



## Decision execution mechanisms of IT governance: The CRM case

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### ABSTRACT

Employing the literature on IT governance and the structuration theory of technology assimilation, this research develops a conceptual model to examine decision execution mechanisms of IT governance in post-adoption stages of CRM diffusion, i.e. CRM use, impacts on business processes, and impacts on firm performance. While the literature mainly addresses the forms and contingencies of IT governance structures for decision making, we focus on IT governance mechanisms for decision execution, that is, the role of top management, business managers and IT managers in post-adoption stages of technology diffusion and how these groups are held accountable for their role. We conceptualize decision execution mechanisms of IT governance as including two dimensions: vertical advocacy from top management and horizontal coordination between business and IT managers. Decision execution mechanisms are assumed to facilitate CRM use and value creation. We analyze a dataset of 82 Chinese firms to examine the model and associated hypotheses. Our results show that: (1) decision execution mechanisms, including both vertical advocacy and horizontal coordination, significantly contribute to the three stages of CRM diffusion; (2) vertical advocacy has a notably greater effect on CRM use and firm performance gains than horizontal coordination, which has a greater effect on process gains. (3) CRM use creates operational and strategic benefits in customer-oriented business processes, which further improves firm performance. These findings have important implications for understanding how IT governance shapes the diffusion of CRM technology.

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### 1. Introduction

As firms are investing heavily in enterprise digital platforms such as enterprise resource planning (ERP), customer relationship management (CRM), and supply chain management (SCM), IT governance has been regarded as an important issue for realizing effective IT deployment (Agarwal & Sambamurthy, 2002). Especially, CRM systems have received increasing attention by firms (Rigby, Reichheld, & Scheffer, 2002). *Customer relationship management* (CRM) systems are enterprise applications that integrate and manage all aspects of customer interactions with the organization to improve the efficiency and effectiveness of customer-oriented business processes, including marketing, sales and customer service (Gefen & Ridings, 2002; Karimi, Somers, & Gupta, 2001). As CRM systems facilitate customer-oriented business processes across multiple business units, effective IT governance for such applications involves extensive organizational efforts in aligning corporate strategy, business processes, management support, and skill development (Bull, 2010; Goodhue, Wixom, & Watson, 2002; Reychav & Weisberg, 2009). This raises important new issues

regarding IT governance structures and mechanisms, as the traditional view of IT governance may not adequately address today's strategic, managerial, and technological complexity in governing new business innovations (Agarwal & Sambamurthy, 2002; Weill & Ross, 2005).

First, the literature on IT governance focuses mainly on determining who makes IT decisions and why (i.e. *decision making structures* and the factors underlying such structures), while far less on what are the role of different groups (e.g. top management, business managers, and IT managers) in the *execution* of such IT decisions and how these groups are held accountable for their role (i.e. *decision execution mechanisms*) (Boynton, Jacobs, & Zmud, 1992; Weill, 2004).

Second, the traditional view of IT governance classifies decision making structures into three main categories: the centralized models (where top management such as CEO, top executives or IT steering committee holds the authority for making IT decisions), the decentralized model (where divisional business units or functional IT units make IT decisions), and the federal model (where top management makes decisions on IT infrastructure and divisional units make decisions on business deployment of IT) (Boynton & Zmud, 1987; Von Simson, 1990). Researchers have come to the consensus that the federal model is more appropriate for large firms since it balances enterprise-wide requirements with business

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unit requirements (Brown & Magill, 1994; Sambamurthy & Zmud, 1999). However, no matter what a decision making structure firms may have, the execution of decisions on complex, multidivisional business applications such as CRM systems requires significantly high levels of *both* centralized top management support and decentralized collaboration between business and IT managers (Agarwal & Sambamurthy, 2002). Therefore, even the federal model, which emphasizes different decision makers for different IT applications, may not fully address the fact that executing the decision on one specific multidivisional application demands both centralized and decentralized mechanisms. This further calls for research on decision execution mechanisms.

In this research, we intend to study the decision execution mechanisms in the context of CRM diffusion. CRM systems are intended not only to automate customer-oriented business processes to reduce costs, but also to collect and analyze customer data to improve customer satisfaction and increase selling opportunities (Karimi et al., 2001). Although firms are boosting their CRM investments,<sup>1</sup> they have seen vastly different outcomes of such investments (Rigby & Ledingham, 2004). There are a number of studies that have investigated the assimilation and performance effects of CRM, as well as the antecedent determinants (e.g. Karimi et al., 2001; Mithas & Krishnan, 2004; Romano & Fjermestad, 2001, etc.). In this study, we focus on investigating the specific decision execution mechanisms for CRM diffusion through theoretical lens of IT governance and the structuration theory of technology assimilation. We wish this research would provide a new theoretical perspective for understanding the role of decision execution mechanisms in affecting the use and value of CRM systems.

Motivated by the above considerations, our study focuses on two key research questions:

- (1) What are the key dimensions of IT governance mechanisms for executing CRM decisions?
- (2) How would such decision execution mechanisms influence the use and value of CRM systems? To better understand these issues, we draw upon the structuration theory and the literature on IT governance as theoretical guidance, and develop a conceptual model to examine the role of decision execution mechanisms in CRM diffusion.

## 2. Theoretical development

### 2.1. IT governance

IT governance has been catching more attention of researchers recently, in view of firms' heavy investments in business IT innovations such as ERP, CRM, and SCM systems (Brown & Grant, 2005; Weill & Ross, 2005). As defined by Weill (2004), IT governance refers to "the framework for decision rights and accountabilities to encourage desirable behavior in the use of IT" (p. 3). Accordingly, we deem IT governance as including two parts: the first is *decision making structures* that determine who makes decisions on different IT applications and who has input to a decision; the second part is *decision execution mechanisms* that determine the role of different groups (e.g. top management, business managers, and IT managers) in executing IT decisions and how these groups are held accountable for their role (Weill, 2004). This is consistent with the view of Boynton et al. (1992), which states that IT governance

is about the location, distribution, and pattern of *both* managerial responsibilities (regarding decision making) and control (regarding decision execution) that influence the initiation and deployment of IT (p. 1). Multiple researchers share the same view of IT Governance (e.g. Duffy, 2002; IT Governance Institute, 2003; Van Grembergen, De Haes, & Guldentops, 2004).

