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The Relationship between Information Systems (IS) Assets, Organizational Capabilities, and IS-enabled Absorptive Capacity in U.S. State Information Technology Departments

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Abstract:

Despite the recognition that information is a strategic asset for any state government, we lack research on the deployment and use of information systems in the U.S. state government context. Information systems are central for state agencies' efforts to develop optimal responses to demands from their internal and external constituents. We examine how a specific IS asset combines with prior knowledge to influence organizational capabilities. We also examine the connection between organizational capabilities and the IS-enabled absorptive capacity of U.S. state IT departments from the perspective of IS employees. This study may help researchers and practitioners understand the role of IS assets in forming IS-enabled absorptive capacity in government organizations. We collected survey data from 417 government IS employees that represented 21 different states. The findings indicate that the role of an IS asset depends on the type of asset. Inside-out IS assets (ERP) moderate the relationship between prior knowledge and organizational capabilities, while outside-in IS assets (CRM) directly affect organizational capabilities. In addition, organizational capabilities can directly affect IS-enabled absorptive capacity in IT departments. This research increases our understanding of the influence of different IS assets on IS-enabled absorptive capacity in state government IT departments. We discuss limitations and directions for future research.

Keywords: Public Sector, State Government, Organizational Capabilities, IS Asset, Absorptive Capacity, ERP, CRM.

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1 Introduction

The challenge for state government information technology (IT) departments is that much of the knowledge they will reference has been generated outside the public sector. Information systems that may be perfectly adequate for use in a business with a limited set of strategic goals may not work in a state government environment populated by many independent agencies that must respond to a diverse set of stakeholders (Harvey, Skelcher, Spencer, Jas, & Walshe, 2010). In addition, the ability to take risks is often curtailed in the public sector (e.g., state government) because of constitutional and legal constraints and the potential of doing harm (Berman & West, 1998). To make knowledge suitable to address public policy questions and public decision making processes, it must be transformed to meet the needs of highly diverse service environments and stakeholders (Yang & Melitski, 2007). But not all agencies have the capability to take advantage of the transformative potential of new knowledge. Absorptive capacity is the ability to recognize the value of new knowledge, assimilate it, and use it for organizational purposes (Cohen & Levinthal, 1990; Zahra & George, 2002), and researchers view it as an important antecedent of innovation (Cohen & Levinthal, 1989, 1990; Jansen, Van Den Bosch, & Volberda, 2005; Todorova & Durisin, 2007; Van Den Bosch, Volberda, & De Boer, 1999; Zahra & George, 2002). Innovation refers to designing, developing, and implementing new products, services, processes, or systems to create value for customers (Joshi, Chi, Datta, & Han, 2010). In the state government context, innovation allows agencies to provide quality public services and better respond to constituents' needs (Robinson, 1998; Vanagunas, 1999).

The resource-based view (RBV) of the firm (Barney, 1991) asserts that resources (i.e., production process inputs such as knowledge) are key to developing and sustaining superior performance. Using an RBV perspective, according to Choi (2014), one can classify resources as tangible (e.g., facilities and raw materials), intangible (e.g., reputation and product quality), and human (e.g., knowledge and employee training). Research has begun to explore the role of information systems resources (i.e., IS assets such as enterprise resource planning systems and human resource management systems) in determining absorptive capacity (Chang, Gong, Way, & Jia, 2013; Roberts, Galluch, Dinger, & Grover, 2012; Saraf, Liang, Xue, & Hu, 2013). Information systems (IS) affect innovation through their impact on knowledge production—particularly when one views the innovation process as a knowledge-creation process (Alavi & Leidner, 2001). Integrating absorptive capacity and innovation theories, scholars have found that information systems impact organizational innovation by creating absorptive capacity (Joshi, Chi, Datta, & Han, 2010; Roberts et al., 2012; Tiwana & Mclean, 2005).

An organizational capability is a repeatable pattern of actions (Wade & Hulland, 2004) that culminates in a firm's ability to combine, integrate, and deploy assets/resources (Choi, 2014) and includes the resources and activities that enable organizations to integrate existing and newly acquired knowledge (Kogut & Zander, 1992). Roberts et al. (2012) argue that research should look at IS resources and organizational capabilities and identify how they influence a firm's absorptive capacity. Drawing on the resource-based view and absorptive capacity and innovation theories, we address the following research question:

> RQ: To what extent does the type of IS asset that state IT departments adopt affect the relationship between organizational capabilities and the department's degree of absorptive capacity?

