanisms IT governance exerts its effects on firm performance.

In the literature, IT governance is said to be concerned with IT project selection and prioritization issues and how the authority for resources and the responsibility for IT are shared between business partners, IT management, and service providers (Weill 2004; Weill and Ross 2004, 2005). To implement IT governance effectively, a set of IT governance mechanisms is required to encourage the congruence with the organizational mission, strategy, values, norms, and culture (Ali and Green 2012; De Haes and Van Grembergen 2005, 2008, 2009; Herz et al. 2012; Huang et al. 2010), which in turn promotes desirable IT behaviors and governance outcomes (Weill and Ross 2004). Hence, an organization's IT governance mechanisms are often indicative of the sophistication of its management (both IT and business) capability (Bradley et al. 2012; Karimi et al. 2000).

Recently, researchers have started to identify key governance mechanisms contributing to effective IT governance such as structural mechanisms (Ali and Green 2012; Bowen et al. 2007; Huang et al. 2010; Karimi et al. 2000; Prasad et al. 2012) and relational mechanisms (e.g., Ali and Green 2012; Bradley et al. 2012). Whereas organizations sense that IT governance is very important to the enterprise, they are uncertain about how IT should be strategically aligned with corporate objectives (ITGI 2009). Although most IT-related activities still rely heavily on IT professionals, non-IT CEOs may just now be coming to the realization of the criticality of IT alignment. This realization has long been the case in the IT profession, on the part of both academics and practitioners. Given that the desirable outcome of effective IT governance is to achieve the congruence between IT strategies and corporate objectives, however, few research papers have theoretically and empirically examined the effect of IT governance mechanisms on strategic alignment.

Strategic alignment and planning have been a top managerial concern since the beginning of the IS profession (Luftman and Kempaiah 2008; Taylor et al. 2010) and its positive impacts on firm performance have been well established in previous research (Chan et al. 1997; Chan et al. 2006; Oh and Pinsonneault 2007; Preston and Karahanna 2009; Tallon 2008; Tallon and Pinsonneault 2011). Strategic alignment can be classified along two dimensions (Reich and Benbasat 2000): (1) the *intellectual* and (2) the *social*. Studies on the intellectual dimension concentrate on the content of plans and planning methodologies while those dealing with the social dimension focus on the people involved in the creation of alignment (Reich and Benbasat 1996). By focusing on the intellectual dimension (alignment of strategy, plans, operations, or processes) rather than the social dimension, the causal link between strategic alignment and performance has been supported in studies such as Tallon and Pinsonneault (2011). Studies on the social dimension, on the other hand, tend to investigate the antecedents of social dimension of

alignment and the relationship between the social dimension and the intellectual dimension (e.g., Preston and Karahanna 2009; Reich and Benbasat 2000), but these works have not extended their impacts to downstream performance. To fill this research gap, we formulate a nomological network to connect together IT governance, strategic alignment, and firm performance.

Despite a considerable body of work on IT governance and strategic alignment, solid empirical evidence is needed to demonstrate their interrelationship. Exactly what are the mechanisms through which the business–IT strategic alignment and IT governance have a downstream effect (if they do) on organizational performance? We believe that strategic alignment can be achieved via implementing well-designed IT governance mechanisms. As noted by Huang et al. (2010, p. 288), "well-designed and orchestrated IT governance mechanisms are expected to produce IT-related decisions, actions and assets that are more tightly aligned with an organization's strategic and tactical intentions." Drawing upon De Haes and Van Grembergen's (2009) study, which explores the impact of IT governance implementations on strategic alignment, we formulate a nomological network to connect together IT governance, strategic alignment, and firm performance. Because strategic alignment and IT governance mechanisms have rarely been studied together, their causal relationship in promoting firm performance remains theoretically underdeveloped. In other words, our understanding of how IT governance influences firm performance through strategic alignment, and the mechanisms through which business and IT strategies align, is embryonic. These gaps are also of considerable practical significance because they address necessary governance practices that impact the ability of IT to sustain strategic alignment. As strategic alignment requires integration between IT and business units, understanding the mechanisms implemented to facilitate the relationship between these two parties becomes salient. The objective of this paper, thus, is to address these persisting gaps.

The remainder of this paper is arranged as follows. We first review the theoretical foundations of our model, synthesizing a diverse body of literature to present supporting perspectives on the link between IT governance mechanisms, strategic alignment, and organizational performance. Next, we introduce our methodology and data, drawn from a matched survey of IS managers and business executives in 131 Taiwanese organizations and discuss the archival data gathered from 72 firms to cross-validate the sample and results. After discussing our results and their implications for IS research and practice, we conclude with research findings and contributions.

Theoretical Development

Our basic research model, *sans* indications of how constructs were measured, appears as Figure 1.

By way of preview, the overall rationale for the model is that the implementation of IT governance mechanisms can facilitate the alignment between IT strategy and business strategy, which thereby leads to higher organizational performance. Although the relationships between these three constructs have been discussed and tested pairwise in previous studies, all three have rarely been simultaneously examined and validated. One of the earliest research works to conceptualize the link between IS strategic alignment and business performance, for example, was Henderson and Venkatraman (1993), with the authors arguing that the lack of alignment between business and IT strategies undermines the realization of value from IT investments. Chan et al. (1997) provided empirical evidence to support such a relationship and further highlighted the importance of *realized* IS strategy (strategy evident in IS deployments, in contrast to planned strategy). Consistent with Chan et al., we examine the fit between business strategic orientation and IS strategic orientation in terms of the support that information systems provide for *realized* business strategies. That is, when IT supports and enables business strategy, the organization is better able to achieve its goals, thus resulting in improved organizational performance. However, neither Henderson and Venkatraman nor Chan et al. provide a practical framework for the realization of IS strategic alignment. Although IT governance has been identified as one potential enabler of strategic alignment, few attempts have ever been made to empirically test the proposed theory.

The relationship between IT governance and strategic alignment was not established until De Haes and Van Grembergen's (2009) exploratory study of IT governance mechanisms for a better alignment between business and IT. Van Grembergen and De Haes (2012) further indicate that the implementation of processes, structures, and relational mechanisms "enable both business and IT people to execute their responsibilities in support of business/IT alignment and the creation of business value from IT enabled investments" (pp. 2-3).[2]

To better illustrate the proposed relationships of our research model in a nomological network, we adopt the resource-based view (RBV) of the firm to explain the impact of IT govern-

[2]Their original proposition is presented in Van Grembergen and De Haes (2009, p. 6) as Enterprise Governance of IT (enables) → Business/IT Alignment (enables) → Business Value from IT Investments, which provides a conceptual foundation for our research model.

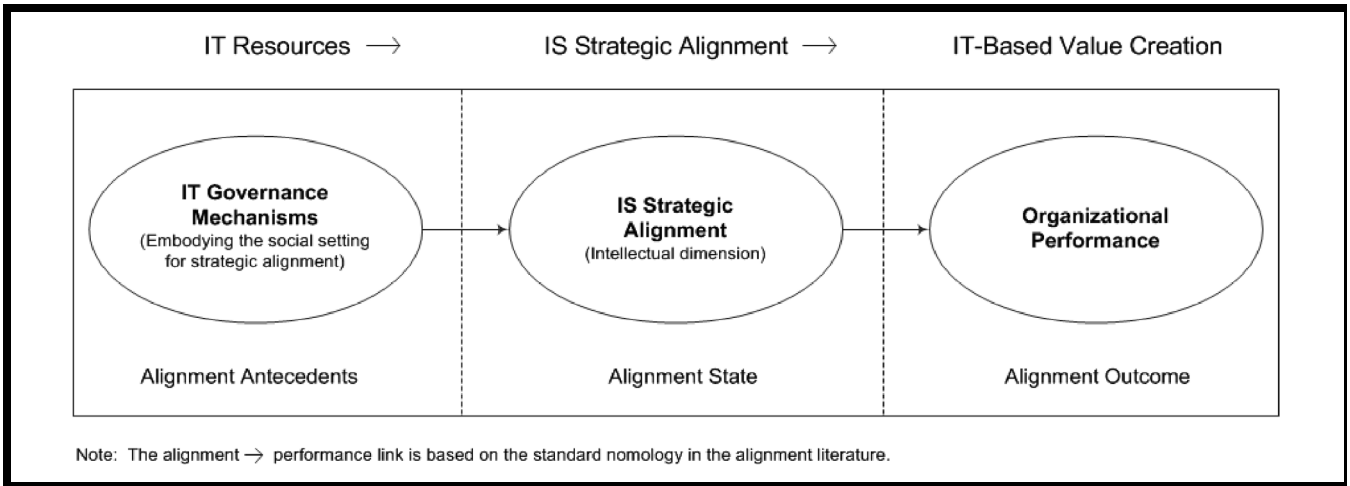

Figure 1. Conceptual Model of Our Research

ance on IS strategic alignment. From a resource complementarity perspective, IT capabilities are the routines or practices that complement IT to deliver its value to firms (Aral and Weill 2007; Melville et al. 2004; Ravichandran and Lertwongsatien 2005). As IT governance is the capacity exercised by the board, executives, and IT management to control the implementation of IT strategy (Van Grembergen 2002) and to govern the use of the key assets of the organization using mechanisms that enable business and IT executives to formulate aligning policies and procedures (Weill and Broadbent 1998; Weill and Ross 2004), we consider IT governance mechanisms to be human IT resources,[3] and furthermore, they complement IT in delivering value to organizations. According to the RBV, firm resources are the main predictors of firm performance (Barney 1991; Grant 1991; Hall 1992; Wernerfelt 1984) and IT resources can bring about differentiation in firm strategies (Bharadwaj 2000). If these resources are hard to replicate and are not perfectly mobile, they have the potential for providing sustainable competitive advantages (Mata et al. 1995). Thus, organizations should foster mechanisms that can create inimitable synergy between IT and business to leverage core resources. IT governance mechanisms are unique to the organization in that they provide the contextual setting for business and IT people to be involved in IT decision making and share knowledge in order to enhance IT support for business objectives.