The extant literature has mainly focused on the first part, i.e. decision making structures of IT governance. Although research on the fundamental concepts represented in the above definition started as early as in the 1960s (though indirectly, e.g. Garrity, 1963), it is until late 1990s that the term "IT governance" has become prominent, as represented by the work of Brown (1997) and Sambamurthy and Zmud (1999) with the notion of "IS governance framework" and later "IT governance framework". Along the way, researchers have investigated the forms of decision making structures, and the contingency factors that lead to the adoption of such structures. Specifically, researchers have found three basic forms of decision making structures (with other mixed forms in between): the *centralized* model (where top management makes IT decisions), the *decentralized* model (where divisional business units or functional IT units makes IT decisions), and the *federal* model (where top management makes decisions on IT infrastructure and divisional units make decisions on business deployment of IT) (Sambamurthy & Zmud, 1999).

Multiple studies have addressed the advantages and disadvantages of each of these three forms of decision making structures (e.g., Brown, 1997; Boynton & Zmud, 1987; Von Simson, 1990, etc.). Researchers have formed the consensus that for large firms, top management should hold the decision rights on IT infrastructure and enterprise-wide IT applications, while divisional units should make decisions on local business deployment of IT, which is close to a federal model (Brown & Magill, 1994; Sambamurthy & Zmud, 1999). Along this line, researchers have studied the contingency factors that affect firms' choices of these models, such as organizational structure and environment (Boynton et al., 1992; Olson & Chervany, 1980), business strategy (Henderson & Venkatraman, 1993; Venkatraman, 1997), firm size and industry (Ahituv, Neumann, & Zviran, 1989; Clark, 1992; Ein-Dor & Segev, 1982).<sup>2</sup>

Yet, research on decision execution mechanisms has been rather unsystematic. In fact, several researchers have long since used the term "IT governance" to describe the set of mechanisms for ensuring successful execution of IT decisions and thus the attainment of IT capabilities (Henderson & Venkatraman, 1993; Loh & Venkatraman, 1992). However, research issues on decision execution mechanisms (i.e. what are the role of top management, business managers and IT managers in executing IT decisions collectively, and how they should play their role) have not been systematically studied from the perspective of IT governance. One stream of previous research has investigated the significant role of top management championship in safeguarding the successful assimilation of IT (e.g. Angeles, Corritore, Basu, & Nath, 2001; Hartono, Li, Na, & Simpson, 2010; Kankanhalli, Teo, Tan, & Wei, 2003; Meador, Guyote, & Keen, 1984; Naranjo-Gil, 2009; Purvis, Sambamurthy, & Zmud, 2001; Reich & Benbasat, 1990). Another stream has studied the strategic importance of collaboration and partnerships between business and IT managers in securing effective IT deployment (e.g. Boynton, Zmud, & Jacobs, 1994; Chen, Sun, Helms, & Jih, 2008; Coughlan, Lycett, & Macredie, 2005; Nelson & Coopridge, 1996; Pollalis, 2003). Combining the two streams of research, a number of studies have shown that effective execution of IT decisions requires *both* vertical advocacy from top

<sup>1</sup> According to Gartner, Inc. (2008), "Worldwide customer relationship management (CRM) software revenue is projected to surpass \$8.9 billion in 2008, a 14.2 percent increase from preliminary 2007 revenue estimates of \$7.8 billion. . . The market is poised for healthy growth through 2012 when revenue is forecast to reach \$13.3 billion."

<sup>2</sup> See Sambamurthy and Zmud (1999) for a comprehensive review.

management *and* horizontal coordination between business and IT managers from different theoretical perspectives (e.g. Armstrong & Sambamurthy, 1999; Chatterjee, Grewal, & Sambamurthy, 2002; Henderson & Venkatraman, 1993; Teo & Ang, 2001). In this study, we intend to study the collective role of these two dimensions from the perspective of IT governance. In this regard, the structuration theory serves as an important theoretical guidance, which we discuss in the next section.

## 2.2. The structuration theory of technology assimilation

The structuration theory of technology assimilation is concerned with how institutional or organizational factors influence the behaviors of individuals within the organization, and therefore, the organizational assimilation and impact of technologies (Chatterjee et al., 2002). This theory is rooted in the basic institutional theory, which suggests that institutional structures (such as organizational routines, rules and procedures) shape the behaviors of individuals. The structuration theory states that there exists three ways in which institutional structures affect individual behaviors of assimilating new technology (Orlikowski, 1992; Scott, 1995)<sup>3</sup>:

- Structures of signification, by which prevailing institutional structures yield meaning and guide individuals to understand how they should behave regarding new technology assimilation.
- Structures of legitimization, by which prevailing institutional structures validate specific behaviors as being appropriate and consistent with organizational goals and values, and thus provide normative templates for individuals to reassure legitimacy of their assimilation actions.
- Structures of domination, by which institutional structures regulate individual behaviors to ensure that their assimilation actions do not violate institutional rules (through organizational sanctions when necessary), and provide organizational resources and support for them to accomplish such assimilation actions.

It is argued that individuals draw upon these three institutional structures to make sense of the technology, acquire the resources and skills for using the technology, and infuse the technology into business processes and strategies, i.e. conduct the necessary actions for assimilating the technology (Orlikowski, Yates, Okamura, & Fujimoto, 1995). Different organizational groups play different roles in executing technology decisions through shaping these institutional structures, which consequently influence individual, thus organizational assimilation of the technology, and ultimately impacts of the technology (Chatterjee et al., 2002). Top management group can manipulate the three institutional structures to motivate, guide, or alter individual actions on technology and provide conditions conducive to technology use (Orlikowski et al., 1995). Specifically, top management can introduce a new structure of signification through advocating the new information technology and articulating a strategic vision of its use. In turn, individuals can recognize the strategic importance of such technology in conducting business activities (Purvis et al., 2001). Further, top management can legitimize the appropriate behaviors toward using the new technology through expressing their views about its benefits and offering incentives to motivate employees. This can promote organizational use of the technology (Orlikowski et al., 1995). Lastly, top management can adjust the structures of domination to encourage individual use of the technology by mandating its use and providing necessary support (Chatterjee et al., 2002).