We lack research that has explored the relationship between organizational capabilities, specific IS assets, and absorptive capacity in the IS field, and we do not know of any research that has done so in the state government context. If we want to provide organizations with actionable insights, we need more research to uncover the factors and interaction mechanisms that may lead to increased absorptive capacity (and, ultimately, innovation)—particularly in the state government IT department context.

2 Literature Review and Hypothesis Development

The RBV of the firm (Barney, 1991) explains the relationship between a firm's capabilities, resources, and performance such that a firm can use its capabilities and resources in unique ways to attain increased performance (Negahban, Kim, & Kim, 2016). Organizations create value by integrating specialized knowledge with a wide array of resources to transform inputs into outputs (Grant, 1996). In a state government agency, this transformation process may translate into improved performance, being able to effectively use resources, and being good stewards of taxpayer money.

2.1 Absorptive Capacity and IS-enabled Absorptive Capacity

In this study, absorptive capacity refers to an IT department's ability to recognize new knowledge, assimilate it, and use it for organizational purposes (Zahra & George, 2002). We define new knowledge as information that individuals in the state government IT department did not previously know and value. Scholars argue that absorptive capacity is critical to innovative capability (e.g., Cohen & Levinthal, 1989, 1990).

Little research has examined absorptive capacity in the public sector, but scholars are beginning to recognize its importance and applicability as citizen's needs and expectations evolve. Researchers have conducted the majority of the studies on absorptive capacity from a public sector perspective outside of the United States. Some have focused on the assistance that government can provide organizations to help increase their absorptive capacity (Germany; Kleis, Chwelos, Ramirez, & Cockburn, 2012; Iran; Ferretti & Parmentola 2010). Others have examined the absorptive capacity of government-organization partnerships (United Kingdom; Zheng & Caldwell 2008) and absorptive capacity as a moderator of the responsiveness-performance relationship for public leisure service providers (United Kingdom; Hodgkinson, Hughes, & Hughes, 2012). Finally, Murray, Roux, Nel, Driver, and Freimund (2011) review absorptive capacity concepts and their relevance to public sector organizations in South Africa. They propose absorptive capacity as a unifying framework to address many organizational issues these organizations are facing (Murray, Roux, Nel, Driver, & Freimund, 2011). In the United States. Harvey et al. (2010) review the conceptual implications of applying absorptive capacity to the performance of public organizations (i.e., a non-market environment), and Riemenschneider, Allen, Armstrong, and Reid (2010) use U.S. state CIOs and IT managers to explore antecedents of absorptive capacity.

Information systems support knowledge acquisition, assimilation, transformation, and exploitation (Joshi et al., 2010; Roberts et al., 2012; Tiwana & Mclean, 2005) and, thus, enable organizations' absorptive capacity, which we refer to as IS-enabled absorptive capacity. Research has identified IS-enabled absorptive capacity as a factor influencing knowledge transfer (Frank, Ribeiro, & Echeveste, 2015) and innovation (Chi, Ravichandran, & Andrevski, 2010). For example, according to Karanja and Bhatt (2014), IS-enabled absorptive capacity "facilitates the generation and capture of ideas on new products, or processes designs, improvements on existing products, and processes as well as retirement of non-rent generating products, services, or business processes" (p. 44).

2.2 Knowledge and Organizational Capabilities

Prior knowledge means "basic skills or even a shared language, but may also include knowledge of the most recent scientific or technological developments in a given field" (Cohen & Levinthal, 1990, p. 128). Studies indicate that prior knowledge is an important antecedent of absorptive capacity (Cohen & Levinthal, 1990) and that internal and external sources of knowledge are critical to a firm's innovative capabilities (Cohen & Levinthal, 1990). The resource-based view of the firm (Barney, 2001) asserts that an organization's ability to take advantage of external opportunities is a function of its internal resources (Hoskisson, Hitt, Wan, & Yiu, 1999). Resources can be tangible (e.g., information systems) or intangible (e.g., human skills, knowledge) inputs and can affect organizational capabilities (Choi, 2014).