[3]According to Aral and Weill (2007, p. 765), IT resources are "combinations of investment allocations and a mutually reinforcing system of competencies and practices"; thus IT governance mechanisms can be considered to be IT resources. Therefore, our research model actually is consistent with the concept of human IT resources defined in Bharadwaj (2000) and reflects the schematic relationship of IT Investments → Mediating Factors → IT-Based Value as illustrated in Kohli and Grover (2008, p. 27).

Therefore, we posit that an organization's alignment between core business strategy and IT strategy is likely to mediate the impact of IT governance mechanisms on firm performance. We next provide theoretical arguments for the hypothesized relationships.

IT Governance Mechanisms

Research on IT governance started with studies dealing with the forms of IT governance (e.g., Brown 1997; Brown and Magill 1994) and contingencies for IT governance (e.g., Sambamurthy and Zmud 1999). More recently, researchers have begun to investigate the impact of specific governance mechanisms on the overall effectiveness of IT governance (Ali and Green 2012; Bowen et al. 2007; Bradley et al. 2012; De Haes and Van Grembergen 2009; Huang et al 2010; Herz et al. 2012; Prasad et al. 2012; Prasad et al. 2010) and identify coordination governance mechanisms in federated IT organizations (Williams and Karahanna 2013). Table 1 summarizes recent research on IT governance mechanisms. Two main observations emerge from Table 1. First, despite differences in the definition of IT governance, IT governance mechanisms in general consist of structures, processes, and relational mechanisms to enhance business/IT alignment, and the research upholds positive associations between IT governance mechanisms and IT governance performance.

Second, only the relationships of certain IT governance mechanisms with IT governance performance have been examined. More complete and solid empirical support for the three types of governance mechanisms identified and their relationship with strategic alignment is still missing from the literature. For example, Huang et al. (2010) found that employing formal IT steering committees was associated with

Table 1. Summary of Prior Research on IT Governance Mechanisms

Study	Research Questions/Purpose	Definition of IT Governance	Research Findings
Bowen et al. (2007)	To examine the factors that influence IT governance structures, processes, and outcome metrics.	IT governance is "the IT related decision making structure and methodologies implemented to plan, organize, and control IT activities" (p.194).	Effective IT governance is positively associated with a shared understanding of business and IT, active involvement of IT steering committees, a balance of business and IT people for IT decision making, and well-communicated IT strategies and policies.
De Haes and Van Grembergen (2009)	"(1) How are organizations implementing IT governance?" (p. 123). (2) "What is the relationship between IT governance and business/IT alignment?" (p. 124).	IT governance "consists of the leadership and organizational structures and processes that ensure that the organization's IT sustains and extends the organization's strategy and objectives" (p. 123).	There is a positive relationship between the use of IT governance practices and business/IT alignment. Highly aligned organizations leverage more mature IT governance practices.
Huang et al. (2010)	To better understand the nature of effective IT steering committees.	The goal of IT governance is "to direct and oversee an organization's IT-related decisions and actions such that desired behaviors and outcomes are realized" (p. 289).	IT steering committees comprised of executive-level participants adopted a broader, longer-term orientation. The SMEs with broadly-disseminated and easily-accessed IT governance policies had greater success in IT use.
Prasad et al. (2010)	"To obtain a deeper understanding of the effectiveness of firm's IT governance initiatives" (p. 215).	"IT governance specifies the decision rights and accountability framework to encourage desirable behavior in the use of IT (Weill and Ross 2004). It also includes the foundational mechanisms in the form of the leadership, and organizational structures and processes that ensure that the organization's IT sustains and extends the organization's strategies and objectives" (p. 216).	IT steering committee is positively related to the level of IT-related capabilities.
Ali and Green (2012)	"What individual IT governance mechanisms impact significantly a higher perceived level of overall effective IT governance?" (p. 180).	"A structure of relationships and processes to control the enterprise in order to achieve the enterprise's goals by adding value while balancing risk versus return over IT and its processes" (p. 180).	The existence of governance mechanisms such as: (1) a culture of compliance in IT; (2) corporate communication systems support; (3) involvement of senior management on a regular basis; and (4) a corporate performance measurement system significantly impact the level of effective IT governance.
Bradley et al. (2012)	"(1) What are some of the antecedent factors to IT governance in hospitals? (2) What are some of the important consequent variables that are affected by IT governance in hospitals?" (p. 157).	IT governance is "the capacity of top management to control the formulation and implementation of the IT strategy via organizational structures and processes that produce desirable behaviors, which will ensure that IT initiatives sustain and extend the organization's strategy and objectives" (p. 157).	Structural and relational mechanisms such as CIO structural power, IT-business mutual participation, and an entrepreneurial culture on IT governance can positively affect IT governance and indirectly, IT value creation.
Chong and Tan (2012)	"(1) How do collaborative networks establish effective IT governance? (2) What socio-technical factors are essential to the effectiveness of IT Governance in a collaborative network? How do these factors influence IT Governance structures, processes and relational mechanisms?" (p. 36).	IT governance is regarded as "a framework in specifying the allocation of IT related decision making rights and responsibilities to the right organizational group and deploying relational mechanisms to support the alignment between business objectives and IT" (p. 34).	Socio-technical factors such as an active involvement of a governing body, a coordinated communication process and the presence of relational culture and attitudinal commitment are essential to the effectiveness of IT governance in a collaborative network.

Table 1. Summary of Prior Research on IT Governance Mechanisms (Continued)

Study	Research Questions/Purpose	Definition of IT Governance	Research Findings
Herz et al. (2012)	"(1) What are relevant IT governance mechanisms based on the current body of knowledge? (2) Which mechanisms could a multisourcing Governance framework in a business group encompass?" (p. 5033).	IT governance is "integral part of corporate governance", which "addresses the definition and implementation of processes, structures and relational mechanisms in the organization that enable both business and IT people to execute their responsibilities in support of business/ IT alignment and the creation of business value from IT-enabled business investments" (p. 5036).	Multisourcing governance mechanisms in a business group were determined to be either company-internal mechanisms or supplier-related mechanisms. Structures, processes and relational mechanism can be configured to match different relationships of multisourcing between the business groups.
Prasad et al. (2012)	"(1) What are the effective IT governance structures for collaborative organizational structures? (2) How do we evaluate the effectiveness of these IT governance structures?" (p. 200).	"IT governance essentially places structure around how organizations IT strategy aligns with business strategy. This IT-business alignment will ensure that organizations continue to achieve their strategies and goals, and implementing ways to evaluate its performance" (p. 201).	Organizational IT governance structures provide the platform for better understanding and effective use of the newly acquired IT resources.

higher success in IT use. More recently, Ali and Green (2012) suggest significant positive relationships between the overall level of effective IT governance and the involvement of senior management in IT, the existence of an ethic or a culture of compliance in IT, as well as corporate communication systems. Despite these efforts, it is still unclear how IT governance mechanisms increase firm performance and the role strategic alignment plays in such a relationship.

Before proceeding to look at the linkages between IT Governance mechanisms and IS strategic alignment, it is helpful to have a working definition. To delineate the necessary elements of an IT governance framework, Peterson (2004), Van Grembergen et al. (2004), and Weill and Woodham (2002) propose that IT governance can be deployed via a mix of *structures, processes, and relational mechanisms*. Structures involve clearly defined roles and responsibilities and a set of IT/business committees such as IT steering committees and business strategy committees. Processes refer to formal processes of strategic decision making, planning, and monitoring for ensuring that IT policies are consistent with business needs (Van Grembergen et al. 2004). Finally, relational mechanisms, which include business/IT interaction and shared learning and communication, are crucial to the IT governance framework.

Similarly, Weill and Ross (2004, p. 85) propose that "effective IT governance deploys three different types of mechanisms: *decision-making structures, alignment processes, and communication approaches.*" In their scheme, decision-making structures are organizational units such as committees, executive teams, and business/IT managers responsible for making IT decisions. Alignment processes are formal processes such as IT investment proposals and evaluations that ensure IT alignment with organizational policies. Communication approaches[4] are announcements and channels that spread principles and policies of IT governance and decision-making outcomes. Weill and Ross argue that effective governance deploys these three mechanisms, which in turn promote desirable IT behaviors and lead to desired performance goals.

In the present study, we chose not to focus on the relationship between the principal stakeholders. Instead, we focus on the effect of building proper communication channels to disseminate IT principles. Hence *communication approaches* is the term of choice for one of the antecedents to IS strategic alignment rather than *relational mechanisms*. Based on De Haes and Van Grembergen (2009) and Weill and Ross, our decomposition of IT governance mechanisms consists of three major governance mechanisms: (1) decision-making struc-

[4]According to Weill and Ross, communication approaches are intended to "spread the word about IT governance decisions and processes and related desirable behaviors throughout the enterprise" (p. 104). Hence, better communications actually provide the necessary contextual setting for social alignment (the shared understanding between the CIO and the top management team about the role of IS in the organization), which focuses on the shared knowledge, mutual understanding, and commitment among IS and business people about mission, objectives, and plans as to the ways in which IS contributes to business success (Martin et al. 2005; Preston and Karahanna 2009; Reich and Benbasat 1996, 2000).

tures, (2) formal processes,[5] and (3) communication approaches. In this research, we argue that the inclusive models of IS strategic alignment should embrace critical aspects of IT governance mechanisms. We provide our theoretical reasoning next.

