



Research article

# Management commitments that maximize business impact from IT

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## Abstract

As digitization becomes pervasive, many organizations struggle to drive value from the growing number of IT-related opportunities. We show how the drivers of IT value creation can be framed as firm-wide commitments to a set of IT capabilities. On the basis of 20 published case studies, we identify a small set of IT decisions that organizations must make to use IT to successfully enhance their impact. We group these decisions into a framework of four commitments. Making these commitments helps organizations reinforce what really matters over time, which in turn helps focus the attention of their employees. We demonstrate, via a survey of 210 publicly traded firms, that firms which are more effective in making these four commitments have higher business impact from IT, which in turn correlates with higher financial performance. We suggest the construct of commitment is a step toward unifying the IT value literature and creating an overarching concept that brings together many of the important management practices identified in previous work.

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## Introduction

In a world in which rapid technology changes deliver a constant stream of new business opportunities, new competitors emerge from unexpected industries and markets, and customer expectations for technological solutions knows no bounds, how can organizations cut through the noise and use IT to help increase firm performance?

Information systems researchers have found many IT-related capabilities that impact firm performance. These include technical capabilities like real-time access to customer data, organizational capabilities like alignment of IT with business strategy, governance capabilities like strategic IT investment decisions, and human capabilities like cross-functional collaboration and knowledge sharing (for reviews, see, e.g., Bharadwaj, 2000; Devaraj and Kohli, 2003; Kohli and Grover, 2008). Not surprisingly, but frustratingly for managers, studies sometimes contradict one another or assess overlapping capabilities (Liang *et al.*, 2010).

We propose that simply acquiring or creating IT capabilities is not sufficient for improving firm performance, and our goal in this research is to develop a more focused framework. We believe that focusing on capabilities underemphasizes an important management characteristic – commitment. Making

commitments forces organizations to examine alternatives and to make choices, allowing them to focus their energy (and their money) on activities and investments that they expect will bring benefit. We posit that management commitment might be a useful way to frame how organizations can increase the value of their IT capabilities.

To extract the key management actions relating to IT-based capabilities, we examined 20 detailed case studies describing IT-related initiatives designed to impact business performance. The analyses identified a set of four management commitments that, we propose, significantly explain the impact of IT in organizations. They are: (1) strategic choice making, (2) development of digital platforms, (3) working smarter with information, and (4) action-oriented assessment.

We tested our model with a survey of 210 IT and non-IT senior executives representing publicly traded firms from around the world. The survey analysis confirms that these commitments are positively correlated with business impact from IT, which is in turn correlated with firm performance. The relationship between commitments and performance is independent of industry and firm size.

We begin with the development of the construct of commitment based on literature synthesis and analysis of our cases. We then develop a conceptual model of the relationship between commitments and firm performance and describe the methods used for survey development and testing. Finally, we present our results, ending with discussion, limitations, and conclusions.

### Management commitment

How do IT investments support the realization of business value? A long history of research on the ownership and development of valuable IT and non-IT capabilities identifies many factors, including the level of investment (Brynjolfsson et al., 2002), governance (Weill and Ross, 2004; Mayer and Salomon, 2006; Bernroider, 2008), strategic alignment (Chan et al., 1997; Luftman, 2003), various management practices relating to improving the performance of specific systems (DeLone and McLean, 1992; Chang and King, 2005), availability and use of specific resources in complementary ways (Wade and Hulland, 2004), and defining core competencies and outsourcing those that are not core (Feeny and Willcocks, 1998). However, this research has not yet provided a parsimonious explanation as to how these factors combine with IT investments to create value.

The dynamic capabilities literature provides a useful framing that links capabilities with managerial actions that result in business value: the concept of *commitment*, defined by Ghemawat (1991) as a decision that has high impact, because it involves significant sunk costs, opportunity costs, lead times, or symbolism. Teece et al. (1997) acknowledge the importance of irreversible commitments, whether explicit or implicit. They note that developing distinctive processes and mechanisms to coordinate and combine assets is both costly and difficult to imitate, but necessary to create and sustain a firm's competitive advantage.

To examine these critical managerial commitments, and understand what types of actions would exemplify such commitments in the context of information systems, we analyzed 20 in-depth case studies developed between 1999 and 2010 as part of a broad range of research studies relating IT investments and performance. The cases were of firms in a variety of industries, including energy, financial services, technology, and manufacturing. They describe a variety of initiatives relating to information systems, including outsourcing, IT governance, shared services, enterprise architecture, evidence-based decision making, e-business initiatives, and IT-based business transformations. All these cases used similar data gathering methods and key questions. In addition, 16 of the 20 cases were coauthored by one of the authors; the other 4 became relevant for use in this study based on follow-up interviews by the authors with executives at the case study companies. Thus the cases form a consistent body of data for our analysis. We had access to the transcripts, and re-analyzed the case materials for this paper to determine what organizations that had generated business impact from their IT investments had in common (see Appendix A for a list of the companies, commitments observed, and publicly available case write-ups).

Most of the cases reported significant performance benefits. For example, 7-Eleven Japan has been the most profitable retailer in Japan for nearly 30 years; Campbell Soup reversed

performance from industry laggard to a leader in ROE; Aetna survived a near-death experience to become a top performer in the health-care insurance industry; UPS first matched, and then exceeded, FedEx's ability to rapidly introduce customer service innovations; ING Direct became the fastest-growing financial services institution in history. Procter and Gamble has consistently been a global top performer in the fast-moving consumer goods industry. In all cases, management had attributed business success at least in part to their IT-based business initiatives.

To develop hypotheses as to how these 20 firms had created business value from IT, we analyzed each case and listed all of the managerial practices that the case study participants described around building and using IT capabilities. The three authors separately analyzed the resulting list of 319 items to look for themes and to understand what each organization had done to drive value from their IT investment. We then consolidated and grouped them to identify patterns across the cases, ultimately developing four distinctive management commitments. We defined a management commitment as *an explicit, specific, high-level agreement within an organization to operate in a given way*. A commitment leads to a consistent pattern of behaviors. It was not the specific content of a commitment that led to success – these varied across the cases. Rather, it was the extent of the commitment that helped drive firm-performance level benefits.<sup>1</sup> The four commitments addressed (1) strategic choice making, (2) development of digital platforms, (3) working smarter with information, and (4) action-oriented assessment.

### Theoretical background

Once the concept of commitment surfaced from our cases, we returned to the literature to find support for our nascent framing. Commitment at the organizational level has been defined and studied from both a strategic and organizational behavior perspective. Ghemawat (1991) conceives of commitment as a decision that has high impact, noting that industrial economists have demonstrated that costly-to-reverse commitments to durable, specialized factors are necessary for competitive advantage. He focuses on strategic commitments made by an enterprise.

In his seminal work relating commitment to organizational behavior, Salancik (1977) describes commitment as both a psychological and a social process, stating that the effect of commitment derives from the extent to which actions relating to it are binding; this is characterized by the explicitness, reversibility, volition, and publicity of the acts relating to the commitment. Although he focuses on the individual level, this definition readily applies to groups such as an organization's management team, who regularly execute commitment-related actions. Thus, commitment exists at the employee level, as well as at group and organizational levels, and one aspect of effective management is the ability to make and sustain commitments to a course of action.

The literature suggests that commitment at all these levels is key to business value in a variety of contexts, and can be observed through managerial actions. Specifically, previous studies in IT (e.g., Hulland et al., 2007; Oh and Pinsonneault, 2007; Chen et al., 2010; Nevo and Wade, 2010) suggest that, in

a digital economy, management commitments to how IT is positioned, managed, integrated, and used could have significant impacts on business performance. We review each of the four commitments relating to IT value below.

#### *Strategic choice making*

Ghemawat (1991) discusses the potential impacts of making strategic choices, particularly around the types of investments an organization plans to make. In studying Nucor, he shows how commitment to specific strategic choices – namely, how USX's prior commitments to modernizing with conventional (thick slab) technology on existing sites allowed Nucor, its competitor, to commit to, and successfully adopt and profit from new thin slab technology (Ghemawat, 1993).

In terms of the impact of IT investments on business value, strategic choices determine what a firm will do with IT, and, as importantly, what it will not do.

Our case studies and IT management literature suggest there are at least four strategic choices relating to business value from IT: (1) which business processes will be standardized (Mooney et al., 1995; Ross et al., 2006), (2) what data will be shared across the enterprise (Smith and McKeen, 2008), (3) how digital assets will be coordinated (Malone et al., 2006; Shin, 2006), and (4) what activities will be outsourced (Lacity and Willcocks, 1998; Koh et al., 2004).