Coordination between business and IT managers is another important mechanism that affects institutional structures and thus the assimilation of IT, especially IT innovations that require firm-wide actions in integrating IT into business strategies and processes (e.g. web technologies and multidivisional enterprise systems) (Chatterjee et al., 2002). Managers in multiple units affect the assimilation of such technology. Yet it is likely that they possess different views of its role and value. Firms thus have to achieve consensus and undertake coordinated actions toward the strategic use of the technology. Viewed from the structuration theory, coordination between business and IT managers change the structures of signification through enabling greater integration of business and IT knowledge. Managers can thus recognize the importance of such integration, and develop a combinative knowledge base necessary for deploying the technology (Chatterjee et al., 2002). Further, the coordination mechanism alters the structures of legitimization by legitimizing knowledge sharing and collaboration among managers with business knowledge (e.g. marketing knowledge and customer information) and IT knowledge. Lastly, the coordination mechanism may also affect the structures of domination through reinforcing mutual support between business and IT managers for technology deployment. As a result, these changes in institutional structures affect technology assimilation by individuals and the organization.

In summary, top management advocacy and coordination between business and IT managers—the two types of decision execution mechanisms—would enhance the use and value of information technology by shaping institutional structures of signification, legitimization and domination, as suggested by the structuration theory.

## 2.3. The technology diffusion perspective on CRM

The technology diffusion perspective suggests that the business value of IT depends on the extent to which IT is used in key business processes and their associated operations (Cooper & Zmud, 1990; Fichman & Kemerer, 1997). Viewed from the technology diffusion perspective, firms' performance improvement from CRM systems depends on the use of CRM systems to improve customer-oriented business processes (Karimi et al., 2001). By collecting and analyzing customer data, CRM systems allow firms to handle marketing, sales and service operations efficiently, analyze customer value and needs strategically, and combine all customer interactions into one integrated seamless interaction (Gefen & Ridings, 2002). Such use of CRM systems leads to significant process-level benefits, including operational benefits (e.g. cost reduction and improved internal efficiency) and strategic benefits (e.g. improved customer satisfaction, enhanced product/service quality, and an enriched understanding of customers) (Goodhue et al., 2002; Kamal, 2011; Mukhopadhyay & Kekre, 2002). These business process improvements further transfer into enhanced firm performance such as financial and competitive performance (Subramani, 2004). Hence, we consider CRM use, its impacts on business processes and impacts on firm performance as three post-adoption stages of CRM diffusion.

## 3. The conceptual model

Drawing upon the literature on IT governance and the structuration theory, we develop a conceptual model as shown in Fig. 1. In the following subsections, we will describe the model in terms of the dependent variables, independent variables, control variables, and relevant hypotheses in turn.

<sup>3</sup> See Purvis et al. (2001) and Chatterjee et al. (2002) for a comprehensive review.

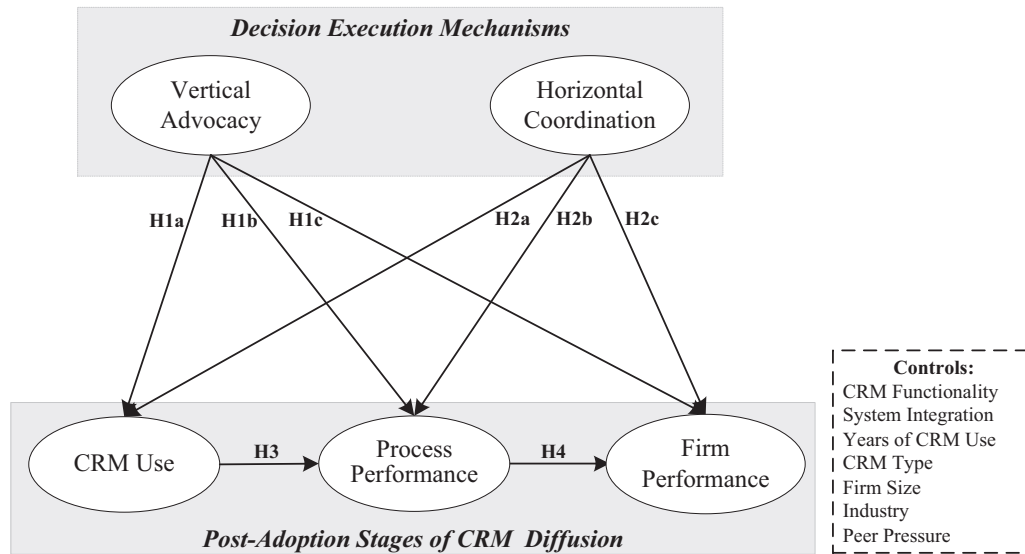


Fig. 1. The conceptual model.

### 3.1. Dependent variables—post-adoption stages of CRM diffusion

The dependent variables in our conceptual model are CRM use, impacts on process performance (or process performance for short) and impacts on firm performance (or firm performance for short). CRM use refers to the extent to which CRM is used in generating, delivering, integrating and exploiting customer and sales knowledge. We conceptualize process performance as process-level operational benefits and strategic benefits generated by CRM deployment (Mukhopadhyay & Kekre, 2002; Subramani, 2004). Operational benefits result from the cost efficiency of automated and streamlined business processes through CRM use, such as increased productivity, decreased marketing and sales expenses, and improved internal communication and coordination (Mukhopadhyay & Kekre, 2002). Strategic benefits stem from firms' leverage of CRM-enabled business opportunities arising in customer relationships, such as enhanced customer retention rate, improved customer satisfaction, product and service improvement, and increased sales forecasting accuracy (based on an enriched understanding of customers) (Subramani, 2004). We conceptualize firm performance as CRM-enhanced firm-level value including financial measures (i.e. net profit, margin rate, and return on assets) and market share (Subramani, 2004).