The Influence of IT Governance Mechanisms on IS Strategic Alignment

IS Strategic Alignment

In the strategy literature, alignment has been seen both as a construct to be measured at a single point in time (e.g., in a cross-sectional study using a variance or factor model) and as a process to be understood over time. In this research, we focus on factor models highlighting antecedents or drivers of alignment. Therefore, unlike other researchers focusing on the *process* aspects of strategic alignment (e.g., Chan et al. 1997; Chan et al. 2006; Sabherwal and Chan 2001; Tallon 2008), our research focuses on the *content* of alignment in that we explore how well the content of the *realized* business strategy matches the content of the *realized* IT strategy. By this definition, IS strategic alignment is conceptualized as a *state* or an outcome of its antecedents (Chan et al. 1997). Determinants of alignment are likely to be mechanisms that drive alignment (for example, communication and planning). This perspective better describes how IS strategic alignment is realized through IT governance mechanisms and which component of strategic alignment contributes more to organizational competitiveness.

IS strategic alignment includes different dimensions. Reich and Benbasat (2000) defined the well-known social–intellectual dichotomy. The social dimension focuses on the values, communications, and mutual understanding of the actors in the organization while the intellectual dimension examines the strategy, structure, and planning methodologies.

Given that our research focuses on the alignment between business and IT strategies, the term *IS strategic alignment* in this paper, as in many other studies (e.g., Chan et al. 1997; Luftman and Brier 1999; Preston and Karahanna 2009; Sabherwal and Chan 2001; Tallon 2008; Tallon et al. 2000; Tallon and Pinsonneault 2011), refers to the ***intellectual*** dimension of strategic alignment. Prior research on intellectual alignment includes work on: (1) *alignment of strategy* (Chan et al. 1997; Henderson and Venkatraman 1993; Luftman and Brier 1999; Oh and Pinsonneault 2007; Sabherwal and Chan 2001; Tallon 2008; Tallon et al. 2000; Tallon and Pinsonneault 2011); (2) *alignment of plans* (e.g., Hirschheim and Sabherwal 2001; Kearns and Sabherwal 2007; Reich and Benbasat 1996); and (3) *alignment of infrastructure and processes* (Henderson and Venkatraman 1993).

Although antecedents of the intellectual dimension of strategic alignment have been studied to some degree by prior researchers, substantive research on IT governance as a critical predictor of alignment has not been forthcoming. Based on prior empirical research on alignment, Chan et al. (2006) posited five antecedent factors affecting alignment between business and IS strategies. These factors are shared domain knowledge, IS/business planning sophistication, prior IS success, environmental uncertainty, and organization size. Other antecedents recognized in prior research include senior executive support for IT, well-prioritized IT projects, business–IT partnerships, and CIO characteristics, attributes, abilities, and leadership (Baker 2004; Luftman et al. 1999); CIO-TMT (top management team) communication, participation, and planning (Chan et al. 2006; Hussin et al. 2002; Luftman et al. 1999; Reich and Benbasat 2000); IT sophistication and external IT expertise (Chan et al. 2006; Hussin et al. 2002); information intensity of the value chain (Kearns and Lederer 2003); a track record for the IS department/CIO (Chan et al. 2006; Luftman et al. 1999); and shared CIO–TMT understanding (Preston and Karahanna 2009; Tan and Gallupe 2006). Despite such substantive efforts, no one has investigated antecedents that deal with IT governance having a critical impact on the alignment between IT and business at the strategic level.

Social alignment, especially shared understanding, has been identified as an important antecedent of intellectual IS strategic alignment (Armstrong and Sambamurthy 1999; Chan 2002; Preston and Karahanna 2009; Tan and Gallupe 2006). Preston and Karahanna (2009) developed a nomological network in which the shared understanding (which captures important aspects of the social dimension of IS strategic alignment) between the chief information officers (CIOs) and top management team (TMT) about the role of IS in the organization is posited to be a proximal antecedent of the intellectual dimension of IS strategic alignment. Shared understanding is enabled by increasing the respective level of business and IS knowledge of the CIO and TMT (Preston and Karahanna 2009) and it is developed through knowledge integration between the CIO and CEO (Armstrong and Sambamurthy 1999; Kearns and Lederer 2003). The literature has identified two key components for knowledge integration (Armstrong and Sambamurthy 1999): *systems of knowing* and *objective knowledge* (business knowledge and IS knowledge). Systems of knowing refer to "organizational arrangements that enable interaction among team members for sharing their perspectives, pooling knowledge, and developing shared

[5]To distinguish from IS strategic alignment, we change the original term *alignment processes* into *formal processes*; however, the operational definition remains the same.

understanding" (Preston and Karahanna 2009, p. 164). According to Armstrong and Sambamurthy (1999), objective knowledge includes the explicit and visible domain knowledge of the CIO and TMT. While Preston and Karahanna's study provides some useful guidance for clarifying the relationship between the social dimension and the intellectual dimension of IS strategic alignment, empirical research to more exactly specify (1) the relationship between IT Governance mechanisms and IS strategic alignment and (2) its effect on organizational performance in a nuanced causal structure is still missing.

The following section explains how IT governance mechanisms enable IS strategic alignment by providing the institutionalized contexts (i.e., organizational arrangements) for CIO and TMT domain knowledge integration.

IT Governance Mechanisms Enable IS Strategic Alignment

IT governance mechanisms help achieve the intellectual IS strategic alignment in that the implemented governance mechanisms clarify the roles and responsibilities of the involved parties and how the authority for IT is shared between business partners, IT management, and service providers (Weill 2004; Weill and Ross 2004, 2005); thus, they can be considered to be organizational arrangements that enable shared understanding among team members. First, *IT steering committees* are one of the "effective governance mechanisms for aligning IT-related decisions and actions with an organization's strategic and operational priorities" (Huang et al. 2010, p. 289). Steering committees are comprised of high-level representatives who are ensured with the task of linking IT strategy with business strategy by matching corporate concerns with IT support (Nolan 1982). Indeed, steering committees are invaluable in establishing the tone of business–IT relationships (Ross et al. 1996). The presence of IT steering committees provides the visibility of IT initiatives, an essential tool for top management to appreciate IT in the organization (Prasad et al. 2010). Moreover, having a steering committee composed of both business unit leaders and CIOs can help ensure close coordination of business and IT in the organization and hence the strategic alignment (Bowen et al. 2007). Finally, structures that allow the CIO to directly report to the CEO and/or the COO[6] ensure that IT is part of the executive team, the level at which most strategy discussions occur. This enables the CIO to obtain a global and holistic perspective on the organization, its goals and strategies, and enhances the CIO's understanding of the TMT's vision of the organization. These *structural mechanisms* influence IS strategic alignment by enabling access to both IT and business units for knowledge exchange and activity participation (Karahanna and Preston 2013).

Formal processes for strategic information systems planning and project/portfolio governance ensure that the CIO first understands the business needs, next prompts the CIO and TMT to reach common organizational goals and objectives through better organizational planning, and finally facilitates the alignment of the organization's IS strategy with its business strategy. For IT governance to be effective, IT policies have to be communicated throughout the enterprise. *Communication approaches* allow the IT and business executive management to communicate and make sure that their roles and responsibilities are clearly understood by each other. Communication mechanisms in this study include situations where the CIO serves on executive committees and discusses IT issues via the established agenda. These conditions enable the CIO to interact with the TMT about how IS can add value and support business strategies. Through this communication mechanism, business knowledge can also be transferred back to the CIO. At the same time, the CIO is able to articulate a vision of IT's role, which helps the TMT understand the role of IS within the organization, in turn enabling the transfer of IS knowledge to the business executives. For shared understanding to develop, the CIO needs business knowledge and the TMT needs some strategic IS knowledge. The CIO's business knowledge and the TMT's strategic IS knowledge enable the "IT and business executives, at a deep level, to understand and be able to participate in the others' key processes and to respect each others' unique contribution and challenges" (Reich and Benbasat 2000, p. 86). Thus, shared knowledge enables the CIO and TMT to create a shared understanding of how IS can be applied to enhance organizational performance, which is a critical and indispensable antecedent to IS strategic alignment.

IS Strategic Alignment as Mediator

Business value can be achieved through IT by implementing an effective IT governance framework (Kearns and Sabherwal 2007). IT governance mechanisms serve as organizational arrangements that allow CIOs and business executives to better contribute their domain knowledge, interact with each other to share perspectives, and enable the transfer of business knowledge and strategic IS knowledge between these two groups. For example, Xue et al. (2013) posit that the allocation of decision rights to the IT unit allows IT managers to

[6]A firm's reporting structure has been closely tied to strategy and performance (Chandler 1962). CIOs may report to C-level executives other than the CEO and the CFO, such as the COO (Stephens et al. 1992). According to Luftman (2003), companies with CIOs reporting to CEOs or COOs have better IT/business alignment. Although having the CIO report to the COO is not very common (Banker et al. 2011), in our sample, some companies do have a reporting structure in which the CIO reports to both the CEO and the COO.

use more of their IT domain knowledge in strategic decision making and help other functional managers identify potential risk-mitigating solutions which they may not be able to identify themselves. Thus IT governance mechanisms bridge IT and business units to promote a shared understanding of each other and to enhance the strategic fit between these two units for common organizational goals (Karimi et al. 2000). Shared understanding of business and IT objectives and well-communicated IT strategies and policies lead to effective IT governance performance (Bowen et al. 2007). Therefore, the ultimate goal of increased business value can be achieved by setting up an IT governance framework with well-designed implementation of these three types of mechanisms (De Haes and Van Grembergen 2009; Weill and Ross 2004).