All 20 of our case studies demonstrated management commitment to one or more of the categories of strategic choices. For example, UPS management made a commitment to standardize its package delivery process and to provide package data across the enterprise. These strategic choices enabled cost-effective operations and rapid implementation of web-based customer services, which allowed UPS to grow:

'The scale, the size, the integration with all the other systems, and the maintenance all beg for centralization and standardization'. – Mike Eskew, Vice Chairman and Incoming CEO.

(Ross, 2001b: 6)

In contrast, Pacific Life chose to standardize only those processes related to business risks, while allowing its business units to develop their own operational processes and data stores:

'I think a big part of our success is customer intimacy. And we've done that very well by being decentralized and being nimble and having an edge in services. [...] and I think a big part of the way we've been nimble and had great service in each of those businesses is by having the services extremely close to the customer'. – Jim Morris, COO.

(Ross and Beath, 2007a: 1–2)

These strategic choices allow Pacific Life's business units to customize their business processes and the related IT to the unique needs of their business partners and customers. The result is that a key goal of their IT investments is to support decentralized operations.

BMW committed to a strategic choice that coordinated all the digital assets in the company (including IT, CAD, robots,

and in-car technology). This choice helped to deliver on the company's strategic goal of delivering custom cars in 6 days.

Procter and Gamble made a choice in 1999 to partner with a set of service providers to deliver some of the company's shared services, which now number more than 170 IT, finance, HR, and other business services: 'By blending business process and technology, we at GBS [Global Business Services] provide solutions to the rest of P&G'. – Filippo Passerini, Group President, GBS, & CIO (Weill et al., 2007: 1). This choice has helped P&G rapidly scale its business to where it now serves over 4 billion consumers. P&G integrated the Gillette business in 15 months with US\$1.2 billion in savings from synergies delivered largely through shared services.

All of these commitments to strategic choices were well communicated and known by employees at many levels. The commitments guided where money was to be invested, and ensured that those investments were significant and difficult to reverse.

#### *Development of a digital platform*

Firms can build innovative applications that offer a short-term boost to performance (Piccoli and Ives, 2005). However, both management experience and research highlight the difficulty of sustaining those benefits when competitors can build a similar application (Johnston and Vitale, 1988; Mata et al., 1995; Nevo and Wade, 2010). Worse still, the proliferation of one-off IT solutions creates a messy IT and business environment that invariably limits future business opportunities (Ross et al., 2006). By implementing digital platforms, rather than individual IT solutions, firms can improve business performance and enable future business opportunities (Barua et al., 2004; Bharadwaj et al., 2007).

Consistent with literature, our cases revealed four types of digital platform investments: technology infrastructure (Weill and Broadbent, 1998), digitized business processes (Bharadwaj et al., 2007), data (Smith and McKeen, 2008; Eckerson, 2009), and electronic linkages to external parties (Truman, 2000; Grover and Saeed 2007). The development of platforms enables reuse of systems and processes, which both cuts costs and reduces time to market (Woerner et al., 2013).

All 20 of our case study sites were building platforms and 11 had existing platforms that impacted firm performance. For example, CEMEX experienced rapid growth through acquisition by replicating its IT infrastructure and ERP platform. Similarly, Dow Chemical Company significantly reduced operating expenses through its ERP platform and standardized processes:

We run, for the most part, single applications that support the whole world. So, we are running a single instance of SAP. [...] And it is all automatic. So, when I say our strength is vertical and horizontal integration, that was a key enabler that drove a tremendous amount of value. – Michael J. Costa, Corporate Director, Six Sigma & Work Process Expertise.

(Ross and Beath, 2005: 4)

Swiss Re wanted to share data globally to manage risk and enhance the customer's experience. But to ensure accurate and timely data for these purposes, management first committed

to a platform that would support standardized business processes:

For us the discussions went: the business model of Swiss Re as a global company asked for global processes supported by global systems, with data as an integral part of it. The alternative would have been to focus solely on the data and allow for heterogeneous business processes. But the decision was clearly to have global business processes. – Guido Kehl, Head, Corporate Technology.

(Beath and Ross, 2007b: 5)

7-Eleven Japan extended its information systems to include its suppliers. This extended platform reduced the time from order to delivery and helped the firm accelerate inventory turnover, which the CEO identifies as the firm's single most important success factor.

Investing in digitized platforms is a well-communicated, costly, difficult-to-reverse commitment, requiring binding actions on the parts of many in the organizations. In all of the cases we analyzed, top management has communicated these commitments, and has made the needed investments in dollars and attention over multiple years.

#### *Working smarter with information*

In our case studies, we found that building a platform invariably led to cost savings, but firms often struggled to drive competitive advantage. However, competitive advantage was apparent in firms that 'worked smarter' by empowering decision makers with information and clear business rules, as well as by using business analytics to create and revise their business rules. Only six of our case study firms demonstrated characteristics of working smarter. However, those six firms were demonstrating significant benefits from enterprise-wide information capabilities and accelerating the benefits from IT-based business initiatives. For example, Allstate Insurance has made a commitment to working smarter with information available from its new integrated claims platform. This involves building fine-grained business rules, based on past claims processed on its platform. These new rules have reduced the time to process a claim from 40 days to as little as 1 day.

PepsiAmericas used its data platform to calculate 'suggested orders': information that its sales representatives used with their customers to plan actual orders more precisely. Using suggested orders reduced store out-of-stocks from 14 to 3.7%: *One of our more experienced Account Sales Managers said, 'You know, I was really skeptical at first and then I just kept finding that the handheld was doing a better job than I was generating an accurate order'.* – Rich Frey, VP, Sales Operations (Beath and Ross, 2010: 10).

Aetna has leveraged its data platform to create a single source of information for executive decisions that more scientifically segments customers and enables them to develop more targeted solutions. 7-Eleven Japan, Swiss Re, and Campbell Soup highlight how data can be used to empower operational-level employees to make decisions on inventories, claims, and supply chain operations, respectively. Those decisions optimize business processes and enhance customer service.

The literature on business analytics and business intelligence describes how firms can embed analytics in digitized business processes, and empower employees to use the information to

improve their decisions (Davenport et al., 2010). Researchers in Naturalistic Decision Making have also discussed the importance of embedding information in work processes to enable better judgment in complex environments (see, e.g., Montgomery et al., 2005), as well as ways to capture human expertise to improve work processes and outcomes (Hoffman, 2007), and using information to improve the performance of experts in the field. For example, submarine operations have benefited from different types of information displays to better manage uncertainty, while oil industry experts have used information for planning, monitoring, and trouble shooting in drilling operations (Mosier and Fischer, 2011). Research on organizational routines has also emphasized the importance of integrating IT and work routines (e.g., Volkoff et al., 2007).

Specifically, our cases revealed three indicators of a commitment to working smarter: (1) empowering operational decision makers with useful information (Morieux, 2011); (2) empowering operational decision makers with clear business rules (Maule, 2010); and (3) creating and revising business rules based on business analytics (Davenport et al., 2010).

A commitment to working smarter also requires significant, difficult to reverse investments, in information assets, process changes, and training. Making these changes is costly in terms of both direct and indirect investment (see, e.g., Sallam, 2012).

#### *Action-oriented assessment*

Nine of our case studies emphasized the importance of committing to assessment practices that generated desirable behaviors. We identified four types of commitments to action-oriented assessment: first was a commitment to using a small set of business metrics that focused people throughout the firm on enterprise-wide goals; second was a commitment to incorporate incentives that balance enterprise and local goals; third was a commitment to the use of rapid feedback to help individuals understand how they are performing, and fourth was a reliance on clear metrics for assessing the success of IT projects.

All of the case study firms that who committed to action-oriented assessment, invested in and relied on digitized data to track performance and provide feedback. For example, Campbell Soup uses data a simple metric, Total Delivered Cost, to encourage individuals throughout the company to use data from the company's ERP to identify opportunities to cut operating costs: *It never dawned on us that what we were doing was empowering thousands of workers, but that is the effect of providing transparent information and the authority to use it.* – Doreen Wright, SVP and CIO (Ross and Beath, 2008: 13).

7-Eleven Japan provides fast graphical feedback to sales-clerks about the recent sales of the items they are responsible for ordering. To encourage enterprise-wide integration, USAA pays bonuses exclusively for achieving firm-wide performance goals. Everyone receiving satisfactory performance ratings receives the same percentage bonus.

The importance of assessment to business success has been well documented by case studies and analyses of numerous firms that have implemented balanced scorecard principles (e.g., Gonzalez-Padron et al., 2010). The goal of the scorecard and similar integrated assessments is to use measurements of key processes and outcomes to provide a framework for new action and continuous improvement (Kaplan and Norton, 1992, 1996b). A commitment to assessing is important because 'what you measure, matters' and

'you get what you measure' (Kaplan and Norton, 1996b). Incentives encourage people to work to achieve goals and to make adjustment to the digital infrastructure, goals, or ways of working in order to improve performance (Capelo and Dias, 2009). Lastly, it is important to be able to assess the performance of projects via post-implementation reviews (Nelson, 2005; Piccoli and Ives, 2005).