Employees who possess prior knowledge can better identify useful external information and integrate it in creative ways into their existing knowledge base advantage (Argote & Ingram, 2000; Grant, 1996). Thus, from a resource-based view, prior knowledge is an intangible asset that contributes to a firm's organizational capabilities. Research has found that the more existing knowledge an individual possesses, the more likely the individual will be able to exploit that knowledge for innovation (Choi, 2014; Roberts, Galluch, Dinger, & Grover, 2012; Zahra & George, 2002). Thus, we expect that, in our context, the more relevant knowledge that individuals possess, the greater the organizational capabilities, and we seek to assess the validity of this relationship in the state government IT department context. Thus, we hypothesize:

H1: Prior knowledge is positively related to organizational capabilities in U.S. state government IT departments.

2.3 IS Assets and Organizational Capabilities

Beard and Sumner (2004) use an RBV perspective to explore the likelihood of developing superior performance from an enterprise resource planning (ERP) system implementation. As a system becomes

embedded into organizational routines, it becomes more non-substitutable and more valuable over time (Hamel & Prahalad, 1994). An organization's IS assets reflect its ability to use its technology resources (Afuah, 2002) and are an important resource that is positively related to innovation (Zhou & Wu, 2010) and superior organizational performance (Bharadwaj, 2000). Adopting IS assets can help an IT department combine its resources more effectively and efficiently. In addition, adopting IS assets can help IT departments connect to their external environments so as to sense external changes faster. Therefore, it may help innovation speed and also may help the state government IT department to understand what customers want. This knowledge can boost innovation and, ultimately, lead to superior performance.

Knowledge can have a relatively short half-life because of turnover and a rapidly changing environment, and systems allow the organization to store and share knowledge for innovation (Kleis et al., 2012). Using the resource-based view, we assert that IS asset adoption is a tangible asset that contributes to a firm's organizational capabilities. Recall that we define organizational capabilities as activities that combine and deploy assets/resources to enable organizations to integrate existing and newly acquired knowledge for innovation (Kogut & Zander, 1992). Organizational capabilities can take two form forms: socialization capabilities and coordination capabilities (Roberts et al., 2012). Socialization capabilities refer to a firm's ability to use norms and customs to produce a collective culture and identity, and coordination capabilities involve knowledge transfer and absorption across and in units. By adopting an IS asset (e.g., ERP system), organizations can bridge the traditional relationship gaps that exist between functions in the firm (Coltman, Devinney, & Midgley, 2011; Galy & Sauceda, 2014) and, thus, enhance the organization's ability to coordinate effort across the organization. Also, IS asset adoption can assist in connecting members of the organization and quickly onboarding new members, which can extend firms' socialization capabilities. For example, a customer relationship management (CRM) system could help support customer interaction procedures, reduce individual effort to manage customer relationships, and potentially make customer knowledge more easily shared (Xu & Walton, 2005). In the private sector, research has found ERP system implementations to have a significant impact on organizational capabilities (Hwang & Min, 2015; Masini & Van Wassenhove, 2009)—often by enhancing an organization's capabilities to coordinate and process information—while improving agility and flexibility (Hwang & Min, 2015). Research has also found ERP systems to influence business strategy, which leads to enhanced organizational capabilities (HassabElnaby, Hwang, & Vonderembse, 2012). Because research has established this relationship in the private sector, we assess the validity of this relationship in the state government IT department context.

Consistent with the literature that has addressed IT (i.e., technology-focused) capabilities, we assert that one can divide IS (i.e., system-focused) capabilities into two categories based on the primary business process area the capability supports: externally focused and internally focused (Stoel & Muhanna, 2009). Outside-in capabilities (Roberts et al., 2012), also known as externally focused capabilities (Stoel & Muhanna, 2009), are resources, skills, and knowledge that help a firm sense, understand, and respond in a timely manner to changes in its markets and to the needs of customers and suppliers (Wade & Hulland, 2004). Outside-in (i.e., externally focused) IS assets, such as a virtual community that allows IT departments to develop external relationships and collect knowledge from sources such as online forums and social media sites, support these capabilities. The outside-in IS asset allows customers to share knowledge, which is an external source of knowledge that an IT department and systems that support research and customer relationship management (CRM) processes can collect. CRM systems help IT departments to communicate with customers and manage the relationships between them and their customers. These relationships can provide knowledge about the customer's needs that IT departments can use to develop innovations. Hence, outside-in IS assets facilitate an IT department's knowledge identification capability such that it can recognize knowledge that could be valuable to it.