Strategic alignment is one of the mediating factors considered to be important and necessary conditions in the chain of IT value creation (Kohli and Grover 2008). It enables companies to maximize IT investments by achieving the congruence between IT and business strategies and plans, leading to greater profitability (Papp 1999). Without ensuring that IT strategies are well aligned with business strategies, superior performance can never be assured. While the intellectual strategic alignment is the subsequent outcome of the level of mutual understanding between CIOs and TMTs, IT Governance mechanisms actually provide necessary conditions for such shared understanding to occur. This is because IS intellectual alignment can be viewed as an "knowledge integration outcome" resulting from the integration of the business and IS strategies (Karahanna and Preston 2013; Kearns and Sabherwal 2007). As such, IT governance mechanisms such as joint committees and process teams with IT memberships can facilitate business and IT professionals' collaboration on business-oriented IT decisions, thus bringing about a fusion of business and IT thinking, which is, accordingly, a key determinant to top governance performance (Weill and Ross 2004). Therefore, to achieve superior governance, it is necessary to evaluate and ensure the quality of the implemented governance mechanisms. Once the governance mechanisms have been implemented, critical business strategies and IT strategies have to be aligned for subsequent improved firm performance. Taken together, we posit that

> *Hypothesis: IS intellectual strategic alignment mediates the positive impact of IT governance mechanisms on organizational performance.*[7]

[7]We focus on this single hypothesis because the relationships between IT governance and intellectual strategic alignment and between intellectual strategic alignment and performance have been well tested separately in previous research. As noted below, we too found strong support for these links even though they are not being hypothesized.

Research Methodology

In order to empirically validate our research model, a field study was conducted. For data collection, a research instrument was created to adapt existing validated questions wherever possible. Past literature was reviewed to specify a set of items that ensured content validity and to achieve minimal overlap between constructs (Kerlinger 1986; Straub, Boudreau, and Gefen 2004). Items associated with these constructs were assessed using a five-point Likert type scale.

For purposes of content validity, semi-structured interviews with firm-matched CIOs and CEOs were conducted to evaluate the appropriateness of language and content of the measurement items for IT governance. Some of the content was modified and then recast by two experienced IS scholars.

All items were further refined using a small-scale pre-test of the questionnaire (Straub, Boudreau, and Gefen 2004) conducted with 36 Executive MBA students with business and IT backgrounds attending a large Taiwanese university. The purpose of this exercise was to assess logical consistency, ease of understanding, sequencing of items, and contextual relevance. By so doing, we trust that measurement error was reduced and the downstream internal validity of the study improved. In addition, we collected data from both IT and business respondents. The purpose was twofold: first, effective IT governance and strategic alignment need to be positioned as an "end-to-end" responsibility of both business and IT; second, the use of paired responses can avoid the possible bias in single-sided self-reported data. For example, CIOs might tend to overestimate the quality of their governance structures, and, incidentally, CEOs may also overestimate business performance.

To meet these two requirements, we collected matched responses and calculated the degree-symmetric values (Straub, Rai, and Klein 2004) from both sides of the dyad as indicators for validation of our research model. The degree-symmetric metric focuses on the extent to which the business and IT key informants are harmonious as well as the level or degree of the overall agreement. In short, this metric captures both the extent to which the dyad agrees and the extent of that overall agreement, assuming that agreeing at a high degree of strategic alignment is superior in impacting downstream variables to agreeing at a low degree of alignment. The final operationalization of each construct is described next.

Constructs

IT Governance Mechanisms

Items for measuring IT governance focus on the degree to which an organization implements necessary and well-

balanced governance mechanisms. To explore how organizations are implementing IT governance to achieve a better fusion of business and IT goals, De Haes and Van Grembergen (2006, 2009) proposed a set of best IT governance practices. These are based on the now-standard framework of governance structures, processes, and relational mechanisms. They argue that each of these practices serve specific or multiple goals in the challenges offered by complex IT Governance. Using a Delphi approach to assure adequate content validity, they interviewed 22 senior IT and business professionals, and subsequently proposed the top 10 most important IT governance practices.[8] They proffer these as a minimum baseline for an IT governance mix of measures.

Similarly, Weill and Ross (2004) proposed three mechanisms through which enterprises implement their governance arrangements: structures, processes, and communication approaches. By examining and comparing the definitions and items from De Haes and Van Grembergen (2009) and Weill and Ross, we adapted items for structural mechanisms and formal processes from both studies. Based on these two studies, once organizations established governance decision-making units such as committees and executive teams as well as formal processes for monitoring activities related to established IT policies, the alignment of IT and business strategy can be better ensured. Although De Haes and Van Grembergen's concept of relational mechanisms is quite similar to Weill and Ross' communication approaches, our research focuses on the effect of building proper communication and channels to disseminate IT principles, and so we selected Weill and Ross' communication approaches as the third dimension of IT governance mechanisms. The communication approaches include having the CIO hold membership on the executive committee as a proper channel to report and discuss IT-related issues via established agendas and having the CIO or a similar role articulate a vision of IT's role.

IS Strategic Alignment

In the IS literature, the term *fit* has often been used to refer specifically to the measurement of alignment (e.g., Bergeron et al. 2001). The strategic alignment literature suggests that alignment can be examined from many points of view, including planned and realized strategies. Because our focus is on the realized strategies of the organization, we adopt the definition of fit to be the degree of coherence between *realized* business strategy and *realized* IT strategy (Chan 1992). Furthermore, while some researchers have focused on the *process* of achieving alignment (e.g., Chan et al. 1997; Chan et al. 2006; Sabherwal and Chan 2001; Tallon 2008), others have focused on the *content*, that is, how well firms have actually demonstrated alignment of IS with organizational strategy (Hussin et al. 2002). Using a content approach, Hussin et al. (2002) propose nine items dealing with product-oriented, market-oriented, and quality-oriented business strategies and then nine parallel IT strategies to align with each of these nine business strategies. Product-oriented strategy deals with product differentiation and new product strategy; market-oriented strategy includes new market and intensive marketing strategy; and quality-oriented strategy consists of service quality, product quality, and production efficiency.

In a departure from prior research focusing on the process of achieving alignment, we operationalize how well firms actually demonstrate alignment of IS with organizational strategy (i.e., the content approach) because this better captures our argument that IS strategic alignment in this research is the *realized state* achieved by implementing IT governance mechanisms. The degree of the realized strategic alignment is influenced by the degree of the implemented IT governance mechanisms. In addition, while many researchers (e.g., Tallon and Pinsonneault 2011) have treated strategic alignment as a reflective construct, we model it as formative, consisting of three types of strategies that associate with firm performance.[9] Why? First, in terms of the effect on increasing organizational competitiveness, we considered these three dimensions appropriate for assessing IS strategic alignment. Many IT studies have simply posed a question such as: "On a scale of 1 to 5, how do you rate strategic alignment in your organization?" While this can be helpful as a single indicator of overall alignment, more detailed scales offer greater means of testing measurement validity (Chan and Reich 2007). In addition, our three dimensions (product, market, and quality) encompass the major business strategies that most companies employ, and they contribute independently to organizational performance, which is assessed in our study as customer perspective, operational excellence, and financial returns. In short, elements of our mediating variable *alignment* map well with our dependent variable *performance*, as suggested by Burton-Jones and Straub (2006) for stronger nomologies. For example, a better alignment of IS to support new market strategies may possibly increase financial returns in the future but not necessarily increase operational excellence at the same time.

[8]We adopted the 10 best practices from De Haes and Van Grembergen (2009) as questionnaire items for IT governance mechanisms. Matching them with the three types of mechanisms followed the original classification of De Haes and Van Grembergen (2009) and definitions provided by Weill and Ross (2004).

[9]These three types of strategies do not necessarily covary, as argued in the methodological literature on formatively measured constructs (Diamantopoulos and Siguaw 2006; Jarvis et al. 2003).

As for measurement of the degree of alignment, Venkatraman (1989) offers six interpretations of fit, two of which are appropriate for this research: the matching and the moderation perspectives. Although both approaches have been widely used in previous research (e.g., Chan et al. 1997; Hussin et al. 2002), neither has dealt with the measurement challenge where different combinations can yield the same alignment score.[10] To avoid a measurement approach that might jeopardize the validity of our analytical results, we adopted the mathematical formulations calculating the degree-symmetric value from Straub, Rai, and Klein (2004, p. 99).[11]

Organizational Performance

To measure organizational performance, we believe, consistent with Rai et al. (2006), that organizational aggregate performance is best measured relative to competition. Thus, we adopt three dimensions of performance from the balanced scorecard (Kaplan and Norton 1992): (1) financial performance, (2) customer perspective, and (3) internal business processes. Because of the scorecard articulation of the linkages between performance measures and business strategy, Banker et al. (2004) argue that "by combining these different perspectives, the balanced scorecard helps managers understand the interrelationships and tradeoffs between alternative performance dimensions and leads to improved decision making and problem solving" (p. 423). Notably, we did not include items for the balanced scorecard's learning and growth dimension since it was less likely that our respondents could rank their own employees' learning skills and innovative potentials relative to their competitors. In addition, based on Rai et al., we concur that these three dimensions are sufficient and appropriate.

For assessing financial performance, financial metrics covering the major categories were required. Weill and Ross (2004) identify three different dimensions: *profit* (surrogates being return on equity [ROE], return on investment [ROI], and percent profit margin); *asset utilization* (measured by return on assets [ROA]); and *growth* (percent change in revenue per annum). Hence, we used ROE, ROI, and ROA as the formative elements of financial performance.

The customer perspective is comprised of product leadership, customer satisfaction, and firm image, all of which were measured by the customer view of a firm's products and services, their overall satisfaction level, and how they perceive the firm image (Kaplan and Norton 2004). Reflecting customer requirements, these components are key to building good relationships with customers and increasing loyalty (Hayes 2008), which, in turn, leads to long-term profitability and business success (Reichheld et al. 2000). To access the performance of internal business processes, we use operational excellence, defined as a focal firm's responsiveness to customers and improvements in productivity relative to its competition (Rai et al. 2006). We use self-reported measures since they have been widely used in organizational research and it is believed that senior managers have reasonable information and perspective about organizational performance (Dess 1987; Powell 1992). However, in order to cross-check the validity of the self-reported measures of performance, we collected archival data with accounting-based measures of performance from public sources for a subset of firms in our sample. The cross-validation of our self-report data is described in the next section.

Table C1 in Appendix C summarizes the definitions and references for the constructs and subconstructs with the indicators associated with each subconstruct. The complete questions used for measuring each construct are enumerated in Appendix A.