### 3.2. Independent variables—vertical advocacy and horizontal coordination

Our conceptual model focuses on the impacts of decision execution mechanisms on the three post-adoption stages of CRM diffusion. Based on our earlier review of the literature (Chatterjee et al., 2002; Henderson & Venkatraman, 1993), we conceptualize decision execution mechanisms as including two dimensions—vertical advocacy and horizontal coordination. First, vertical advocacy refers to the actions that top management take to shape the strategic vision of employees toward CRM, and provide incentives, training, support, and adjustments to champion the use of CRM in multiple business processes (Chatterjee et al., 2002). Therefore, vertical advocacy represents the organizational efforts vertically from top management down to the line employees in executing CRM decisions to effectively infuse CRM into business operations. Second, horizontal coordination signifies the knowledge integration between business managers and IT managers, and thus the collaboration and partnership between them (Armstrong &

Sambamurthy, 1999; Boynton et al., 1994). Horizontal coordination thus represents the collective efforts of business and IT managers in integrating business and IT knowledge to realize effective collaboration in CRM networking among multiple business units.

### 3.3. Controls regarding CRM and environmental factors

We consider CRM functionality in providing the key functions for conducting marketing, sales, service and analytical operations as an important control. Further, firms use CRM systems to realize collaborative interactions with selected customers and business partners and thus value creation through system integration (of CRM with internal enterprise systems and front-end e-business systems), which needs to be controlled (Teo, Devadoss, & Pan, 2006). Also, we control for the temporal length of CRM use by firms in view of the organizational learning effect (Teo, Srivastava, & Ho, 2006), and the type of CRM system (licensed vs. in-house developed). Further, we control for firm size (using the number of employees), industry effects, and peer pressure (measured as the extent to which CRM is used by competitors) (Gatignon & Robertson, 1989).

### 3.4. Hypotheses

Our review of the literature on IT governance in Section 2.1 suggests that, successful execution of IT decisions requires both vertical advocacy from top management and horizontal coordination between business and IT managers (Henderson & Venkatraman, 1993). There are multiple studies in the IT literature that reinforce the importance of vertical advocacy and horizontal coordination in IT assimilation (e.g. Armstrong & Sambamurthy, 1999; Boynton et al., 1994; Purvis et al., 2001; Reich & Benbasat, 1990; Štemberger, Manfreda, & Kovačič, 2011; Teo & Ang, 2001, etc.). The structuration theory of technology assimilation further theorizes how such decision execution mechanisms affect individual, thus organizational assimilation of IT through manipulating institutional structures of signification, legitimization and domination (Chatterjee et al., 2002).

Top management group can institute a new structure of signification by articulating the strategic vision of IT, legitimize the appropriate behaviors of IT use through offering incentives to motivate employees, and align the structures of domination by providing necessary support, training, and adjustments in business

processes, so as to facilitate technology diffusion within the organization. Lack of strong top management support in CRM deployment would significantly hinder the potential of CRM for improving business performance (Seah, Hsieh, & Weng, 2010). For example, one sales manager of Changfeng Gas Company, whom we surveyed and interviewed, described the difficulty they encountered in CRM deployment. Since the top management team in his firm does not have technical expertise, they are not aware of the potential benefits of CRM and make no efforts toward advocating CRM. Although CIO and IT managers champion the use of CRM, employees in relevant functional units resist the use of CRM in their operations, since CRM use requires significant learning, experience and efforts. As a result, CRM is implemented but not used adequately, or not used at all in some departments. Their CRM deployment is proved to be a failure, despite of the significant investment. Similar situations are often seen in practice. Therefore, strong vertical advocacy is critical for CRM diffusion. Guided and supported by strong vertical advocacy, employees would be fully aware of the potential benefits of CRM, and therefore be dedicated to using CRM efficiently and effectively, leading to improved business processes and firm performance. Therefore, we propose the following hypotheses:

- H1a.** Vertical advocacy will positively influence CRM use.
- H1b.** Vertical advocacy will positively influence process performance.
- H1c.** Vertical advocacy will positively influence firm performance.

In light of the structuration theory, horizontal coordination between business and IT managers influences technology diffusion through affecting institutional structures. Such coordination alters the structures of signification by achieving synergistic integration of business and IT knowledge, legitimizes business-IT knowledge sharing and collaboration, and aligns the structures of domination through strengthening mutual support between business and IT managers (Armstrong & Sambamurthy, 1999). This consequently promotes the organizational diffusion of IT, especially multidivisional enterprise systems (such as CRM) that involve firm-wide infusion of IT into business processes. Lack of horizontal coordination would inhibit CRM diffusion within the firm. In another Chinese firm—Shengxueren Drug. Inc. that we surveyed, business managers are not familiar with the benefits of CRM, while IT managers do not understand the sales and service operations of the firm. The knowledge gap and lack of communication between the two groups lead to an entry-level use of CRM for mainly data recording, while not for operation improvement and knowledge sharing. The CRM implementation in Shengxueren Drug. Inc. turns out to be in trouble. Therefore, successful CRM diffusion requires sufficient horizontal coordination. Facilitated by horizontal coordination, business and IT managers are motivated to communicate more often, share their knowledge more efficiently, and cooperate with each other more effectively (Al-Mudimigh, Ullah, & Alsubaie, 2011; Chang & Wang, 2011). This would lead to a greater level of CRM use, and improved business processes and firm performance, as hypothesized below.

- H2a.** Horizontal coordination will positively influence CRM use.
- H2b.** Horizontal coordination will positively influence process performance.
- H2c.** Horizontal coordination will positively influence firm performance.

Our review of the technology diffusion perspective reveals that CRM systems enhance firm performance through its use in various customer-oriented business processes that creates operational and strategic benefits (Barua, Kriebel, & Mukhopadhyay, 1995; DeLone & McLean, 1992). Through CRM use in customer-oriented

processes to generate, deliver, integrate and exploit customer and sales knowledge, firms would be able to achieve operational efficiency and cost reduction, as well as improved customer satisfaction, product/service quality, and sales forecasting accuracy based on enriched customer and sales knowledge (Garrido-Moreno & Padilla-Meléndez, 2011; Gefen & Ridings, 2002; Goodhue et al., 2002; Hsieh, 2009). These process-level benefits would further lead to firm-level benefits including improved financial performance and market share (Subramani, 2004). Therefore, we hypothesize that:

- H3.** Firms with greater CRM use will achieve greater impacts on process performance.
- H4.** Firms with greater CRM impacts on process performance will achieve greater impacts on firm performance.