A commitment to action-oriented assessment is costly, both in terms of investing in the data and scorecards, as well as in terms of management and employee time to make regular assessments, and to determine the changes to make based on the assessments (Kaplan and Norton, 1996a).

**Conceptual framework and hypotheses**

The research team tested the four commitment model by looking for alternative explanations of ongoing developments at the firms we had studied, both by reviewing the published cases as well as the original interviews and public company documents. Satisfied that the model produced insights into how the case study firms had generated business value from IT, we introduced the model to 15 CIO's in a half-day workshop. The CIOs analyzed their own organizations in terms of the framework of commitments. This exercise helped validate the importance and resonance of the four commitments and gave us confidence we could assess commitments via a survey.

Encouraged by the evidence from the 20 case studies and the CIO feedback, we tested this relationship statistically on a larger sample of firms. Given the strategic role of IT in many organizations today (Sambamurthy et al., 2003), we expect that organizations that have higher levels of commitments relating to IT will perform better.

There are two broad classes of benefit that managers care about: financial performance – reflected in publicly available firm financial performance metrics, and non-financial benefits – visible to managers in an organization, but not measured

directly in financial terms. The latter benefits include strong capabilities, a fact-based culture, consistent innovation, empowerment, and business agility.

While financial performance is easily measured, and does not suffer from respondent bias, it is difficult to disentangle the possible causes of good performance. Non-financial benefits are readily observable to managers, and easier to relate to causes, but difficult to confirm objectively. Therefore, we tested for both types of benefits.

Consistent with other IT research (e.g., Shin, 2006; Muhanna and Stoel, 2010), for the financial measure of firm performance we use return on equity (ROE). ROE is a measure of how well a company uses reinvested earnings to generate additional earnings. It is calculated by dividing the after-tax income by book value. ROE is a general indication of a company's efficiency: that is, how much profit is generated given the resources provided by stockholders. ROE incorporates both profitability and efficiency and is a commonly used broad measure of firm performance (e.g., Kaplan and Norton, 1992; Rai et al., 1997; Shin, 2006).

Thus we hypothesize (see also Figure 1):

**Hypothesis 1:** Firms with higher levels of overall enterprise commitments relating to IT will also have better financial performance.

Specifically:

**Hypothesis 1a:** Firms with greater commitment to making strategic choices will also have higher financial performance.

**Hypothesis 1b:** Firms with greater commitment to development of digital platforms will also have higher financial performance.

**Hypothesis 1c:** Firms with greater commitment to working smarter with information will also have higher financial performance.

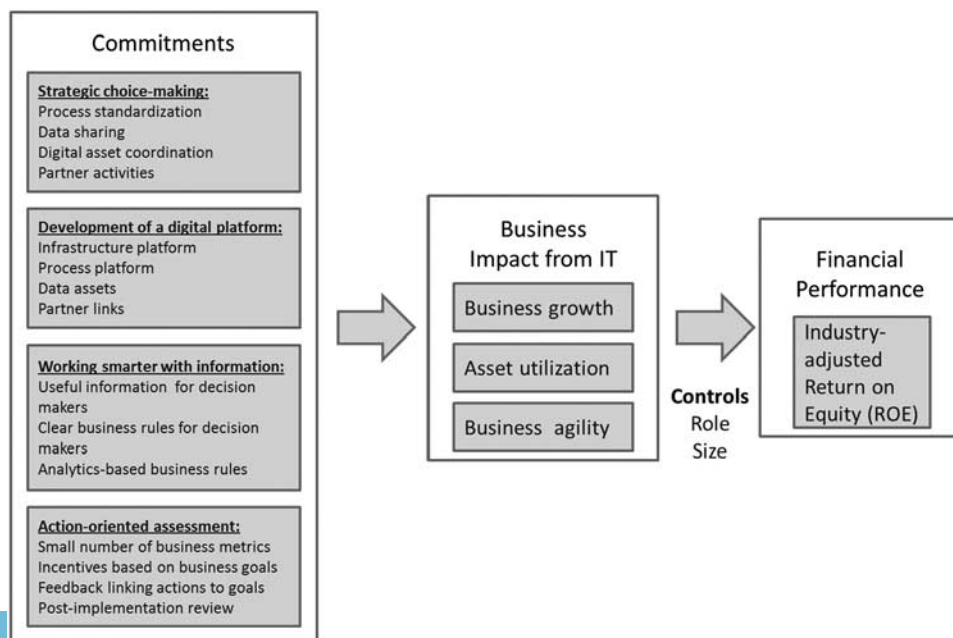


Figure 1 Management commitments, business impact from IT and financial performance.

**Hypothesis 1d:** Firms with greater commitment to action-oriented assessment will also have higher financial performance.

#### Defining business impact from IT

In a single year, many factors – current and past – contribute to a firm's financial performance. Thus, to compensate for confounding factors we adopted a combination of perceptual and financial measures of impact. This dual perspective on performance has also been used in many other studies (Tallon and Kraemer, 2007). The combination of externally reported financial performance measures and directly reported perceptual measures helps provide a trail of evidence, going from IT investments via a firm's management capabilities (e.g., Tanriverdi, 2006; Muhanna and Stoel, 2010) to the perceptual impact of IT on important business goals, and finally to the impact on financial performance.

Prior research has also shown a significant correlation between perceptual measures of IT business value measures and financial performance (e.g., Tallon and Kraemer, 2007) including ROA and ROE (Bharadwaj, 2000; Wang *et al.*, 2008) or Tobin's Q (Hitt and Brynjolfsson, 1996; Aral and Weill, 2007). Lastly, Winter (2003) shows that managers' perceptions of issue that are important to company success are generally sufficiently accurate to lead them to take action.

We define business impact from IT as the perception of the contribution of IT to three broad business outcomes: business growth, asset utilization, and business agility. We weight this contribution of IT to each outcome by the perceived importance of each outcome. This measure is consistent with other research. Kohli and Grover (2008), in their call for expanded research in the area of business value of IT, note that IT value can manifest itself in many ways, including productivity improvements and profitability through efficient use of assets, the support of business growth, and increased business agility – the ability for a business to adjust to changing conditions. The importance of IT's contribution to asset utilization and growth have also been demonstrated by Ravinchandran and Lertwongsatien (2005) and Rai *et al.*, (2006); IT's impact on agility has been shown by, among others, Sambamurthy *et al.*, (2003), Melville *et al.*, (2004) and Fink and Neumann (2009).

Thus we hypothesize:

**Hypothesis 2:** Firms with higher Business Impact from IT will also have higher industry adjusted ROE.

If Hypothesis 2 is supported then we can more confidently use business impact from IT as a mediator for financial performance and focus on the relationship of commitments and business impact from IT.

#### Relating the commitments to business impact

We also test the relationship between both the aggregated group of four commitments and the individual commitments and business impact from IT. Given the strategic role of IT in many organizations today (Sambamurthy *et al.*, 2003), we expect that organizations that have higher levels of commitments relating to IT will see higher business impact from IT.

Thus we hypothesize:

**Hypothesis 3:** Firms with higher levels of commitments relating to IT will also have more Business Impact from IT.

Specifically:

**Hypothesis 3a:** Firms with a greater commitment to making strategic choices will also have more Business Impact from IT.

**Hypothesis 3b:** Firms with a greater commitment to development of a digital platform will also have more Business Impact from IT.

**Hypothesis 3c:** Firms with a greater commitment to working smarter with information will also have more Business Impact from IT.

**Hypothesis 3d:** Firms with a greater commitment to action-oriented assessment will also have more Business Impact from IT.

In summary, we expect that commitments will positively impact business impact from IT. Business impact from IT, in turn, will positively impact the financial performance.

#### Testing the four commitment model

##### Operationalization of commitment

Because commitment cannot be easily measured directly, we took a different approach. We conceptualize a commitment along a directly observable dimension: the extent to which an organization is committed, reflected in explicit, specific, and voluntary management practices, many of which may involve significant costs or effort from the organization's employees.

The choice and wording of questions about specific management practices relating to each commitment was based on our analysis of the case studies and prior research, and refined based on discussions with more than 30 executives from the industries represented by the cases at multiple research workshops. The survey instrument was pilot tested with 35 senior managers who attended a subsequent research workshop, and modified to increase clarity. The final survey questions are in Appendix B.

##### Data and metrics

We surveyed senior non-IT (55%) and IT (45%) managers during the summer of 2010 about their organization's commitments as reflected in specific management practices, and about the business outcomes from IT in their company. We included both IT and non-IT respondents because our model impacts the entire organization. All respondents were from publicly traded firms. We used Compustat information to obtain performance and size data for 2010 for each respondent's firm.