Inside-out capabilities (Roberts et al., 2012), also known as internally focused capabilities (Stoel & Muhanna, 2009), are resources, skills, and knowledge that help organizations offer products and services and minimize costs associated with production, operational support, and fulfillment. Firms deploy these capabilities themselves in response to market requirements and opportunities (Wade & Hulland, 2004), and inside-out IS assets support them. Inside-out IS assets enhance a firm's ability to take advantage of market opportunities. Enterprise resource planning (ERP) systems are an example of an inside-out (i.e., internally focused) IS asset that focuses on integrating internal operations and data to enhance efficiency. ERP systems provide immediate access to standardized data across the organization, which, in turn, allows the organization to more readily apply new knowledge to create products and services (Roberts et al., 2012). Hence, inside-out IS assets increase an organization's knowledge application capability. Thus, we hypothesize:

H2: IS asset adoption is positively related to organizational capabilities in U.S. state government IT departments.

H2a: ERP adoption is positively related to organizational capabilities in U.S. state government IT departments.

H2b: CRM adoption is positively related to organizational capabilities in U.S. state government IT departments.

Research has found IS assets to interact with various antecedents of an organization's absorptive capacity. For example, Joshi et al. (2010) found that technologies embedded in IS (e.g., e-communities) helped firms to understand, synthesize, and use complex technical knowledge. Consistent with this view, we propose that IS asset adoption may interact with prior knowledge such that they affect organizational capabilities. For example, by adopting an IS asset such as an ERP system, IT departments in state government agencies can share/transfer knowledge and transform it into organizational capabilities.

According to the resource-based view, different IS resources may have different effects on organizational performance (Schryen, 2013; Wade & Hulland, 2004). We assert that different IS assets may have different interaction effects with prior knowledge. For example, an ERP system is internally focused and may standardize the resource management process, which may negatively moderate the relationship between prior knowledge and organizational capabilities because it reduces employees' reliance on prior knowledge to create organizational capabilities. The ERP system can make business processes more routine and employees less reliant on prior knowledge to achieve organizational capabilities. For example, without an ERP system, employees might have idiosyncratic business processes and need to use their prior knowledge to develop organizational capabilities. With an ERP system, a firm can standardize its business processes and, thus, embed prior knowledge into the system, which means that individuals can use the routines that the ERP system creates. The basic idea is that ERP systems create routines that reduce individuals' reliance on prior knowledge to create organizational capabilities (i.e., the system may compensate for knowledge deficiencies). Thus, we assert that ERP systems can function as a substitute for prior knowledge. This substitution affects the nature of the relationship (strength) between prior knowledge and organizational capabilities. The relationship changes as a function of ERP asset adoption such that increased ERP adoption will reduce the reliance on prior knowledge to increase organizational capabilities (i.e., have a negative moderating effect).

On the other hand, a CRM system is externally focused and may increase knowledge transfer through increased knowledge access and, thus, may have positive moderation effect on the relationship between prior knowledge and organizational capabilities. According to Garrido-Moreno, Lockett, and García-Morales (2014), "Despite organizations' huge investments in CRM technology infrastructures, too often these systems fail to deliver commensurate levels of performance and value because other complementary factors are not valued" (p. 1032). However, customers and customers' information are always changing. Thus, a CRM system cannot substitute for prior knowledge because the CRM system cannot create a routine for an employee to deal with the unique aspects of individual customer relationships. Unlike an ERP system, using a CRM system to manage the entire customer lifecycle often creates unused technology capacity, causes unnecessary business disruptions, and fails the payback test. Rather than use CRM systems to transform entire businesses, research suggests that the key is to direct efforts toward solving a small number of clearly defined problems (i.e., pain points) in the customer relationship cycle (Rigby & Ledingham, 2004). So, while firms can create routines in a CRM system, compared with an ERP system, we assert the number of routine processes is minimal. What a CRM system does provide is additional information and/or knowledge about customers. Thus, we hypothesize:

H3: IS asset adoption moderates the relationship between prior knowledge and organizational capabilities in U.S. state government IT departments.