#### 4. The empirical study

To test the proposed model and hypotheses, we conducted a survey to collect data during the period of March through April 2010. Based on a comprehensive literature review and interviews with managers, we designed a questionnaire and refined it through several runs of pretests, revisions, and pilot tests. An expert panel reviewed each of the items on the questionnaire for its content, scope and purpose to ensure content validity. After the questionnaire was finalized, its paper version was distributed to 91 part-time MBA students at the Business School of Renmin University of China (in Beijing), who were randomly selected and has used CRM in their work. In the questionnaire, we define CRM as enterprise applications that integrate and manage all aspects of customer interactions with the organization to improve customer-oriented business processes, including marketing, sales, customer service, etc.

Our final dataset includes 82 firms located in Beijing after teasing out inappropriate responses. Characteristics of the sample are reported in Table 1. The sample includes small, medium, and large firms from multiple industries. Although the sample seems to be balanced in itself, all the firms are located in Beijing, which is a relatively more developed city in terms of its economy than most cities or rural areas of China. Therefore, we consider this sample as comprised of relatively more advanced firms than average in China as a whole. For the same reason, we also consider that firms in this sample are generally more developed than CRM adopters in China as a whole.

We examined the common method bias by using Harman's one-factor test (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) and found no significant common method bias. We developed our measurement model through consecutive stages of theoretical modeling, statistical testing, and refinement, following the paradigm suggested by Straub (1989). We used partial least squares (PLS) to conduct CFA. Considering the adequateness of sample size for conducting PLS analysis, we used the rule of thumb as suggested by Chin (1998), i.e. the sample size should be greater than ten times the number of constructs in the model. Our model has seven latent constructs, including two controls operated as multi-item constructs. In view of the fact that our model has several other single-item controls, we consider our sample size as marginally sufficient for CFA and later the structural model estimation using PLS.<sup>4</sup>

For *reflective constructs* (i.e. CRM use, process performance and firm performance), we examined construct reliability, convergent validity, and discriminant validity (Straub, 1989). *Construct reliability*

<sup>4</sup> We also acknowledge this as a limitation of this paper in Section 8.

**Table 1**  
Sample characteristics.

Industry	Obs.	# of employees	Obs.	Respondent department	Obs.
Manufacturing	26	<500	21	Marketing and sales	27
Financial Services	11	500–5000	27	Service	18
IT services	15	>5000	23	Product development	6
Social and public services	12	Unknown	11	IT	2
Energy	8	<b>Respondent position</b>		Human resources	4
Construction	4	Top/senior managers	5	Finance	6
Transportation	3	Middle level managers	39	Other administration	8
Real estate	3	Lower level employees	26	Unknown	11
		Unknown	12		
Total	82				

**Table 2**  
Measurement model: reflective constructs.

Construct	Range of path loadings <sup>a</sup>	Composite reliability	Average variance extracted
CRM use	0.813–0.893	0.919	0.740
Process performance	0.747–0.853	0.911	0.632
Firm performance	0.847–0.915	0.933	0.776

<sup>a</sup> All path loadings are significant at  $p < 0.01$  level.

ity measures the degree to which items are free from random error, and therefore yield consistent results. As shown in Table 2, all three reflective constructs have a composite reliability above the cutoff value of 0.70 (Chin, 1998). In addition, all these constructs have an average variance extracted (AVE) greater than 0.5 (Chin, 1998), suggesting that sufficient variance is explained by the latent constructs. *Convergent validity* assesses the consistency across multiple operationalizations. All standardized path loadings of the reflective constructs are significant ( $p < 0.01$ ) and greater than the cutoff value of 0.70, suggesting good convergent validity (Chin, 1998). *Discriminant validity* evaluates the extent to which different constructs diverge from one another. We used Fornell and Larcker's (1981) criteria: the square root of AVE of each construct should be greater than the off-diagonal correlations. Such results suggest that the items share more common variance with their respective constructs than with other constructs. As shown in Table 3, our measurement model meets this criterion.

For *formative constructs* in our model (i.e. all latent constructs other than the three reflective constructs), the weights of all indicators are significant ( $p < 0.01$ ) and above the suggested cutoff value of 0.30 (Chin, 1998), as shown in Table 4. Therefore, formative constructs in our model are acceptable. Further, we checked the validity of the formative second-order construct–decision execution mechanisms. The paths from the first order constructs to the second-order construct are significant and greater than the cutoff of 0.30, suggesting satisfactory validity (Chin, 1998).

In summary, our measurement model satisfies various reliability and validity criteria. Thus, constructs developed by this measurement model could be used for hypothesis testing.

## 5. Results

We estimated the structural model on the sample using PLS. The results are shown in Fig. 2. To test our hypotheses, we examined the PLS path estimates. Vertical advocacy has significant and positive paths to CRM use ( $p < 0.01$ ), process performance ( $p < 0.10$ ), and firm performance ( $p < 0.01$ ). Horizontal coordination has significant and positive paths to CRM use ( $p < 0.10$ ), process performance ( $p < 0.01$ ), and firm performance ( $p < 0.01$ ). These results indicate the important role that the two decision execution mechanisms play in technology diffusion. Moreover, vertical advocacy has a greater effect on CRM use and firm performance than horizontal coordination, while horizontal coordination has a greater effect on process performance. The R2 of CRM use, process performance and firm performance are 56%, 68% and 73%, respectively, showing substantive data variation explained by the relevant independent variables. CRM use has a significant and positive path to process performance ( $p < 0.01$ ), which has a significant and positive path to firm performance ( $p < 0.01$ ). This result shows the strong association among the three stages of CRM diffusion. Hence, we found strong support for H1a, H1c, H2b, H2c, H3 and H4, and weak support for H1b and H2a.