To control for industry differences in firm performance, we used an industry-adjusted measure of ROE. We created nine industry categories: financial services, insurance, IT and professional services, digital services (e.g., media, telecommunications), digital products (electronics and high tech), health and medical (health-care and pharmaceutical companies), industrial/infrastructure (e.g., automotive, energy, utilities), manufacturing (e.g., aerospace, chemicals), and consumer (including consumer products manufacturing, retail, and

**Table 1** Descriptive statistics (*N*=210)

	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Standard deviation</i>
Organization size (Log FTE)	2.05	6.32	4.47	0.75
Organization size (FTE)	111	2.1MM	83,480	168,446
Industry adjusted ROE (2010) (in percentage)	-97.16	97.76	0.00	20.01

**Table 2** Measurement model validity testing (*N*=210)

<i>Construct</i>	<i>Convergent validity: Composite reliability and variance extracted</i>				<i>Discriminant validity (variable correlations on lower triangle, with Root AVE in bold on the diagonal)</i>				
	<i>CR</i>	<i>AVE</i>	<i>MSV</i>	<i>ASV</i>	<i>BIIT</i>	<i>SC</i>	<i>DD</i>	<i>WS</i>	<i>AA</i>
BIIT – Business impact from IT	0.821	0.605	0.482	0.381	<b>0.778</b>				
SC – Strategic choice making	0.854	0.595	0.555	0.390	0.507	<b>0.771</b>			
DD – Dev't of digital platform	0.876	0.641	0.555	0.437	0.631	0.745	<b>0.801</b>		
WS – Working smarter with info	0.819	0.602	0.529	0.481	0.694	0.671	0.681	<b>0.776</b>	
AA – Action-oriented assessment	0.815	0.528	0.529	0.386	0.623	0.544	0.574	0.727	<b>0.726</b>

consumer services such as travel and hospitality). Industry-adjusted ROEs are reported as percentages; descriptive statistics are included in Table 1.

### Control variables

One firm-level variable (firm size) and one respondent-level variable (respondent role) were used to control for their effects on financial performance. We controlled for firm size using the logarithm of the number of employees, as firm size ranged from 100 to 2.1 million and was not normally distributed. We controlled for respondent variation by role: respondents self-classified as IT or non-IT; 55% of respondents were from IT. See Table 1 for descriptive statistics for the control variables.

### Calculated variables and measurement model

Business impact from IT was based on three business outcome indicators: business growth, asset utilization, and agility. Each indicator was calculated by multiplying the results of a question about the importance of IT to achieving each business outcome with the results of a question asking about the success the enterprise has achieved in using IT to create business value for each outcome (Weill, 2004). This formulation allowed us to take into account variation in both business intentions (via the importance question) as well as business results (via the success question).

While we had financial information for all 210 cases, 18 cases were missing indicators (16 failed to answer 1 question of the 21, 1 failed to answer 2 questions, and 1 failed to answer 3 questions). To maximize the sample size, rather than delete these cases, we used the AMOS impute function to estimate responses for those questions.

We analyzed the convergent and discriminant validity of the indicators for the commitment and business impact from IT constructs using AMOS. The resulting measurement model is shown in Table 1, and the final indicator regression weights are in Appendix C.

Convergent validity of all constructs is supported by acceptable values for composite reliabilities ( $CR > 0.7$ ) and average variance extracted ( $AVE > 0.5$ ), with  $CR > AVE$  (see Table 1). Furthermore, indicator loadings are all significant, with 17 of 20 over the threshold of 0.7. We analyzed discriminant validity using the Fornell–Larcker criterion (Fornell and Larcker, 1981), which suggests that the squared latent variable correlations should be less than AVE for each construct to ensure validity. In addition, for each construct, Maximum Shared Squared Variance (MSV), and Average Shared Squared Variance (ASV) should be less than AVE (see Table 2) (Hair *et al.*, 2010).

Overall fit indices for the measurement model were as follows:  $\chi^2 = 240.9$ ,  $DF = 125$ ,  $P < 0.001$ ;  $CFI = 0.943$ ;  $RMSEA = 0.067$  (90% confidence interval is between 0.054 and 0.079); and  $SRMR = 0.0564$ .

To check for common method bias we ran Harman's Single Factor test. The results show that a single factor accounts for 45.2% of the variance, below the recommended cutoff of 0.5 (Harman, 1976).

### Structural model

Figure 2 shows the theoretically derived structural model and the hypotheses related to the paths. We tested the model using covariance-based SEM in AMOS. We included only firm size and role as controls on financial performance, as financial performance is already adjusted for industry.

### Results

The results for the full path model in Figure 2 show relatively good overall fit:  $\chi^2 = 396.91$ ,  $DF = 175$ ,  $P < 0.001$ ;  $CFI = 0.897$ ;  $RMSEA = 0.078$  (90% confidence interval is between 0.068 and 0.088); and  $SRMR = 0.0801$ . CFI is at the commonly recommended cutoff of 0.9, while RMSEA and SRMR are both close to the recommended cutoff of 0.08 (Hu and Bentler, 1999).

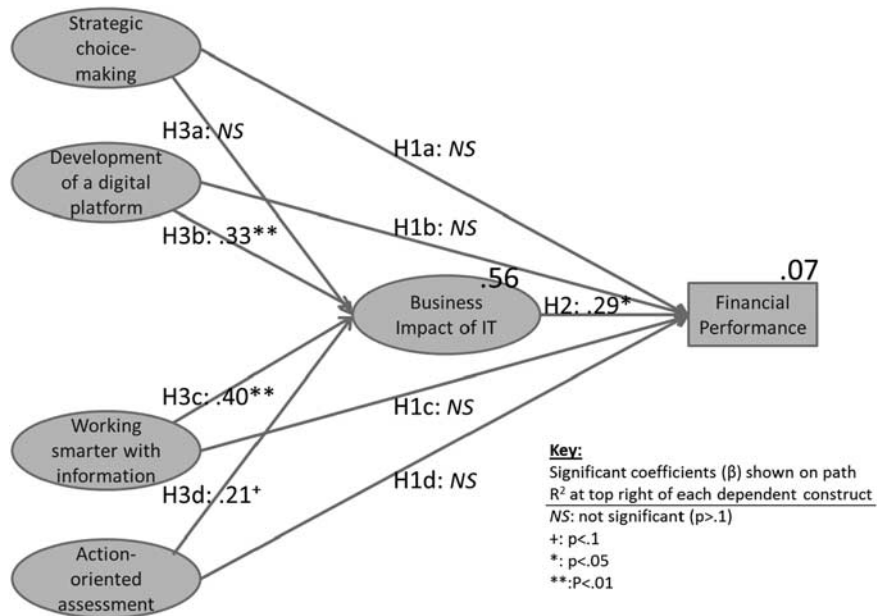


Figure 2 Path model, hypotheses, and results.

Hypotheses were evaluated using standardized loadings and  $P$  values for each path. As shown in Figure 2 and detailed in Table 3, none of the direct paths between commitments and financial performance are significant ( $P > 0.12$ ), so that Hypothesis 1 is not supported.

The path between BIIT and financial performance is significant ( $\beta = 0.29$ ,  $P = 0.035$ ). This result demonstrates that firm performance is associated with higher levels of business impact from IT, supporting Hypothesis 2. Although the variance explained for financial performance is small ( $R^2 = 0.072$ ; see Appendix D for a complete table of squared multiple correlations), this is typical for studies that try to relate IT and financial performance (see, e.g., Shin, 2006). This result also suggests that BIIT could be used as a mediator for firm performance when evaluating the impacts of commitments.

These results suggest that BIIT mediates the relationship between the four commitments and financial performance; and removing the paths from commitments to performance results in a slightly more parsimonious model with similar fit parameters:  $\chi^2 = 400.41$ ,  $DF = 179$ ,  $P < 0.001$ ;  $CFI = 0.897$ ;  $RMSEA = 0.077$  (90% confidence interval is between 0.067 and 0.087); and  $SRMR = 0.0803$ .

Hypothesis 3 is partially supported: while commitments to both development of digitized platforms ( $\beta = 0.329$ ,  $P = 0.005$ ) and working smarter with information ( $\beta = 0.397$ ,  $P = 0.006$ ) are significantly associated with business impact from IT, and action-oriented assessment ( $\beta = 0.211$ ,  $P = 0.063$ ) is marginally significant, strategic choice making is insignificant. The overall variance explained for BIIT is 0.56.