Control Variables

Not all research has concluded that strategic alignment has a direct or positive impact on performance and these inconsistent results are perhaps due to a lack of control variables in the analyses (Chan and Reich 2007). Chan et al. (2006) found, for example, organizational size is associated with strategic alignment. While firm size is usually treated as one of the antecedents to organizational performance, we model it as a control variable directly affecting strategic alignment in that our main focus is the mediation effect of IS strategic alignment. We were trying to rule out rival explanations of alignment other than IT governance.[12] Since it is easier for workers to communicate and coordinate with each other in very small firms, small-sized firms may tend to be relatively better aligned while medium-sized firms may show less evi-

[10]For example, in the matching approach, $(5 - 5) = (1 - 1)$; in the moderation approach, $(4 \times 1) = (2 \times 2)$. In either case, the interpretation of alignment can be totally different but the resulting scores are the same.

[11]For example, if business strategy value is 2 and IT strategy value is 3 on a five-point scale, the degree value (DV), defined as the summated index of the IT and business strategy values of the construct, is calculated as $(2/5 + 3/5)/2 = 0.5$; then the symmetry value (SV), the ratio of the IT strategy value to the business strategy value, is $2/3 = 0.66$. Finally, the degree-symmetric value (DSV), defined as the extent to which the IT and business informants actually accord with each other (as to the overall agreement), is computed as $(DV + SV)/2 = (0.5 + 0.66)/2 = 0.58$.

[12]To be complete, we also tested the effects of firm size on organizational performance and industry type on strategic alignment and no significant results were found.

dence of strategic alignment (Chan and Reich 2007). In addition, important antecedents to alignment were contingent on the industry in which the organization operated (Chan et al. 2006). Xue et al. (2012) also found that the impact of IT asset portfolio on organizational efficiency varies in different industry environments. For example, IT asset portfolio is associated with a greater increase in operational efficiency in less dynamic industry environments. In that our sample was collected from medium- to large-sized firms across different industry types, we specified firm size and industry type as control variables for ruling out alternative explanations in our research model. Total number of full-time equivalent employees was used as a proxy of firm size. As for the industry type, Tan (1995) found that IT is more responsive to businesses emphasizing innovation in their product and market strategies. As such, IT industry may have higher performance attributed by IT supporting business strategies compared to other industries. We thus categorized the industry type into two groups: IT versus non-IT.

Data Collection

Our study employed a matched-pair design, which helped to limit common method bias (CMB) between those variables preceding performance in the model (i.e., IT governance mechanisms and strategic alignment) and the dependent variable organizational performance. The fact that these dyadic data were gathered from distinct and independent sources (Podsakoff et al. 2003) and were subsequently transformed into degree-symmetric values greatly reduces the chances of CMB. In addition, this dyadic design allows researchers to use items that are suitable to each respondent's domain knowledge (Tallon and Pinsoneault 2011). In our design, we asked executives or senior managers from both IT and business departments to answer governance- and alignment-related questions. These questions require respondents with sufficient management knowledge from both business and IT domains and cover responsibilities of both sides. In addition, since the use of paired responses can avoid the possible bias in single-sided self-reported data (e.g., CEOs may overestimate business performance), we also asked IT managers to answer the performance questions and we calculated the degree-symmetric values for data analysis.

The research instrument targeted high-level business and IT executives (such as CEOs and CIOs) or senior managers ranging from mid-sized (with more than 100 employees) to large (with more than 1000 employees) firms in Taiwan. Since IT governance is practiced more often in larger companies and strategic level decisions should involve higher level managers/executives, we concluded that the most suitable respondents would be the most senior managers from both business and IT departments in medium- to large-sized organizations.[13] For a sampling frame of working adults, we contacted EMBA programs from different Taiwanese universities and their related professional and school associations such as the University–Industry Cooperation Center and alumni associations for volunteer participants. We collected essential data via mail, e-mail, and online questionnaires. In that we needed to collect dyadic data from both top IT and business managers, we eliminated responses with single respondents and those with incomplete values. In the data analysis, we achieved matched responses from a total of 136 organizations[14] to validate the proposed research model, resulting in a response rate of 71 percent,[15] a rate that is considerably higher than matched surveys found elsewhere in the alignment literature using a similar approach for data collection (e.g., Karahanna and Preston 2013).

The majority of the respondents (more than 70 percent) were high to middle level managers or executives from business units and IT departments, persons who held positions that are well suited with the subject matter of this investigation and were likely to be informed about strategies and other decisions within their firms. The mean age of respondents was 47 and average work experience was 12.5 years. More than 66 percent had a Master's or a higher educational degree. Participating organizations represented a variety of industries including manufacturing, services, IT, and others, and 70 percent of the organizations had more than 1000 employees.

Nonresponse bias was tested through *t*-tests on the independent variables. Assuming that the last group of respondents is most similar to non-respondents, a comparison of the first and last timed quartile of respondents provides a test of response bias in the sample (Armstrong and Overton 1977; Bailey 1978). The first and last quartiles were compared on key study variables and there were no significant response

[13]Since the participating organizations in this study were medium to large in size and the three industries included account for over 90% of the 1,000 largest firms in Taiwan, as identified in the 2007 directory published by China Credit Information Services, Ltd., we considered them an appropriate target population for this study.

[14]After the cross-validation process using archival financial data, five firms from the same financial industry were dropped. This resulted in 131 firms for our final data analysis.

[15]We employed a dual-stage strategy for data collection. We first contacted volunteers, and then we asked them to help recruit another respondent (top executives) from the same organization (snowballing); therefore, the response rate actually represented the return rate with complete matched instruments per organization. That is, two complete instruments from the business and IT departments from the same organization were required for every dyadic sample.

biases across these variables (decision-making structure, t = 0.349; formal process, t = 0.768; communication approach, t = 0.179; product-oriented alignment, t = 0.263; quality-oriented alignment, t = 1.482; market-oriented alignment, t = 1.04).

In addition, since it is virtually impossible to get information about the whole population, in this case, comparison (χ^2) tests of the characteristics (firm size and industry type) between the first and last quartile were utilized and these found no significant differences (p = 0.228 for firm size and 0.110 for industry type). The comparison results indicated that non-response bias was not a pervasive threat in this research. The descriptive statistics of the sample characteristics can be found in Appendix B.

Data Validation and Analysis

Measurement Validation

The instrument was validated via partial least squares (PLS) using SmartPLS 2.0 (Ringle et al. 2005). PLS is well suited for our study because our research model employs formative indicators (Chin 1998). After purification (MacKenzie et al. 2011), the psychometric properties of the instrument were assessed. As shown in Appendix C, the research measures are all multidimensional, second-order formative/first order formative (Jarvis et al. 2003). According to Jarvis et al. (2003), constructs should be modeled as formative if the following decision rules hold: (1) the direction of causality is from indicators to constructs, (2) the indicators are not interchangeable, (3) covariation among indicators is or is not present; and (4) the nomological net (antecedents and consequences) of indicators differs. These four decision rules suggest that both first-order and second-order constructs in our research model can only be modeled as formative. For example, while the formative conceptualization of IT governance mechanisms was based on the logic that increases in decision-making structures, formal processes, and communication approaches increase the degree of IT governance mechanisms, these three aspects of governance are certainly not interchangeable and do not necessarily covary. Similarly, organizational performance was assessed by three different dimensions—financial returns, customer perspectives, and operational excellence—the sum of which we believe sufficient to represent an organization's overall performance. Not only do these three aspects not necessarily covary, but they are also not interchangeable. As Jarvis et al. argue, an increase of any of these three formative indicators can increase the degree of the overall performance, but not necessarily increase the level of the other two indicators.

In order to estimate the significance of the indicator weights (Gefen et al. 2000), a bootstrapping technique with 500 re-samples was used. No minimum threshold values for second-order indicator weights have been established and so none were dropped, consistent with the suggestions of Petter et al. (2007). We determined that the instrument was conceptually coherent and that construct validity was sufficient to proceed to the structural tests of the model. All measurement validation procedures and tests for the formative measurement model are described in detail in Appendix C.

Test of Structural Model

Figure 2 shows graphically the results of the tests of the structural model. The hypothesis was tested by examining the size and significance of the paths in the model and the explained variance or R^2 values (Barclay et al. 1995; Chin and Gopal 1995). Based on a review of the prior literature, we included firm size as a control variable for IS strategic alignment, and industry type (IT versus non-IT) for organizational performance.

We calculated the *a priori* statistical power of our sample for each of the two dependent variables (IS strategic alignment and organizational performance) in our structural model to ensure that any nonsignificant effects would be interpretable. The statistical power to detect significant effects for each dependent variable (given the number of predictors, explained variance, sample size, and a significance level of 0.05) was 0.99, which exceeded the recommended guideline of 0.80 (Cohen 1988), suggesting that our sample offers sufficient statistical power for testing the research model.

The results in Figure 2 indicate that all weights and paths were significant at the .05 alpha protection level and that the model explains 30.3 percent of the variance in organizational performance and 27 percent of the variance in IS strategic alignment. The standardized path coefficient from IT Governance mechanisms to IS strategic alignment is 0.520 and the effect of IS strategic alignment on organizational performance is 0.551, both significant at an alpha protection level of 0.05—and both of sufficient magnitude that it is clear that the effects are substantive.