**Table 3**  
Correlation matrix of latent constructs.

	Correlation matrix <sup>a</sup>						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Vertical advocacy	N/A						
(2) Horizontal coordination	0.486	N/A					
(3) CRM use	0.499	0.431	0.860				
(4) Process performance	0.525	0.559	0.593	0.795			
(5) Firm performance	0.574	0.418	0.561	0.580	0.881		
(6) CRM functionality	0.553	0.528	0.535	0.518	0.531	N/A	
(7) System integration	0.475	0.543	0.359	0.331	0.447	0.334	N/A

<sup>a</sup> Diagonal elements in the correlation matrix are the square roots of AVEs (average variance extracted) for reflective constructs.

**Table 4**  
Measurement model: formative constructs.

Constructs	Indicators	Weights	Constructs	Indicators	Weights
Vertical advocacy (VA)	VA1	0.340***	Horizontal coordination (HC)	HC1	0.347***
	VA2	0.342***		HC2	0.397***
	VA3	0.322***		HC3	0.359***
	VA4	0.376***		HC4	0.385***
	VA5	0.369***	CRM functionality (CF)	CF1	0.371***
System integration (SI)	SI1	0.674***		CF2	0.357***
	SI2	0.602***		CF3	0.338***
				CF4	0.309***

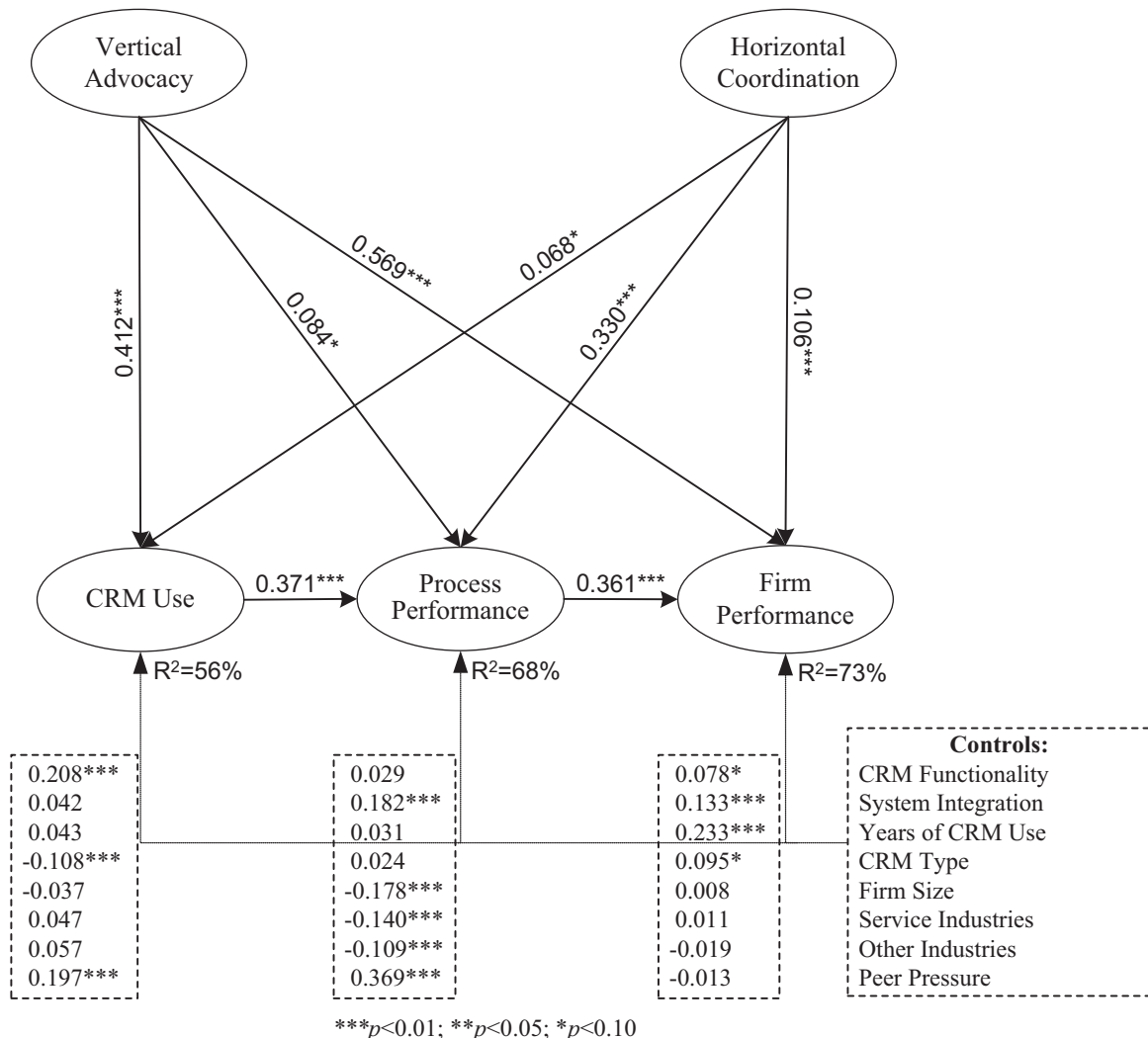
\*\*\*  $p < 0.01$ .

In addition, we found that CRM functionality has a significant and positive impact on CRM use ( $p < 0.01$ ) and firm performance ( $p < 0.10$ ), while system integration has a significant and positive impact on process performance ( $p < 0.01$ ) and firm performance ( $p < 0.01$ ). These results indicate that CRM functionality and system integration significantly facilitates CRM diffusion within a firm. Firms that have been using CRM for a longer period are found to have significantly better firm performance ( $p < 0.01$ ). Licensed and hosted CRM systems are found to be associated with a significantly lower degree of CRM use ( $p < 0.01$ ), but a higher degree of firm

performance gains ( $p < 0.10$ ). Large firms in non-manufacturing industries (i.e. service and other industries) are found to have a significantly lower degree of process gains from CRM ( $p < 0.01$ ). Peer pressure significantly drives CRM use ( $p < 0.01$ ) and process gains ( $p < 0.01$ ).