## Discussion, limitations and conclusions

### Discussion

Consistent with prior research, business impact from IT is significantly correlated with financial performance, controlling for industry. The contribution of this research is to

conceptualize and test the impact of commitments on business impact from IT. Commitments are an explicit, specific, high-level agreement within an organization to operate in a given way. Commitments permeate the enterprise, are well understood by all, and reinforce important management practices that help increase business impact from IT.

However, the commitments are not all equally significant. When we tested the relationship of each commitment to business impact from IT, strategic choice making was insignificant, actionable assessment was marginally significant, while the other two commitments were highly significant. This result initially seemed to contradict some of the case studies, which described how management made commitments before making platform investments, or changing how people work with information, or assessing the results. As we explored, we realized that the explanatory power of a commitment to making strategic choices is due to the extent that it is correlated with (or even leads) the other commitments: Bivariate correlations range from 0.507 to 0.745, as shown in Table 2.

To explore the importance of strategic choice making we ran a model with paths only between strategic choice making, BIIT, and financial performance. Interestingly, the path from strategic choice making to BIIT becomes significant ( $\beta = 0.60$ ,  $P < 0.001$ ), the  $R^2$  for BIIT drops from 0.56 in the full model to 0.36 here, and the path from BIIT to performance is no longer significant. The fit of this model is worse than for the full path model, with key indicators dropping below acceptable values:  $\chi^2 = 451$ ,  $DF = 181$ ,  $P < 0.001$ ;  $CFI = 0.875$ ;  $RMSEA = 0.084$  (90% CI is between 0.075 and 0.094); and  $SRMR = 0.0978$ . This suggests that making a strategic choice by itself, even if well understood and broadly bought into, does not impact business performance on its own. Commitments to development of a digital platform, working smarter with information, and action-oriented assessment all require much more investment in both effort (to implement systems, change many people's work practices, and perform assessments) as well as



**Table 3** Structural model path estimates ( $N=210$ )

			<i>Estimate</i>	<i>Standardized estimate</i>	<i>Standard error</i>	<i>Critical ratio</i>	<i>P</i>
BIIT	<—	SC	-0.802	-0.119	0.793	-1.012	0.312
BIIT	<—	DD	1.945	0.329	0.694	2.801	0.005
BIIT	<—	WS	2.225	0.397	0.802	2.773	0.006
BIIT	<—	AA	1.443	0.211	0.775	1.862	0.063
SC_partners	<—	SC	1	0.673			
SC_assets	<—	SC	1.251	0.771	0.129	9.717	***
SC_data	<—	SC	1.244	0.796	0.128	9.739	***
SC_process	<—	SC	1.298	0.835	0.131	9.935	***
DD_partners	<—	DD	0.931	0.69	0.091	10.285	***
DD_data	<—	DD	1.244	0.814	0.101	12.343	***
DD_process	<—	DD	1.246	0.904	0.087	14.289	***
DD_infrastructure	<—	DD	1	0.779			
AA_feedback	<—	AA	1.284	0.799	0.127	10.081	***
AA_incentives	<—	AA	1.207	0.796	0.117	10.289	***
AA_metrics	<—	AA	1	0.716			
AA_PIR	<—	AA	0.897	0.571	0.12	7.483	***
WS_analytics	<—	WS	0.954	0.774	0.08	11.931	***
WS_rules	<—	WS	1	0.821			
WS_info	<—	WS	0.767	0.729	0.072	10.643	***
BusFlexibility	<—	BIIT	1	0.797			
AssetUtilization	<—	BIIT	0.897	0.81	0.082	10.922	***
ITGrowth	<—	BIIT	0.925	0.722	0.088	10.554	***
Ind_Adj_ROE	<—	Role	-2.134	-0.053	2.996	-0.712	0.476
Ind_Adj_ROE	<—	LogFTE	2.928	0.11	1.852	1.581	0.114
Ind_Adj_ROE	<—	BIIT	1.225	0.294	0.58	2.111	0.035
Ind_Adj_ROE	<—	SC	5.904	0.21	3.938	1.499	0.134
Ind_Adj_ROE	<—	DD	-5.372	-0.218	3.481	-1.543	0.123
Ind_Adj_ROE	<—	WS	-2.519	-0.108	4.033	-0.625	0.532
Ind_Adj_ROE	<—	AA	-0.637	-0.022	3.728	-0.171	0.864

Note: \*\*\* =  $P < 0.001$ .

capital and operating costs, while a commitment to a strategic choice alone does not require nearly as many resources. In addition, this finding supports the prior work on commitment reviewed above, confirming that stronger commitments (as represented by irreversible investments) have a greater impact on business performance than ones that are more readily changed.

We also tested a moderated model using commitment, BIIT, and ROE (not shown), but the interaction between commitment and BIIT is not significant, indicating a fully mediated model: commitment is positively related to BIIT, and BIIT is positively related to ROE.

In all but one of the cases, the research team has conducted interviews with IT leaders subsequent to the case studies to follow up on the events described in each case. These interviews suggest that commitments continue to be important over time. We also learned that individual practices, such as setting explicit accountability for creating value from IT investments, that are not supported by consistent, long-term commitments are not effective, or are no longer performed.

In addition to pointing to four commitments, the cases also suggest that a key role for IT leaders and IT units is to shepherd commitments. This includes several specific practices. First, IT leaders can work with their business counterparts to make and communicate the commitments across the organization. Second, IT can ensure that the commitments are

coherent, and can work with business leaders to resolve contradictions and make exceptions in executing them, as needed. Third, IT often takes the lead in implementing commitments, for example, via IT investments in infrastructure, platforms, and data. Fourth, IT may develop and sometimes manage the measuring systems and processes that support assessment and subsequent adjustments.<sup>2</sup>

The construct of commitment in this paper attempts to move the IT value literature a step toward a concept that brings together many of the important management practices identified in previous work. For example, being committed to strategic choice making could be achieved in a number of ways, often including many of the management practices found important previously such as top management steering committees that do effective prioritization (Ravinchandran and Lertwongsatien, 2005; Bernroider, 2008), or ensuring decision rights and accountabilities are clear (Miranda and Kavan, 2005). Similarly, a commitment to development of a digital platform is instantiated by having effective infrastructure capabilities (Bhatt and Grover, 2005), or by building electronic linkages with suppliers and customers (Barua *et al.*, 2004; Rai *et al.*, 2006). A goal of this paper is to begin a conversation about consolidating the many predictors of business value from IT to into a smaller and more manageable number. We suggest that these consolidated predictors could be a set of four commitments: to strategic choice making,



development of a digital platform, working smarter with information, and action-oriented assessment, which together describe the management actions that result in greater business impact from IT.

The concept of commitment may also be useful in supporting the 'co-evolution quest' of contemporary IS strategy research (Tanriverdi *et al.*, 2010). Commitments are not about designing a specific strategy, but about addressing the dynamically evolving needs of complex firms by focusing resources – attention, skills, resources, and partnerships.

### Limitations

There are a number of limitations to this study. First, the statistical analysis is cross-sectional, not taking into account the important effects of time. However, from our case studies we believe commitments are enduring: they can take several years to nurture and last for many years. Our plan is to collect data from some of these firms in future years to start to tease out the impacts of time.

Second, we posit that commitments are a higher level construct that encompass many of the other variables found in the IS literature. In creating the measures for commitments, we only considered the factors found in the 20 case studies. There may be other important factors relating to culture, commitments by vendors, or the impact of mergers that can be measured. However, while we did not explicitly capture these in our statistical model, the cases demonstrated that effective commitments incorporated multiple cultural and other organizational factors.

Third, in this paper we included only companies listed on stock exchanges so we could obtain independent performance data. A future analysis will include additional smaller and large firms that are privately held, and focus in more detail on the relationship between commitment and business impact from IT.

Fourth, while our case studies typically consisted of 4–10 interviews per firm, the statistical analysis used the same respondent to rate both business impact from IT and commitment. We mitigated some of this statistical risk by identifying a statistically significant relationship between business impact from IT and performance (obtained from public data). We mitigated some of the theoretical risk by basing the survey questions on case studies with multiple respondents. However, to test the construct of commitment more fully we suggest using multiple respondents in each firm, from various functions and geographies. This will help indicate how well the commitments are understood across the firm, mitigate respondent bias, and perhaps even suggest how to make commitments that are more effective.

Fifth, it is difficult to measure an abstract concept such as commitment through a survey. While all commitments encompass irreversibility, sunk costs, and explicit intent, they only become visible as a result of the extent of specific management practices, many of which require significant investments or effort. While respondents may not know the size or irreversibility of the investment, they can easily observe the extent of the practices. Therefore we asked about those practices in the survey, rather than the more abstract constructs such as irreversibility and sunk costs. Future research focusing on how commitments are manifested in terms of investments in digitization will help tighten the link between

the commitment construct and its operationalization in a digitization context. Similarly, additional research focusing on operationalizing commitment will also support testing hypotheses about the relationships among commitments; for example, whether commitments to strategic choices are antecedents to the other commitments.