H3a: ERP adoption negatively moderates the relationship between prior knowledge and organizational capabilities in U.S. state government IT departments.

H3b: CRM adoption positively moderates the relationship between prior knowledge and organizational capabilities in U.S. state government IT departments.

2.4 Organizational Capabilities and IS-enabled Absorptive Capacity

We assert that higher IS-enabled absorptive capacity is more likely to occur when state agencies have certain organizational processes in place. We believe the organizational processes that promote

innovation (e.g., looking for a better way of performing existing processes) and more efficient and effective processes are more likely to influence IS-enabled absorptive capacity than stagnant organizational processes. Kogut and Zander (1992) define organizational capabilities as "the intersection of the capability of the firm to exploit its knowledge and the unexplored potential of the technology" (p. 19). Organizational capabilities enables organizations (and/or departments) to integrate extant knowledge with newly acquired knowledge (Eisenhardt & Martin, 2000; Kogut & Zander, 1992; Van den Bosch, Volberda, & de Boer, 1999). Organizational capabilities "depend on the links across a mosaic of individual capabilities" (Cohen & Levinthal, 1990, p. 133) and facilitate knowledge exchange, enhance commitment to and compliance with exploitation processes of new external knowledge (Jansen et al., 2005), and influence employees' participation in decision processes and their coordination across groups. We assert that, in state governments where strong organizational capabilities exist, employees will be more likely to actively scan for and absorb knowledge because they recognize that varied knowledge might help them across the agency. Since organizational capabilities can assist work units in more effectively using resources and sharing knowledge, we assert that these activities may positively influence an individual's ability to identify and absorb new knowledge useful to the IT department and agency. Therefore, we propose:

H4: Organizational capabilities are positively related to IS-enabled absorptive capacity in U.S. state government IT departments.

H4a: Organizational capabilities are positively related to ERP-enabled absorptive capacity in U.S. state government IT departments.

H4b: Organizational capabilities are positively related to CRM-enabled absorptive capacity in U.S. state government IT departments.

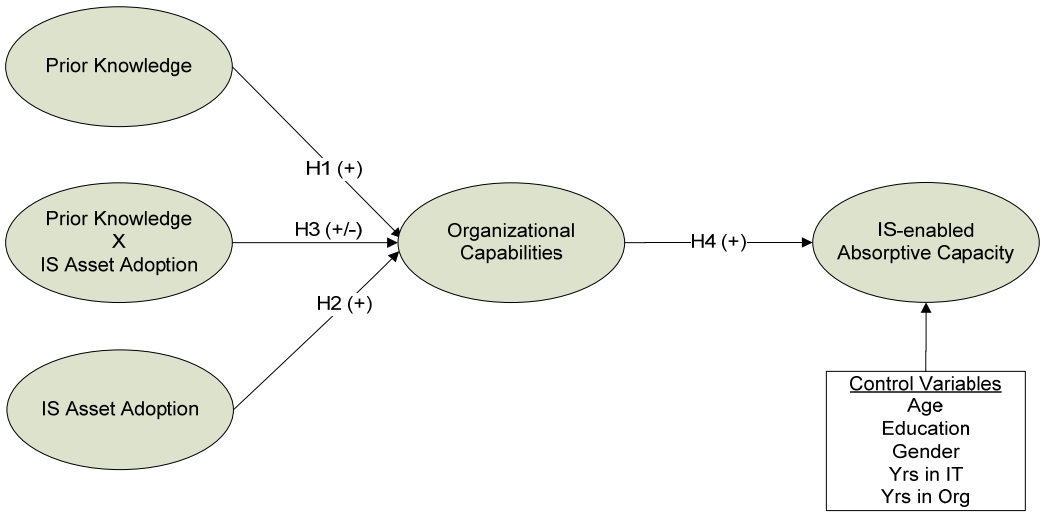

Figure 1. General Research Model

3 Method

In building our model, we surveyed IS employees who worked in state government IT departments about the potential antecedents of IS-enabled absorptive capacity that are applicable in their state governments. In state government IT departments, employees typically directly use information systems such as ERP and CRM. Therefore, we thought it better to investigate the perceptions of IS employees because they are more closely involved with the phenomenon under study.