**6. Major findings**

- Decision execution mechanisms (including both vertical advocacy and horizontal coordination) are significant drivers of post-adoption



**Fig. 2.** Results.

*stages of CRM diffusion (i.e. CRM use, process performance, and firm performance).*

As shown by the empirical results in Fig. 2, vertical advocacy and horizontal coordination have positive and significant paths to CRM use, process performance and firm performance, indicating the important role of decision execution mechanisms in facilitating CRM diffusion. The importance of decision execution mechanisms speaks to the nature of CRM initiatives, i.e. strategic networking among multidivisional, integrated customer-oriented business processes. Broadly speaking, these findings point to the importance of IT governance in facilitating the post-adoption diffusion of information technologies within organizations. Vertical advocacy and horizontal coordination collectively form the mechanisms for executing decisions on CRM initiatives, as different organizational groups need to play their respective role for effectively executing such decisions.

On the one hand, vertical advocacy from top management significantly drives CRM decision execution, as effective governance of CRM diffusion requires top management to institute CRM's strategic vision, provide incentives, training and support to facilitate CRM use, and make necessary adjustments in business processes. Viewed from the structuration theory, such vertical advocacy shapes institutional structures of signification, legitimization and domination toward being conducive to CRM diffusion (Chatterjee et al., 2002). Since CRM deployment involves various business operations among multiple units, only top management can fulfill such advocacy efforts with more effectiveness and less difficulty (Agarwal & Sambamurthy, 2002).

On the other hand, the diffusion of CRM technology demands significant horizontal coordination between business managers and IT managers. Such coordination changes the structures of signification by facilitating the integration of business and IT knowledge, legitimizes business-IT collaboration and partnerships, and alters the structures of domination by reinforcing mutual support between business and IT managers (Chatterjee et al., 2002). Such manipulation of institutional structures further facilitates the diffusion of CRM technology into multiple business processes within the organization.

Moreover, vertical advocacy has a notably greater effect on CRM use and firm performance gains than horizontal coordination, which has a greater effect on process gains. This seems to indicate the particular importance of top management support in championing the assimilation of enterprise-wide systems such as CRM, which requires strategic data sharing and networking among multiple departments within the organization, while horizontal coordination between IT and business managers tend to be important for realizing effective customer-oriented process collaboration and alignment.

- *CRM use improves firm performance through creating operational and strategic benefits in customer-oriented business processes.*

As theorized earlier, firms with greater CRM use may achieve greater business process improvements, and thus greater firm performance improvements. Our results consistently show a significant and positive linkage from CRM use to process performance, and then to firm performance. By using CRM systems to support customer-oriented business processes, firms can improve cost efficiency, strengthen customer relationships, and increase responsiveness to customer needs, thereby enhancing financial performance and competitive performance (Rigby & Ledingham, 2004).

More fundamentally, this result has an important implication for research on IT payoff in general. Information technology must be successfully exploited in firms' business processes before it

can exhibit any significant payoff. As noted by Armstrong and Sambamurthy (1999), "while most firms are making significant investments in IT, not all of them are able to apply IT effectively in their business activities." Thus, we expect that failing to achieve effective IT exploitation in business processes might be an explanation for insignificant performance impacts of IT. Process performance stands out to be an intermediary stage that firms need to undergo before they can succeed in the next stage where IT business value is realized.

## 7. Managerial implications

This study provides several implications for managers. Our conceptual model might be useful for managers to assess their IT governance structures and mechanisms for facilitating CRM initiatives. Our model identifies vertical advocacy and horizontal coordination as two dimensions of decision execution mechanisms that are shown to be critical for CRM success. Firms need to take these dimensions into consideration when managing CRM systems. Different management groups in the firm should take different responsibilities in CRM deployment.

Top management should notice that it is important for them to bring CRM technology deeper into strategies, employees, business processes and resource configuration, in addition to technology advancement. Specifically, top management can introduce the benefits of CRM systems to employees in multiple customer-oriented departments, and champion CRM deployment within the firm by articulating a strategic vision of its use. Further, top management can legitimize and mandate the appropriate behaviors toward using CRM through making adequate regulations and offering incentives to motivate employees. Lastly, top management should provide necessary support such as training, process adjustments, and relevant resources to encourage individual use of CRM. As a result, such advocacy helps firms to achieve greater use of CRM in business operations and realize enhanced business process performance and firm performance.

Meanwhile, business managers and IT managers should also take their responsibilities in driving CRM diffusion through knowledge integration and coordination with each other. They need to grasp both business and IT knowledge to realize effective CRM deployment for improving business operations and firm performance. IT managers not only need to have sufficient technical know-how on CRM system, but also need to have a deep understanding of customer-oriented operations. For business managers, they should fully recognize the potential benefits of CRM for improving operational performance based on their functional expertise. In addition, firms should also legitimize the knowledge sharing and collaboration between business and IT managers through establishing relevant regulations, such as regular meetings, standard operation procedures, and problem solving regulations, in order to reinforce mutual support between business and IT managers. In a nutshell, successful execution of CRM decisions requires all organizational groups to be accountable for their respective role in facilitating CRM diffusion.

Regarding CRM technology capabilities, firms should acquire sufficient CRM functionality for conducting customer-oriented operations. CRM functions for supporting marketing, sales, service and analytical operations facilitate CRM use and thus help firms improve business processes and firm performance. Firms also need to augment their integration of CRM systems with internal systems and front-end e-business systems to enhance information flow. System integration helps firms eliminate the information "silos", and therefore achieve better streamlined business processes and firm performance.