Sixth, there may also be endogeneity bias given the cross-sectional data. For example, it may be the case that financial performance drives business impact and may create the slack resources necessary to enable development and nurturing of commitments. We addressed this issue by using 2010 performance data as our dependent variable: the survey was conducted partway through the 2010 fiscal year, before financial results were known. In addition, our cases suggest that making commitments is associated with business transformation, which occurred due to cost and other pressures, not due to the availability of slack resources.

### Conclusions

We propose that the concept of commitments is an important addition to the literature on generating business value from IT. Commitments are an appealing construct as they are relatively simple: are we committed or not, and do our actions and practices demonstrate our commitment? The concept of commitment is also generalizable, as it applied across all the industries we studied. In addition, unlike environmental turbulence or technology innovations, commitments can be readily influenced by management and IT units alike. Thus, the concept of commitment allows us to make descriptive and prescriptive statements about the relationship of IT and business value that are relevant for managers, helping to answer the question: what can management do to increase the value from the organization's investments in IT?

These results suggest a fruitful avenue for further research to derive a more integrated perspective on the drivers of value from IT. The construct of commitment developed in this research allows us to ask additional research questions, such as: how do various management capabilities identified in prior IT research support an organization's ability to make and keep commitments? How do commitments affect how managers focus their investments in IT resource and capability development? And how do firms create and maintain commitments over time? For example, our case study analysis suggests that effective commitments require supporting governance mechanisms for reinforcement, as well as processes for project prioritization and management to support the investments that implement commitments.

We expect that the importance of making these commitments will increase as the world becomes more digital, and IT plays an increasing role in all aspects of business. In helping their enterprises making and keeping commitments, IT leaders have a unique opportunity to engage their business counterparts in achieving value from the organization's investments in IT, seizing the opportunities to exploit new IT innovations, and continuing to improve how organizations use IT to achieve growth, asset utilization, and agility.

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## Notes

- 1 The issue of culture is often mentioned as an important factor in organizational performance. While 'culture' as such is difficult to operationalize, we see commitment as a key aspect of organizational culture that is measurable, and thus what we have chosen to focus on in this paper (thanks to two anonymous reviewers for this point).
- 2 Several of these practices are also analyzed in other models. For example, Sledgianowski et al. (2006) focus on the relationship of alignment and impact from IT, and ask about some of these practices. We feel that alignment and commitment are two different ways to frame how impact from IT can be achieved, and therefore we would expect to see some correlation among these models.

## References

- Aral, S. and Weill, P. (2007). IT Assets, Organizational Capabilities, and Firm Performance: How resource allocations and organizational differences explain performance variation, *Organization Science* 18(5): 763–780.
- Barua, A., Konana, P., Whinston, A.B. and Fang, Y. (2004). An Empirical Investigation of Net-Enabled Business Value, *MIS Quarterly* 28(4): 585–620.
- Beath, C.M. and Ross, J.W. (2006). JM Family Enterprises, Inc.: Selectively outsourcing IT for increased business value. MIT CISR Working Paper WP 358, Cambridge, MA: MIT Press, pp. 1–13.
- Beath, C.M. and Ross, J.W. (2007a). Chevron: Outsourcing commodity processes in a commodity business. MIT CISR Working Paper WP 371, Cambridge, MA: MIT Press, pp. 1–19.
- Beath, C.M. and Ross, J.W. (2007b). Information and Transformation at Swiss Re: Maximizing economic value. MIT CISR Working Paper WP 373, Cambridge, MA: MIT Press, pp. 1–14.
- Beath, C.M. and Ross, J.W. (2010). Pepsiamericas: Building an information savvy company. MIT CISR Working Paper WP 378, Cambridge, MA: MIT Press, pp. 1–17.
- Bernroider, E.W.N. (2008). IT Governance for Enterprise Resource Planning Supported by the Delone-Mclean Model of Information Systems Success, *Information & Management* 45(5): 257–269.
- Bharadwaj, A.S. (2000). A Resource-Based Perspective on Information Technology Capability and Firm Performance: An empirical investigation, *MIS Quarterly* 24(1): 169–196.
- Bharadwaj, S., Bharadwaj, A. and Bendoly, E. (2007). The Performance Effects of Complementarities between Information Systems, Marketing, Manufacturing, and Supply Chain Processes, *Information Systems Research* 18(4): 437–453.
- Bhatt, G.D. and Grover, V. (2005). Types of Information Technology Capabilities and their Role in Competitive Advantage: An empirical study, *Journal of Management Information Systems* 22(2): 253–277.
- Brynjolfsson, E., Hitt, L.M. and Yang, S. (2002). Intangible Assets: Computers and organizational capital, *Brookings Papers on Economic Activity* 23(1): 137–198.
- Capelo, C. and Dias, J.F. (2009). A System Dynamics-Based Simulation Experiment for Testing Mental Model and Performance Effects of Using the Balanced Scorecard, *System Dynamics Review* 25(1): 1–34.
- Chan, Y.E., Huff, S.L., Barclay, D.W. and Copeland, D.G. (1997). Business Strategic Orientation, Information Systems Strategic Orientation, and Strategic Alignment, *Information Systems Research* 8(2): 125.
- Chang, J.C.-J. and King, W.R. (2005). Measuring the Performance of Information Systems: A functional scorecard, *Journal of Management Information Systems* 22(1): 85–115.
- Chen, D.Q., Mocker, M., Preston, D.S. and Teubner, A. (2010). Information Systems Strategy: Reconceptualization, measurement, and implications, *MIS Quarterly* 34(2): 233–A238.
- Chung, R. and Marchand, D. et al. (2005). The Cemex Way: The right balance between local business flexibility and global standardization, *IMD Case* 3–1341.
- Chung, R. and Paddock, K. et al. (2003). Cemex: Global growth through superior information capabilities, *IMD Case* 3–0953.
- Davenport, T.H., Harris, J.G. and Morison, R. (2010). *Analytics at Work: Smarter decisions, better results*, Boston, MA: Harvard Business School Press.
- DeLone, W.H. and McLean, E.R. (1992). Information Systems Success: The quest for the dependent variable, *Information Systems Research* 3(1): 60–95.
- Devaraj, S. and Kohli, R. (2003). Performance Impacts of Information Technology: Is actual usage the missing link? *Management Science* 49(3): 273–289.
- Eckerson, W. (2009). Who Ensures Clean, Consistent Data? (Hint: It's not just the IT department!), *TDWI Monograph Series* 15(9): 1–10.
- Feeny, D.F. and Willcocks, L.P. (1998). Core is Capabilities for Exploiting Information Technology, *Sloan Management Review* 39(3): 9–21.
- Fink, L. and Neumann, S. (2009). Exploring the Perceived Business Value of the Flexibility Enabled by Information Technology Infrastructure, *Information & Management* 46(2): 90–99.
- Fornell, C. and Larcker, D.F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error, *Journal of Marketing Research* 18(1): 39–39.
- Ghemawat, P. (1991). *Commitment: The Dynamic of Strategy*, New York: Free Press.
- Ghemawat, P. (1993). Commitment to a Process Innovation: Nucor, USX and thin-slab casting, *Journal of Economics and Management Strategy* 2(1): 135–161.
- Gibson, C. (2006a). Allstate Insurance Company: Building the capability for IT-enabled change. MIT CISR Working Paper WP 361, Cambridge, MA: MIT Press, pp. 1–6.
- Gibson, C. (2006b). Turnaround at Aetna: The IT factor. MIT CISR Working Paper WP 362, Cambridge, MA: MIT Press, pp. 1–6.
- Gonzalez-Padron, T.L., Chabowski, B.R., Hult, G.T.M. and Ketchen, D.J. (2010). Knowledge Management and Balanced Scorecard Outcomes: Exploring the importance of interpretation, learning and internationality, *British Journal of Management* 21(4): 967–982.
- Grover, V. and Saeed, K.A. (2007). The Impact of Product, Market, and Relationship Characteristics on Interorganizational System Integration in Manufacturer – Supplier dyads, *Journal of Management Information Systems* 23(4): 185–216.
- Hair, J., Black, W., Babin, B. and Anderson, R. (2010). *Multivariate Data Analysis*, 7th edn, Upper Saddle River, NJ: Prentice-Hall.
- Harman, H.H. (1976). *Modern Factor Analysis*, Chicago: University of Chicago Press.
- Hitt, L.M. and Brynjolfsson, E. (1996). Productivity, Business Profitability, and Consumer Surplus: Three different measures of information technology value, *MIS Quarterly* 20(2): 121–142.
- Hoffman, R.R. (ed.) (2007). *Expertise out of Context*, Mahwah, NJ: Lawrence Erlbaum Associates.
- Hu, L.T. and Bentler, P.M. (1999). Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional criteria versus new alternatives, *Structural Equation Modeling: A Multidisciplinary Journal* 6(1): 1–55.
- Hulland, J., Wade, M.R. and Antia, K.D. (2007). The Impact of Capabilities and Prior Investments on Online Channel Commitment and Performance, *Journal of Management Information Systems* 23(4): 109–142.
- Johnston, H.R. and Vitale, M.A. (1988). Creating Competitive Advantage with Interorganizational Information Systems, *MIS Quarterly* 12(2): 153–165.
- Kaplan, R.S. and Norton, D.P. (1992). The Balanced Scorecard – Measures that drive performance, *Harvard Business Review* 70(1): 71–79.
- Kaplan, R.S. and Norton, D.P. (1996a). *The Balanced Scorecard: Translating strategy into action*, Boston, MA: Harvard Business School Press.
- Kaplan, R.S. and Norton, D.P. (1996b). Linking the Balanced Scorecard to Strategy, *California Management Review* 39(1): 53–79.
- Koh, C., Ang, S. and Straub, D.W. (2004). IT Outsourcing Success: A psychological contract perspective, *Information Systems Research* 15(4): 356–373.
- Kohli, R. and Grover, V. (2008). Business Value of IT: An essay on expanding research directions to keep up with the times, *Journal of the Association for Information Systems* 9(1): 23.
- Lacity, M.C. and Willcocks, L.P. (1998). An Empirical Investigation of Information Technology Sourcing Practices: Lessons from experience, *MIS Quarterly* 22(3): 363–408.