Archival Data Cross-Validation of Self-Report Data

To triangulate on these self-report results, we collected available archival data on firm performance from public sources (mainly from the Market Observation Post System website in

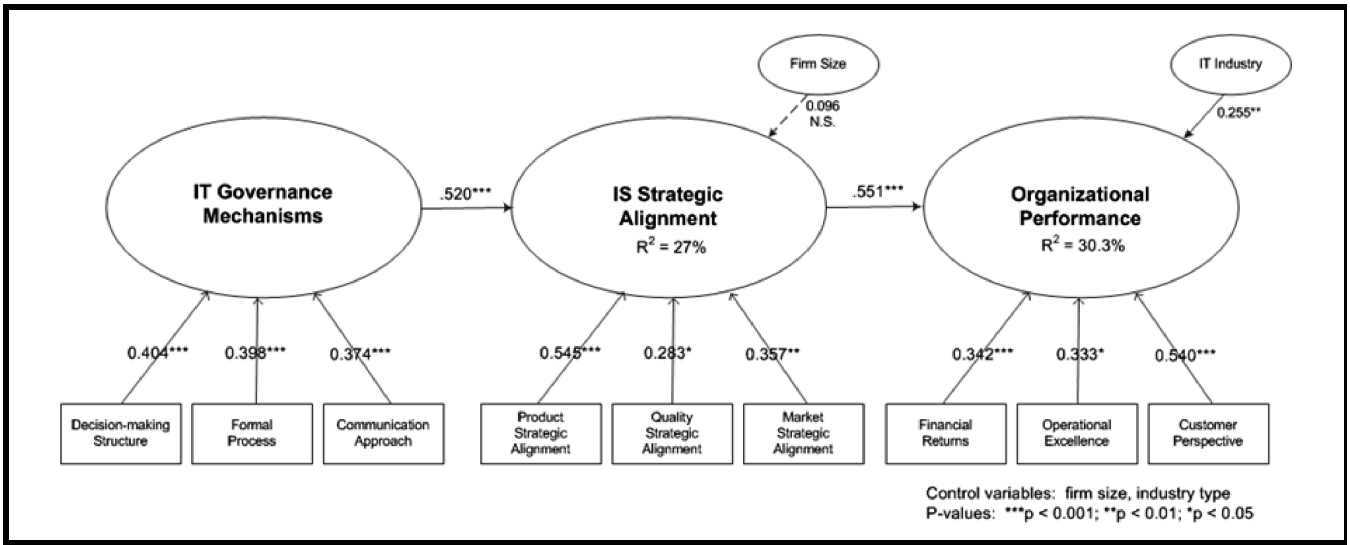

Figure 2. Results of Initial Path Analysis

Taiwan). This collation process resulted in a dataset with two additional financial measures (ROA and ROE) for a total of 77 firms. We then conducted multiple cross-validations to assess the quality of the self-report data used to assess performance and further exercise the model. In true triangulation form, validation of one method (self-reports) also validates the other, in this case archival method (Campbell 1960), so the ultimate goal of our triangulation was to test for and hopefully find similar outcomes. First, after correlation analysis, five organizations from the financial sector were removed (from both this dataset and the initial dataset) because the self-report responses were highly inconsistent with the archival financial reports. We then computed a three-year (2009–2011) mean value of the two ROA and ROE financial performance measures and reevaluated the research model via PLS. Significant paths are indeed highly similar (strategic alignment → organizational performance with path coefficients of 0.551 using self-reported financial data of 72 firms and 0.597 using archival data). Of the variance in organizational performance, the structural models explain 30.3 percent with self-report data and 35.7 percent with archival data. This cross-validation analysis provides additional support for the overall validity of our empirical findings.

Testing the Main Hypothesis: The Mediating Effect of IS Strategic Alignment

To assess the significance of the mediating effect of IS strategic alignment and determine whether it partially or fully mediates the relationship between IT governance mechanisms and organizational performance, we first performed a Sobel test (Baron and Kenny 1986; Kenny 2012; Sobel 1982). This technique examines the path coefficients and the standard errors of the direct paths between IT governance mechanisms (independent variable), strategic alignment (mediating variable), and organizational performance (dependent variable). The indirect effect of IT governance mechanisms on organizational performance is significant as indicated by this Sobel test (5.789, $p < 0.001$).

To determine whether strategic alignment completely or partially mediates the link between IT governance mechanisms and organizational performance (Kenny 2012), the direct effect is examined when the mediator is removed from the model. When we remove strategic alignment from the model, the direct effect of IT governance mechanisms on firm performance changes from insignificant to positive and significant ($\beta = 0.408$, $p < 0.001$). This means that IT governance mechanisms are positively associated with performance but only insofar as IT governance mechanisms influence IS strategic alignment. It is only subsequent to this that IS strategic alignment contributes to higher organizational performance. Thus, the analysis suggests that IS strategic alignment fully mediates the linkage between IT governance mechanisms and organizational performance.

Discussion and Implications

Overall, our model suggests, at about 27 percent and 30 percent explained variance levels and substantive path coeffi-

cients, that IT governance mechanisms enable IS strategic alignment, which itself increases organizational performance, especially operational excellence and customer attentiveness. These findings have substantive implications for organizations implementing IT governance practices in as much as IT governance needs to be focused and leveraged in order to create superior strategic alignment.

The magnitude of the significant weights can be used to determine the relative importance of indicators in forming a latent construct according to Cenfetelli and Basselier (2009). Because PLS estimates the measurement model and the relationships between constructs simultaneously, the "item weights of formative constructs display the importance of their impact" on the dependent variable or the corresponding latent construct (Chwelos et al. 2001, p. 312). Thus, the weights on the subconstructs reveal their relative importance in determining the latent construct. These weights can be interpreted similarly to the estimated beta coefficients from a multiple regression analysis (Chwelos et al. 2001). That is, for formative indicators, one examines item weights, which can be interpreted as a beta coefficient in a standard regression. Since the model was run using standardized construct values, the beta values can be interpreted directly. Some detailed observations regarding the relationships between IT governance mechanisms, strategic alignment, and organizational performance are called for. First, while the weights associated with the three formative indicators of IT Governance mechanisms (i.e., decision-making structure, formal process, and communication approach) are similar (weights of .404, .398, and .374, respectively), we conclude that these three mechanisms contribute fairly equally to the intellectual alignment between IT and business strategy. This is consistent with the IT governance literature that well-balanced mechanisms lead to effective IT governance (e.g., Weill and Ross 2004).

Second, product-oriented alignment (weight = .545) is more heavily affected by IT governance mechanisms than quality and market alignment (.283 and .357 weights, respectively). This seems to imply that the more IT strategy aligns with business strategy in terms of supporting new product development, product diversification, and differentiation strategies, the better the overall performance. Market-oriented strategic alignment, which includes alignment in intensive marketing and new market exploration, occupies the second position. Finally, the strong effect of strategic alignment on organizational performance suggests that strategic alignment may also improve organizational performance, especially when it helps organizations to improve how they are being perceived by customers (the customer perspective), which is a critical success factor in today's competitive marketplace.

Implications for Practice

The research findings also provide certain implications for practice. First, placing CIOs on executive committees is an effective mechanism for promotion of IT/business alignment. While shared understanding (i.e., social alignment) is a critical predictor that leads to strengthening the intellectual dimension of IS strategic alignment (Preston and Karahanna 2009), our results support the argument that structural governance mechanisms provide the institutionalized context for CIOs and TMTs to participate in the decision-making process. Together these parties can and should interact with each other and share domain knowledge. Moreover, direct reporting structures to the CEO enable direct CIO–CEO interactions and hence promote shared understanding which, in turn, leads to IS-business intellectual alignment. While our results seem to support the effectiveness of such centralized governance structures,[16] this may be because hierarchical cultures (such as in Taiwan) are more likely to adopt centralized governance structures (Sambamurthy and Zmud 1999) and tend to depend on vertical communication (Martinsons and Davison 2007).

Banker et al. (2011) also argue that firms that align their CIO reporting structure with their strategic positioning (e.g., a differentiation strategy with a CIO–CEO reporting structure) will earn superior rents. This finding is consistent with Kearns and Sabherwal (2007) who argue that centralization of IT decisions affects top managers' knowledge of IT. This facilitates business managers' participation in strategic IT planning and IT managers' participation in business planning and both of these planning behaviors enhance business–IT strategic alignment.

In addition, as IT decisions made by steering committees and CEO/CIO (corporate level) tend to be a centralized governance structure, a higher degree of IT governance structural mechanisms heralds at the same time a quite centralized governance structure. This mechanism design allocates strategic decisions (at the corporate level) to their natural organizational owners (the CEO, CIO, and top management team) and can lead to better fit between business and IT capabilities to create synergies across different units in multibusiness organizations (Reynolds et al. 2010).

Secondly, the importance of communication approaches can be explained through the alignment benefits that come from

[16]We found that the majority (more than 65%) of the survey responses for governance structures answered 4 or 5 on a 1–5 scale, while 3% answered 1 and 12% answered 2, all of which indicates, overall, a fairly centralized governance arrangement in the sampled Taiwanese firms.

knowledge sharing among IT and business executives and a shared understanding of the role and capabilities of IT (Preston and Karahanna 2009). This shared understanding and knowledge between IT and business executives can best be achieved by more conscious communication. Enjoining proper communication channels, IT and business managers are more apt to sense market opportunities or threats and to build a consensus around particular strategies. Therefore, communication mechanisms can strengthen IT support of business strategies, especially in market-related strategies. At the same time, knowledge sharing, which involves the sharing of information and expertise, can help decision making and strategies for cocreating new or better products (Dyer and Hatch 2006), hence leading to better alignment in product-oriented strategies. To our surprise, the relatively lower weight in the quality-oriented strategy alignment suggests that the current IT strategy support for achieving product quality and service quality strategies is not the primary source of competitive advantage, at least as seen in our sample. While prior studies have only considered quality improvement to reflect key strategic orientations of firms (e.g., Oh and Pinsonneault 2007), we instead adopt a more complete approach to include all relevant dimensions, in terms of business strategies, that can reflect the relative contributions of each alignment.

What is heartening in these results is that firm performance does improve with good strategic alignment. The performance elements that are most affected by good IT–business alignment are, in reverse order of impact, operational excellence (weight = .333), financial returns (weight = .342), and customer focus (weight = .540). These results reify the earlier inferences that good governance and alignment affect customers in the most dramatic way.