## 8. Limitations and future research

Our methodology required tradeoffs that may limit the use of the data and interpretation of the results. Below we discuss the key limitations of this study and corresponding avenues for further research. First, the dataset used in this study is only 82 Chinese firms in Beijing. The sample size is a bit limited, rather than ideal. While focusing on firms in one large city in one country allows us to control for extraneous area and country factors, we do not know whether the results would carry over to firms in other areas of China or other countries. Future research can test our theoretical model using a broader dataset across multiple areas and countries. Second, due to the cross-sectional nature of our dataset, we are unable to analyze longitudinal processes, such as the long-term sustainability of the relationships. Therefore, our results can only show relationships existing between decision execution mechanisms and technology diffusion. Moreover, IT governance structures and mechanisms are dynamic. A further test of the dynamic relationships would require longitudinal data. Third, to gain a more comprehensive understanding of IT value creation under different IT governance structures and mechanisms, other types of IT applications and enterprise-wide systems (such as ERP, SCM and PDM) deserve further research. Lastly, external environmental factors such as IT standards, laws and regulations deserve to be factored in when considering IT governance issues in the whole picture of corporate governance. While this study provides some preliminary results for future research, there is clearly much more work to be done.

## 9. Concluding remarks

As firms are increasingly using CRM systems to integrate customer-oriented business processes, IT governance structures and mechanisms for deploying such multidivisional systems have become more important than ever. This study attempts to present a theoretical viewpoint on understanding the role of IT governance in CRM diffusion, supported by empirical evidence.

Along this line, this paper makes several specific contributions. First, we have developed a conceptual model for understanding decision execution mechanisms—what role different organizational groups play and how they work together to facilitate CRM diffusion—theoretically grounded on the structuration theory and the literature on IT governance. Guided by this theoretical framework, we have identified two significant dimensions of decision execution mechanisms, i.e. vertical advocacy from top management and horizontal coordination between business and IT managers. Further, decision execution mechanisms are found to be critical drivers of CRM diffusion, i.e. CRM use, business process improvements, and firm performance improvements. This study thus contributes to the literature on IT governance, by adding both theoretical rationales underlying the execution of IT decisions and empirical support to such rationales. Furthermore, this research extends the current IT governance research by focusing on the decision execution regarding complex multidivisional enterprise systems, rather than general IT in organizations.

Second, our study sheds new light on the “IT business value” debate in the CRM context. Our results show that CRM technology generates business value through its use in improving customer-oriented business processes. This contributes new evidence to why IT does not always lead to improved firm performance, and thus helps to reframe the conversation from direct relationships between IT and firm performance to intermediate usage and impacts on business processes. We believe this “bridging the gap” effort extends the IT business value literature.

Finally, by identifying specific patterns of decision execution mechanisms, we have empirically found that vertical advocacy is particularly effective in the CRM context. This contributes to the literature on CRM systems by adding new perspectives on the governance of such complex, multidivisional networking systems. This may also provide useful understandings on how enterprise-wide IT applications should be governed in terms of decision making and the execution of such decisions.

In summary, the major contribution of this study lies in its theoretical extension of the literature on IT governance, by conceptualizing the role of decision execution mechanisms in technology diffusion from a view of the structuration theory. Our work highlights the significant effects of decision execution mechanisms including vertical advocacy and horizontal coordination in CRM diffusion. We hope these initial results will motivate more research in this important arena.

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## Appendix A. Measurement items

Constructs	Indicators		
<b>Decision execution mechanisms</b>	<b>VA1</b>	Extent top management has articulated and communicated CRM's strategic vision to employees	
	<i>Vertical advocacy</i>	<b>VA2</b>	Extent top management has provided incentives to motivate employees to use CRM
		<b>VA3</b>	Extent top management has provided training for employees to use CRM
	<b>VA4</b>	Extent top management has provided support to use CRM	
	<b>VA5</b>	Extent top management has reengineered business processes to use CRM	
<i>Horizontal coordination</i>	<b>HC1</b>	IT managers understand customer-oriented business operations in coordination with business managers	
	<b>HC2</b>	Business unit managers recognize the benefits of CRM system for improving business operations in coordination with IT managers	
	<b>HC3</b>	IT staff has the technical know-how to manage CRM system in coordination with business managers	
	<b>HC4</b>	Business staff has the IT skills to use CRM system in coordination with IT managers	
<b>CRM use</b>	<b>CU1</b>	Extent CRM is used in generating customer and sales knowledge	
	<b>CU2</b>	Extent CRM is used in delivering customer and sales knowledge	
	<b>CU3</b>	Extent CRM is used in integrating customer and sales knowledge	
	<b>CU4</b>	Extent CRM is used in exploiting customer and sales knowledge	
<b>Process performance</b>	<b>PP1</b>	Staff productivity	
	<b>PP2</b>	Marketing and sales expenses	

<b>Firm performance</b>	<b>PP3</b>	Quality of internal communication and coordination
	<b>PP4</b>	Quality of customer service
	<b>PP5</b>	Product/offering improvement
	<b>PP6</b>	Sales forecasting accuracy
	<b>PP7</b>	Customer satisfaction
<b>Controls</b>	<b>PP8</b>	Customer retention rate
	<b>FP1</b>	Net profit
	<b>FP2</b>	Net profit margin rate
	<b>FP3</b>	Return on assets (ROA)
<b>CRM functionality</b>	<b>FP4</b>	Market share
	<b>CF1</b>	Extent CRM system supports marketing activities such as customer targeting, pricing, and marketing campaign management
	<b>CF2</b>	Extent CRM system supports sales activities such as customer account and information management, order management, and sales recommendations
	<b>CF3</b>	Extent CRM system supports service activities such as after-sales service management, service knowledge database (for solving customer problems), and call center operations
<b>System integration</b>	<b>CF4</b>	Extent CRM system supports analytic activities such as customer value analysis, customer retention rate analysis, and sales forecasting
	<b>SI1</b>	Extent CRM system digitally integrated with internal systems and databases
<b>Years of CRM use</b>	<b>SI2</b>	Extent CRM system digitally integrated with front-end e-business systems
	<b>YR</b>	Years of CRM use by the firm
<b>CRM type</b>	<b>TY</b>	CRM system is a: 0 = In-house developed system, 1 = licensed/hosted package
<b>Firm size</b>	<b>FS</b>	Number of employees
<b>Industry</b>	<b>IN</b>	Manufacturing vs. Service vs. Other industries (using dummy variables)
<b>Peer pressure</b>	<b>CP</b>	Extent competitors use CRM

Note: All items were based on 7-point Likert scale except those noted otherwise.

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