- Liang, T.-P., You, J.-J. and Liu, C.-C. (2010). A Resource-Based Perspective on Information Technology and Firm Performance: A meta analysis, *Industrial Management & Data Systems* 110(8): 1138–1158.
- Luftman, J.N. (2003). *Competing in the Information Age: Align in the sand*, New York: Oxford University Press.
- Malone, T.W., Weill, P., Lai, R.K., D'Urso, V.T., Herman, G., Apel, T.G. and Woerner, S.L. (2006). Do Some Business Models Perform Better than Others? MIT Working Paper 4615–06, Cambridge, MA: MIT Press.
- Mata, F.J., Fuerst, W.L. and Barney, J.B. (1995). Information Technology and Sustained Competitive Advantage: A resource-based analysis, *MIS Quarterly* 19(4): 487–505.
- Maule, A.J. (2010). Can Computers Help Overcome Limitations in Human Decision Making? *International Journal of Human-Computer Interaction* 26(2/3): 108–119.
- Mayer, K.J. and Salomon, R.M. (2006). Capabilities, Contractual Hazards, and Governance: Integrating resource-based and transaction cost perspectives, *Academy of Management Journal* 49(5): 942–959.
- Melville, N., Kraemer, K. and Gurbaxani, V. (2004). Review: Information technology and organizational performance: An integrative model of IT business value, *MIS Quarterly* 28(2): 283–322.
- Miranda, S.M. and Kavan, C.B. (2005). Moments of Governance in IS Outsourcing: Conceptualizing effects of contracts on value capture and creation, *Journal of Information Technology* 20(3): 152–159.
- Montgomery, H., Lipshitz, R. and Brehmer, B. (eds.) (2005). *How Professionals make Decisions*, Mahwah, NJ: Lawrence Erlbaum Associates.
- Mooney, J., Gurbaxani, V. and Kraemer, K. (1995). A Process Oriented Framework for Assessing the Business Value of Information Technology. International conference on Information Systems, Amsterdam, NL: Association for Information Systems, 17–27.
- Morieux, Y. (2011). Smart Rules: Six ways to get people to solve problems without you, *Harvard Business Review* 89(9): 78–86.
- Mosier, K.L. and Fischer, U.M. (eds.) (2011). Informed by Knowledge: expert performance in complex situations, *Expertise, Research, and Applications*, New York: Psychology Press.
- Muhanna, W.A. and Stoel, M.D. (2010). How Do Investors Value IT? An empirical investigation of the value relevance of IT capability and IT spending across industries, *Journal of Information Systems* 24(1): 43–66.
- Nagayama, K. and Weill, P. (2004). 7-Eleven Japan: Reinventing the Retail Business Model. MIT CISR Working Paper WP 338, Cambridge, MA: MIT Press, pp. 1–22.
- Nelson, R.R. (2005). Project Retrospectives: Evaluating project success, failure, and everything in between, *MIS Quarterly Executive* 4(3): 361–372.
- Nevo, S. and Wade, M.R. (2010). The Formation and Value of IT-Enabled Resources: Antecedents and consequences of synergistic relationships, *MIS Quarterly* 34(1): 163–183.
- Oh, W. and Pinsonneault, A. (2007). On the Assessment of the Strategic Value of Information Technologies: Conceptual and analytical approaches, *MIS Quarterly* 31(2): 239–265.
- Piccoli, G. and Ives, B. (2005). IT-Dependent Strategic Initiatives and Sustained Competitive Advantage: A review and synthesis of the literature, *MIS Quarterly* 29(4): 747–776.
- Quaadgras, A.L. and Weill, P. (2009). Globalizing IT Operations at BMW: Transparency and people, *MIT CISR Research Briefing* 9(11): 1–4.
- Rai, A., Patnayakuni, R. and Patnayakuni, N. (1997). Technology Investment and Business Performance, *Communications of the ACM* 40(7): 89–97.
- Rai, A., Patnayakuni, R. and Seth, N. (2006). Firm Performance Impacts of Digitally Enabled Supply Chain Integration Capabilities, *MIS Quarterly* 30(2): 225–246.
- Ravinchandran, T. and Lertwongsatien, C. (2005). Effect of Information Systems Resources and Capabilities on Firm Performance: A resource-based perspective, *Journal of Management Information Systems* 21(4): 237–276.
- Robertson, D.C. (2003). ING Direct: The IT challenge. IMD Working Paper 3–1345, Switzerland: Lausanne.
- Ross, J.W. (1999). Dow Corning Corporation: Case studies A, B and C. MIT CISR Working Paper WP 305, Cambridge, MA: MIT Press, pp. 1–43.
- Ross, J.W. (2001a). Delta.com E-Business at Delta Air Lines: Extracting value from a multi-faceted approach. MIT CISR Working Paper WP 317, Cambridge, MA: MIT Press, pp. 1–9.
- Ross, J.W. (2001b). United Parcel Service: Delivering packages and e-commerce solutions. MIT CISR Working Paper WP 318, Cambridge, MA: MIT Press, pp. 1–14.
- Ross, J.W. (2004). Project Governance at USAA, *MIT CISR Research Briefing* IV(1D): 1–4.
- Ross, J.W. and Beath, C.M. (2005). The Federated Broker Model at the Dow Chemical Company: Blending world class internal and external capabilities. MIT CISR Working Paper WP 355, Cambridge, MA: MIT Press, pp. 1–14.
- Ross, J.W. and Beath, C.M. (2007a). Agility and Risk Management at Pacific Life: Optimizing business unit autonomy. MIT CISR Working Paper WP 372, Cambridge, MA: MIT Press, pp. 1–13.
- Ross, J.W. and Beath, C.M. (2007b). Building Business Agility at Southwest Airlines. MIT CISR Working Paper WP 369, Cambridge, MA: MIT Press, pp. 1–14.
- Ross, J.W. and Beath, C.M. (2008). Campbell Soup Company: Harmonizing processes and empowering workers. MIT CISR Working Paper WP 374, Cambridge, MA: MIT Press, pp. 1–18.
- Ross, J.W. and Beath, C.M. (2010). USAA: Organizing for innovation and superior customer service. MIT CISR Working Paper WP 382, Cambridge, MA: MIT Press, pp. 1–19.
- Ross, J.W., Weill, P. and Robertson, D.C. (2006). *Enterprise Architecture as Strategy*, Boston, MA: Harvard Business School Press.
- Salancik, G.R. (1977). Commitment and the Control of Organizational Behavior and Belief, in B.M. Staw and G.R. Salancik. *New Directions in Organizational Behavior*, Chicago: St. Clair Press, pp. 1–54.
- Sallam, R.L. (2012). Survey analysis: Customers rate their BI platform ownership costs. *Gartner research note* (G00239667).
- Sambamurthy, V., Bharadwaj, A. and Grover, V. (2003). Shaping Agility through Digital Options: Reconceptualizing the role of information technology in contemporary firms, *MIS Quarterly* 27(2): 237–263.
- Shin, N. (2006). The Impact of Information Technology on the Financial Performance of Diversified Firms, *Decision Support Systems* 41(4): 698.
- Sledgianowski, D., Luftman, J.N. and Reilly, R.R. (2006). Development and Validation of an Instrument to Measure Maturity of IT Business Strategic Alignment Mechanisms, *Information Resources Management Journal* 19(3): 18–33.
- Smith, H.A. and McKeen, J.D. (2008). Master data management: Salvation or snake oil? *Communications of the AIS* 23(4): 63–72.
- Tallon, P.P. and Kraemer, K.L. (2007). Fact or Fiction? A sensemaking perspective on the reality behind executives' perceptions of IT business value, *Journal of Management Information Systems* 24(1): 13–54.
- Tanriverdi, H. (2006). Performance Effects of Information Technology Synergies in Multibusiness Firms, *MIS Quarterly* 30(1): 57–77.
- Tanriverdi, H., Rai, A. and Venkatraman, N. (2010). Research Commentary – Reframing the dominant quests of information systems strategy research for complex adaptive business systems, *Information Systems Research* 21(4): 822–834.
- Teece, D.J., Pisano, G. and Shuen, A. (1997). Dynamic Capabilities and Strategic Management, *Strategic Management Journal* 18(7): 509–533.
- Truman, G.E. (2000). Integration in Electronic Exchange Environments, *Journal of Management Information Systems* 17(1): 209–244.
- Volkoff, O., Strong, D.M. and Elmes, M.B. (2007). Technological Embeddedness and Organizational Change, *Organization Science* 18(5): 832–848.
- Wade, M. and Hulland, J. (2004). Review: The resource-based view and information systems research: Review, extension, and suggestions for future research, *MIS Quarterly* 28(1): 107–142.
- Wang, L., Gwebu, K.L., Wang, J. and Zhu, D.X. (2008). The Aftermath of Information Technology Outsourcing: An empirical study of firm performance following outsourcing decisions, *Journal of Information Systems* 22(1): 125–159.
- Weill, P. (2004). Don't Just Lead, Govern: How top-performing firms govern IT, *MIS Quarterly Executive* 3(1): 1–17.
- Weill, P. and Broadbent, M. (1998). *Leveraging the New Infrastructure*, Boston: Harvard Business School Press.
- Weill, P. and Ross, J.W. (2004). *IT Governance: How top performers manage IT decision rights for superior results*, Boston, MA: Harvard Business School Press.
- Weill, P., Soh, C. and Kien, S. (2007). Governance of Global Shared Solutions at Procter and Gamble, *MIT CISR Research Briefing* VII 3 A: 1–4.
- Weill, P. and Woodham, R. (2002). State street corp: Evolving IT governance. MIT CISR Working Paper WP 327, Cambridge, MA: MIT Press, pp. 1–11.
- Winter, S.G. (2003). Mistaken Perceptions: Cases and consequences, *British Journal of Management* 14(1): 39–44.
- Woerner, S., Weill, P. and McDonald, M. (2013). Turn Time into Money: Faster growth through digital reuse, *European Business Review* 25(3): 38–42.