Overall, the findings of performance elements hint that intangibles such as more responsiveness to customers do not always impact the balance sheet directly or immediately, but do help meet customer demands. Conventional measures such as financial metrics are thus seen as inadequate in themselves to fully capture corporate performance (Banker et al. 2001). To survive and compete in the information age, it is necessary for companies to use measurement systems derived from their strategies and capabilities (Kaplan and Norton 1996). When managers get excessively focused on short-term financial performance metrics, activities such as process improvements and customer and market development, both of which bring in long-term benefits, will be traded off for quarterly profitability. Nevertheless, we close by pointing out that the impact of alignment on financial performance was significant and substantial enough in our findings to draw the attention of managers.

Contributions to Research

Our theoretically significant findings show that (1) IT governance mechanisms (decision-making structures, formal processes, and communication approaches) are important antecedents of the intellectual dimension of IS strategic alignment, and (2) the intellectual dimension of IS strategic alignment fully mediates the impact of IT governance mechanisms on organizational performance. While previous studies have shown that IT governance can have a direct effect on organizational performance (e.g., Brown and Magill 1994; Sambamurthy and Zmud 1999; Weill and Ross 2004), we instead formulate an alternative nomology in which strategic alignment fully mediates the link between IT Governance mechanisms and organizational performance. Prior research has considered the effects of strategic alignment in terms of historical measures of financial performance (Croteau and Bergeron 2001; Oh and Pinsonneault 2007; Tallon and Pinsonneault 2011), whereas this research employs more comprehensive performance measures that identify the larger impact of strategic IT alignment and our results show that strategic alignment may contribute more to other key indicators such as gaining a customer focus.

This study adds to the theoretical bases of the IT governance and strategic alignment literature in three ways. First, we propose and empirically validate IT governance mechanisms as a construct that captures crucial IT governance practices, which provides an institutionalized context within which social alignment occurs and later leads to intellectual dimension of IS strategic alignment. We base this on the implementation frameworks of De Haes and Van Grembergen (2009) and Weill and Ross (2004), but our modeling of the construct is unique in the literature. Second, we propose a mediated research model that postulates a causal link between IT governance mechanisms, strategic alignment, and organizational performance and thus conceptually links these two key antecedents to organizational performance. Third, we identify and empirically test strategic alignment as fully mediating the positive impact of IT governance mechanisms on organizational performance.

Apart from the nomological contribution, this study also provides support for previous governance research in that although the three governance structures, mechanisms tend to undergird a centralized mode, in fact some contingency factors have to be taken into consideration such as the types of IT decisions (Weill and Ross 2004) and IT activities (Sambamurthy and Zmud 1999) as well as the organization's strategic direction (Weill and Ross 2004). Our findings suggest the following.

First, in our research, steering committees at the executive or senior management level are responsible for determining IT development prioritization and investment, which are suggested by as Sambamurthy and Zmud's (1999) study and Weill and Ross' (2004, 2005) governance arrangement matrix. IT decisions regarding IT principles, IT prioritization, and investment should be made by a business monarchy at the corporate level (as our results also demonstrate) in order to get higher performance.

Second, the reason for more effective governance practices tending to be centralized is that a centralized IT governance structure can better promote efficient IT use (Huang et al. 2010). It also eases the decision-making process that encapsulates IT/business alignment. The effectiveness of IT governance can smooth the way for IT to facilitate enterprise strategy, which should be evident in business–performance metrics. Weill and Ross (2005, p. 29) found that "the most profitable companies tend to be centralized in their approach to IT governance" as "their strategies emphasize efficient operations." Our assumption that centralized IT governance may encourage a high degree of standardization in the pursuit of profitability and operational excellence is based on their research findings using ROE, ROI, and ROA to measure firm profits, and this assumption seems to be borne out in our overall results.

Finally, this research suggests that IT governance mechanisms serve as an institutionalized context for promoting IT–business shared understanding (i.e., social alignment). In that IT–business partnerships can be regarded as one kind of IS resource, distinguished from IT assets by their intangible nature (Nevo and Wade 2010), our research also confirms previous empirical findings to support the notion that IS resources can contribute to organizational performance (e.g., Rai et al. 2006; Tanriverdi 2006).

Limitations and Future Research

There are limitations to this study to guide future research. First, our research findings relied on perceptual dyadic data from two key informants in the business units and IT departments of each organization. The use of a single informant from each department was due to accessibility issues, but we tried to reduce bias by using a dyadic design utilizing responses from both senior business and IT executives and degree-symmetric metrics. Measures of all key variables of IT governance mechanisms and strategic alignment may have higher reliability when answered by numerous members of senior management from the same organization (Klein et al. 1994).

Second, given that we used cross-sectional data to evaluate the impact of IT governance mechanisms on strategic alignment and performance implications of strategic alignment as a critical mediator, it would be useful to conduct longitudinal research on key antecedents of effective IT governance and its consequences. Such research could provide valuable insights into the lagged influence of governance antecedents and strategic alignment on organizational performance over time.

Third, our research was limited to one country, Taiwan, thereby limiting the generalizability across borders. However, as the results suggest, a centralized governance structure is effective in promoting the intellectual IS strategic alignment and this may be in part due to the high power distance culture of Taiwan. Applying Weill and Ross's (2004) archetypes of IT governance decision-making structures (i.e., business monarchy, IT monarchy, IT/business duopoly, federal, and feudal),Wang (2010) also found that the vast majority of Chinese companies employed only the IT monarchy and business monarchy governance modes. This pattern of centralization implies a potential cultural influence in the adoption of IT governance structures. That is to say, individual dimensions of IT governance mechanisms can be dramatically influenced by national culture. If this assumption is true, it is very possible that our results could be generalizable to other Asian countries with high power distance. To prove this speculation, data collected in other Asian and Pacific Rim countries should be compared with those from the Western Hemisphere, Europe, the Middle East, and Africa. There could be interesting cultural effects being played out across these regions. In these cases, more sophisticated analyses of the possible moderating impacts caused by cultural differences could evaluate the relationships among IT decision-making structures and strategic alignment.

Fourth, our focus in this study was on the intellectual dimension of strategic alignment, as in much of the previous literature. While we did not directly measure the social alignment dimension (that is, cognitive elements that result in a shared understanding between CIOs and TMTs), future research can add this construct as an outcome of IT Governance mechanisms. Furthermore, because our conceptualization of communication mechanisms was limited to those formal approaches which Preston and Karahanna (2009) considered to be more effective, further research can add informal communications in that they may be important in trust-forming relationships. We also had a novel approach in modeling the intellectual dimension of IS strategic alignment as a formative construct, which represents a departure from the conventional alignment literature. The use of formative construct may suffer from issues of confounds in interpretation as noted in Tan et al. (2013).

To check whether interpretational confounding existed in this research, we conducted a *post hoc* test to assess the formative constructs. We ran two models as suggested by Kim et al. (2010): one with IS strategic alignment as the sole dependent variable and another with organizational performance as the sole dependent variable. The weights of all of the formative indicators remain consistent across the two models, indicating that interpretational confounding is unlikely to be a major concern in this study. However, formative constructs developed in this study should be verified in future studies with MIMIC models recommended by Jarvis et al. (2003) and Kim et al. (2010).

Finally, this study uses only quantitative data to support the hypothesized relationships. Chan et al. (2006) suggest that a logical extension of the alignment research stream would be to adopt both quantitative and qualitative approaches. Future research should use both quantitative and qualitative data and perhaps mixed methods studies to contribute deeper insights.

Conclusion

IT governance is still a neglected—but crucial—area of IS study, one that has fortunately gained greater attention recently. However, empirical studies in this field are still scarce. The main purpose of this research has been to investigate this important research domain by consolidating knowledge about IT governance, proposing a nomological model to interpret how organizational value is created through IT governance mechanisms, and provide more guidance on how strategic alignment can better enhance the effectiveness of IT governance mechanisms on organizational performance. Dyadic data collected from 131 Taiwanese companies was used to empirically validate the theoretical relationships proposed in the research model. Our findings, cross-validated with archival data from 72 firms, provide a better understanding of the positive impact of IT governance mechanisms on organizational performance and the mediating role strategic alignment plays in influencing this impact.

Our work reveals that IT governance structures, processes, and communications are effective mechanisms in promoting the intellectual dimension of IS strategic alignment in that they provide an institutionalized context that also enables shared understanding (i.e., social alignment) between corporate-level business and IT executives (such as CEOs and CIOs) and the top management team. The research theoretically proposes and empirically validates a nomological model which links three important themes of organizational and IT research: IT governance, strategic alignment, and organizational performance.

Acknowledgments

This research was supported by the MOE Grant for Pursuing Research Excellence and National Science Council Grants (No. 99-2410-H-110-036, 100-2917-I-110-007 & 101-2420-H-110-011-DR). The authors thank Yi-Chieh Chiu for his involvement in a pilot project and help in data collection, the senior editor, an anonymous associate editor, and three anonymous reviewers whose comments have helped improve this paper considerably. The first author is also grateful to the faculty of the CIS department at Georgia State University for providing valuable feedback during her symposium presentation. Special thanks to Dr. Arun Rai for his helpful comments and to Dr. Sandra Slaughter for her insightful suggestion at the first Atlanta-Athens Conference on Research in Information Systems.

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MIS Quarterly

RESEARCH NOTE

HOW INFORMATION TECHNOLOGY GOVERNANCE MECHANISMS AND STRATEGIC ALIGNMENT INFLUENCE ORGANIZATIONAL PERFORMANCE: INSIGHTS FROM A MATCHED SURVEY OF BUSINESS AND IT MANAGERS

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Appendix A

Instrument Items

Part I. IT Governance Mechanisms

For each of the following IT governance practices please choose the most appropriate category according to the implementation degree in your company.