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**Appendix A**

**Table A1** Cases used for commitment cross case analysis

Company	Industry	Research focus	SC	DD	WS	AA	Reference
7-Eleven Japan	Retail	Information-based business model	✓	✓	✓	✓	Nagayama and Weill (2004)
Aetna	Insurance	IT-enabled business transformation	✓	✓	✓		Gibson (2006b)
Allstate	Insurance	Information-based decision making	✓	✓	✓	✓	Gibson (2006a)
BMW	Manufacturing	IT unit transformation	✓	✓		✓	Quaadgras and Weill (2009)
Campbell Soup	Food and beverage	ERP and business transformation	✓	✓	✓	✓	Ross and Beath (2008)
CEMEX	Manufacturing	ERP and business transformation	✓	✓			Chung et al. (2005); Chung et al. (2003)
Chevron	Energy	Outsourcing	✓	✓			Beath and Ross (2007a)
Delta Air Lines	Transportation	e-business initiatives	✓	✓			Ross (2001a)
Dow Chemical Co.	Manufacturing	Outsourcing	✓	✓			Ross and Beath (2005)
Dow Corning	Manufacturing	ERP and business transformation	✓	✓			Ross (1999)
ING Direct	Financial services	e-business initiatives	✓	✓			Robertson (2003)
JM Family	Financial services	Outsourcing	✓	✓		✓	Beath and Ross (2006)
Pacific Life	Financial services	Enterprise architecture and governance	✓	✓			Ross and Beath (2007a)
PepsiAmericas	Food and beverage	Enterprise architecture and governance	✓	✓	✓	✓	Beath and Ross (2010)
P&G	Consumer products	IT & business shared services	✓	✓		✓	Weill et al. (2007)
Southwest Airlines	Transportation	Enterprise architecture and governance	✓	✓			Ross and Beath (2007b)
State Street	Financial services	IT governance	✓	✓			Weill and Woodham (2002)
SwissRe	Insurance	IT-enabled business transformation	✓	✓	✓		Beath and Ross (2007b)
UPS	Transportation	e-business initiatives	✓	✓		✓	Ross (2001b)
USAA	Financial services	Enterprise architecture and governance	✓	✓		✓	Ross (2004); Ross and Beath (2010)

Key: SC = Strategic choice-making; DD = Development of a digital platform; WS = Working smarter with information; AA = Action-oriented assessment.

A checkmark indicates that evidence of this commitment was present in the case.

## Appendix B

### Survey questions

- (1) To what extent has your enterprise made the following strategic choices: (1 = not at all; 5 = to a great extent):
- Specified which business processes should be standardized across the enterprise (e.g., order to cash, marketing, supply chain, customer service, billing, risk management)?
  - Specified the classes of enterprise information (e.g., customer, order) to be shared across the enterprise?
  - Specified how all digital assets (e.g., business processes, digital products, data, CAD, process control, infrastructure) will be coordinated?
  - Specified the critical business activities to be performed inside the enterprise vs by other firms?
- A *platform* is a coherent set of standardized, digitized business processes along with supporting infrastructure, applications, and data.
- (2) To what extent has your enterprise created the following platform elements (1 = not at all; 5 = to a great extent):
- An efficient, reliable, scalable technology infrastructure?
  - A digitized platform(s) that supports the enterprise's key business processes?
  - A data asset specifying enterprise master data, transaction data, and historical data?
  - Standardized electronic links to external parties?
- (3) To what extent does your enterprise do the following (1 = not at all; 5 = to a great extent):
- Empower operational decision makers with useful information?
  - Empower operational decision makers with clear business rules?
  - Create and revise business rules based on business analytics?
- (4) To what extent does your enterprise have the following (1 = not at all; 5 = to a great extent):
- A small set of business metrics focused on enterprise-wide goals?
  - Incentives that balance enterprise and local goals?
  - Feedback that relates individuals' actions to the enterprise's goals (e.g., scorecards, sales/profit reports)?
  - Findings from post-implementation reviews that inform future projects?
- (5) How important are the following business outcomes to your enterprise (1 = not important; 5 = very important):
- Effective use of IT for business growth?
  - Effective use of IT to help the enterprise best use all its assets?
  - Effective use of IT for business agility?
- (6) How successful is your enterprise at achieving these business outcomes (1 = not successful; 5 = very successful):
- Effective use of IT for business growth?

- Effective use of IT to help the enterprise best use all its assets?
- Effective use of IT for business agility?

## Appendix C

**Table C1** Measurement model indicator loadings (standardized regression weights)

			Estimate
SC_partners	<—	SC	0.67
SC_assets	<—	SC	0.77
SC_data	<—	SC	0.80
SC_process	<—	SC	0.84
DD_partners	<—	DD	0.69
DD_data	<—	DD	0.82
DD_process	<—	DD	0.90
DD_infrastructure	<—	DD	0.78
AA_feedback	<—	AA	0.80
AA_incentives	<—	AA	0.80
AA_metrics	<—	AA	0.72
AA_PIR	<—	AA	0.57
WS_analytics	<—	WS	0.78
WS_rules	<—	WS	0.82
WS_info	<—	WS	0.73
BusFlexibility	<—	BIIT	0.80
AssetUtilization	<—	BIIT	0.81
ITGrowth	<—	BIIT	0.72

## Appendix D

**Table D1** Squared multiple correlations (full path model)

	Estimate
LogFTE	0
Role	0
BIIT	0.556
Ind_Adj_ROE	0.072
ITGrowth	0.521
AssetUtilization	0.656
BusFlexibility	0.635
WS_info	0.532
WS_rules	0.674
WS_analytics	0.599
AA_metrics	0.513
AA_incentives	0.634
AA_feedback	0.638
AA_PIR	0.326
DD_infrastructure	0.608
DD_process	0.817
DD_data	0.663
DD_partners	0.476
SC_process	0.698
SC_data	0.634
SC_assets	0.594
SC_partners	0.453

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