Scale: SD (Strongly Disagree); D (Disagree); N (Neutral); A (Agree); SA (Strongly Agree)

IT Governance Mechanisms		SD	D	N	A	SA
ITM1	Our company has a Steering Committee at Executive or senior management level responsible for determining IT development prioritization.	☐	☐	☐	☐	☐
ITM2	CIO is a full member of the executive committee.	☐	☐	☐	☐	☐
ITM3	Our company has established a formal prioritization process for IT investments and projects in which business and IT is involved.	☐	☐	☐	☐	☐
ITM4*	Our company has established formal processes to control and report upon budgets of IT.	☐	☐	☐	☐	☐
ITM5	Our company has a committee at level of broad of directors to ensure IT is regular agenda item and reporting issue for the board of directors.	☐	☐	☐	☐	☐
ITM6	The CIO or similar role in our company is able to clearly articulate a vision for IT's role in the company.	☐	☐	☐	☐	☐
ITM7	Our company has established formal processes to define and update IT strategies.	☐	☐	☐	☐	☐
ITM8	Our company has a Steering Committee composed of business and IT people focusing on prioritizing and managing IT projects.	☐	☐	☐	☐	☐
ITM9	CIO has a direct reporting line to the CEO and/or COO.	☐	☐	☐	☐	☐
ITM10	Our company has established formal processes to govern and manage IT projects.	☐	☐	☐	☐	☐

Note: *ITM4 was dropped because (1) its concept of control IT budgets overlaps with ITM3 (prioritization for IT investment) and (2) control and report involve two dimensions, which could confuse the respondents when answering this question.

Part II. Strategic Alignment

For each of the following statements, please choose the most appropriate category regarding to the strategic alignment of your company.

Scale: SD (Strongly Disagree); D (Disagree); N (Neutral); A (Agree); SA (Strongly Agree)

Business Strategy		SD	D	N	A	SA
B1*	We attempt to be ahead of our competitors by cheaper pricing of our products.	☐	☐	☐	☐	☐
B2	We attempt to be ahead of our competitors by quality products rather than price.	☐	☐	☐	☐	☐
B3	We attempt to be ahead of our competitors by ensuring that our products are distinctively different from our competitors.	☐	☐	☐	☐	☐
B4	We attempt to be ahead of our competitors in introducing new products.	☐	☐	☐	☐	☐
B5	We attempt to be ahead of our competitors by offering a wide range of products.	☐	☐	☐	☐	☐
B6	We constantly to improve the efficiency of our production process.	☐	☐	☐	☐	☐
B7	We attempt to be ahead of our competitors by providing quality service to our customers.	☐	☐	☐	☐	☐
B8	We attempt to be ahead of our competitors by intensive marketing of our products.	☐	☐	☐	☐	☐
B9	We attempt to achieve growth by expanding into new markets.	☐	☐	☐	☐	☐
IT Strategy						
IT1*	Our current systems assist in reducing our costs.	☐	☐	☐	☐	☐
IT2	Our current systems help us to distinguish our products from those of competitors.	☐	☐	☐	☐	☐
IT3	Our current systems allow us to improve the quality of our products.	☐	☐	☐	☐	☐
IT4	Our current systems enable us to introduce new products earlier than our competitors.	☐	☐	☐	☐	☐
IT5	Our current systems help in improving the efficiency of our production process.	☐	☐	☐	☐	☐
IT6	Our current systems enable our company to diversify our products.	☐	☐	☐	☐	☐
IT7	Our current systems enable our company to provide quality customer service.	☐	☐	☐	☐	☐
IT8	Our current systems enable us to embark on an intensive marketing of our products.	☐	☐	☐	☐	☐
IT9	Our current systems assist us in identifying new markets.	☐	☐	☐	☐	☐

Note: Paired items B1* and IT1* were deleted because, based on expert opinion, the IT strategy of reducing costs is not actually aligned with cheaper pricing of products. IT strategy should be able to assist in decreasing what customers are charged.

Part III. Organizational Performance

For each of the following statements, please choose the most appropriate category regarding to the organizational performance of your company.

Scale: SD (Strongly Disagree); D (Disagree); N (Neutral); A (Agree); SA (Strongly Agree)

Financial Returns		**SD**	**D**	**N**	**A**	**SA**
OP1	Our company's return on investment (ROI) is better compared to other companies in the same industry.	☐	☐	☐	☐	☐
OP2	Our company's return on equity (ROE) is better compared to other companies in the same industry.	☐	☐	☐	☐	☐
OP3	Our company's return on asset (ROA) is better compared to other companies in the same industry.	☐	☐	☐	☐	☐
Customer Perspective						
OP4	Customers perceive our company's quality of products and services is better compared to other companies in the same industry.	☐	☐	☐	☐	☐
OP5	Our company has higher customer satisfaction compared to other companies in the same industry.	☐	☐	☐	☐	☐
OP6	Our company has better firm image compared to other companies in the same industry.	☐	☐	☐	☐	☐
Operational Excellence						
OP7	Our company has better productivity improvements compared to other companies in the same industry.	☐	☐	☐	☐	☐
OP8	Our company has better timeline of customer service compared to other companies in the same industry.	☐	☐	☐	☐	☐
OP9	Our company has better production cycle time compared to other companies in the same industry.	☐	☐	☐	☐	☐

Appendix B

Sample Characteristics (N = 131)

	Frequency	Percent
Revenues		
Less than $ 16.5 million	6	4.6
$ 16.5 million - $ 165 million	33	25.2
$ 165 million - $ 330 million	23	17.6
$ 330 million - $ 1.6 billion	28	21.4
More than $ 1.6 billion	41	31.3
Number of Employees		
100 - 500	24	18.3
501 - 1000	15	11.5
1001 - 5000	43	32.8
More than 5001	49	37.4
Industry Group		
Services	35	26.7
Manufacturing	54	41.2
IT	37	28.2
Other	5	3.8

Appendix C

Measurement Validation: Procedures and Tests

Table C1 summarizes the definitions and references for the constructs and subconstructs and the items of indicators associated with each subconstruct. The complete descriptions of measurement items used for each construct are enumerated in Appendix A.

Table C1. Construct Definitions and Measurement

Construct	Definition	Type	Items	Source or Basis
IT Governance Mechanisms: The degree to which an organization implements critical IT governance best practices.		Formative-2nd order		Weill and Ross (2004); De Haes and Van Grembergen (2009)
Decision-Making Structure	The degree to which the organization has established organizational units and roles responsible for making IT decisions such as committees.	Formative-1st order	IT steering committee (ITM1), and strategic information systems planning steering committee (ITM8), and CIO reporting to CEO and/or COO (ITM9).	De Haes and Van Grembergen (2009)
Formal Process	The degree to which the organization has established formal processes to monitor and ensure that IT policies are consistent with business needs.	Formative-1st order	Formal process for portfolio management (ITM3), formal process for strategic information systems planning (ITM7), and formal process for Project governance (ITM10)	Weill and Ross (2004); De Haes and Van Grembergen (2009)
Communication Approach	The degree to which the organization has established channels to ensure proper communication and disseminate IT governance principles.	Formative-1st order	CIO on executive committee (ITM2), IT strategy agenda to report and discuss IT issues (ITM5), and CIO or similar role to articulate a vision of IT's role (ITM6**).**	Weill and Ross (2004)
Strategic Alignment: The degree of coherence between realized business strategy and realized IT strategy.		Formative-2nd order		Chan (1992)
Product-oriented Strategic Alignment	The alignment between IS strategy and business strategy in product development.	Formative-1st order	IT strategies supporting new products (B4IT4), products diversification (B5IT6) and differentiation (B3IT2) strategies.	Hussin et al. (2002)
Quality-Oriented Strategic Alignment	The alignment between IS strategy and business strategy in terms of quality and production efficiency.	Formative-1st order	IT strategies supporting product quality (B2IT3), production efficiency (B6IT5) and service quality (B7IT7) strategies.	Hussin et al. (2002)
Market-Oriented Strategic Alignment	The alignment between IS strategy and business strategy regarding marketing activities.	Formative-1st order	IT strategies supporting intensive marketing (B8IT8) and new markets (B9IT9) strategies.	Hussin et al. (2002)
Organizational Performance: An organization's aggregate performance relative to its competition.		Formative-2nd order		Rai et al. (2006)
Financial Returns	The degree to which the organization's performance is better than its competitors in terms of conventional financial measures.	Formative-1st order	Return on investment (OP1), return on equity (OP2) and return on assets (OP3)	Weill and Ross (2004)
Customer Perspective	The degree to which the organization's performance is better than its competitors from customers' perspective.	Formative-1st order	Customer's perception of products and services quality (OP4), customer satisfaction (OP5) and firm image (OP6)	Kaplan and Norton (2004)
Operational Excellence	The degree to which the organization's performance is better than its competitors in its responsiveness and generation of productivity improvements.	Formative-1st order	Productivity improvements (OP7), timeline of customer service (OP8), production cycle time (OP9)	Rai et al. (2006)

The first stage in data analysis evaluates the measurement properties of the instrumentation, which include reliability and construct validity. To validate the formative constructs in our research model, we follow the steps recommended in Petter et al. (2007). Petter et al. pointed out that the conventional criteria to evaluate measurement validation such as construct validity and reliability for reflective constructs cannot be applied to assess formative ones. First, content validity is mandatory for formative measures. We established content validity via literature review and interviews with experts (CIOs and CEOs) with respect to the IT governance items. After data collection, construct validity was accessed by removing the first-order indicators with insignificant weightings (Diamantopoulos and Winklhofer 2001).

To assess the measurement properties of the instrument, we first multiplied item values by their individual PLS weights and summed them up for each first-order indicator, a formulation suggested by Bagozzi and Fornell (1982), and then the second-order variables were measured by creating composite indices based on a weighted sum of the first-order indicators (Diamantopoulos and Winklhofer 2001). The generated composite index values were used as the measures for IS strategic alignment and organizational performance. Finally, we use the VIF (variance inflation factor) statistic to determine whether the formative measures are correlated too highly (Petter et al. 2007). The VIF values of all formative constructs are below the threshold value 3.3 (Diamantopoulos and Siguaw 2006), which suggests that our measures do not have a multicollinearity problem.

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