3.1 Participants

Table 1 shows the demographics for the participants.

Table 1. Descriptive Statistics

Concept	Values	Statistics
Gender	Male	152
	Female	214
	Did not report	51
Age		M = 46.33, SD = 9.52
Marital status	Single	109
	Married	257
	Did not report	51
Level of education	High school diploma	61
	Associate degree	80
	Bachelor degree	168
	Graduate degree	58
	Did not report	50
Years in organization		M = 11.17, SD = 8.78
Years of IS experience		M = 16.65, SD = 9.92
Years in current job		M = 8.29, SD = 6.94
Position classification	Administrative	15
	Professional	105
	Technical	237
	Did not report	60
Job function	Application programmer	89
	Project lead	35
	Software engineer	8
	Systems analyst	45
	Systems programmer	24
	Other	165
	Did not report	51
Annual salary	Below $25,000	4
	$25,000-$39,999	62
	$40,000-$54,999	159
	$55,000-$69,999	83
	$70,000-$84,999	36
	$85,000-$99,999	15
	$100,000 or above	6
	Did not report	52
Formal degree in IS major	Yes	184
	No	182
	Did not report	51

The sample for this study comprised 417 non-managerial employees in state government IT departments that represented 21 different states (42% response rate based on 50 states). We obtained the names and email addresses of the state CIOs from the National Association of State Chief Information Officers (NASCIO) headquarters. NASCIO provides support to state CIOs through information exchange of IS best practices and innovations. The executive director of NASCIO contacted the state CIOs by email; the emails provided the URL for the survey website and encouraged the CIOs to distribute the URL for the survey website to their IS employees.

We analyzed the responder versus non-responder states and found no significant differences in terms of the regions in the US or the state's "grade" on the "Government Performance Project's Grading the States 2008 Report" (Barrett & Greene, 2008) that gives grades of A, B+, B, B-, and so on to each state. A common control variable in the information systems literature is industry. Because all participants in this study were state government IS employees, we did not need to control for industry.

3.2 Measures

All survey items (items show in the Appendix) came from previously validated scales that we adapted to the U.S. state government IT department context. Organizational capabilities can take two forms: socialization capabilities and coordination capabilities. We developed the measurement of socialization capabilities from Van der Post, De Coning, and Smit (1997) and Pandey and Rainey (2006). We developed the measurement of coordination capabilities from Van der Post et al. (1997). We measured organizational capabilities by aggregating the socialization capabilities and coordination capabilities. We adapted the prior knowledge measure from Medsker and Campion (1997).

In this research, we explored the adoption of two IS assets: enterprise resource planning systems (ERP) and customer relationship management systems (CRM). We define the perception of IS asset adoption as the degree to which an individual believe that the individual's IT department has leveraged the asset. We measure the perceptions that an individual may have regarding adopting an IS asset for two reasons. First, individuals' behavior toward the asset is a function of how they perceive the asset. As classic IS theories such as the technology acceptance model consistently demonstrate, perceptions about a technology are instrumental in the adoption decision and, ultimately, usage behavior (Davis, 1989; Fishbein & Aizen, 1975; Rogers, 1983). Second, research has found that perceived measures of concepts frequently correlate positively with corresponding objective measures (e.g., organizational performance: Powell, 1992; system use: Morris & Dillon, 1997). We assert that studying the interaction among perceived attributes helps to establish theory (Moore & Benbasat, 1991), and measuring the perceived level of IS asset adoption is appropriate for this context.

Since individual cognitions are the basis of absorptive capacity (Lane, Koka, & Pathak, 2006), we included five control variables in the model to exclude potential noise caused by individual differences: employees' age, education level, gender, years in the IT field, and years in the organization. Research has found that employees' age and gender shapes their cognition (Angst & Agarwal, 2009; He, Butler, & King, 2007), and, therefore, we included age and gender in the control variables. Work experience and the level of academic degree are two important factors that also influence absorptive capacity (Lund Vinding, 2006). Thus, we included years in IT, years in the organization, and education level of the employee as additional control variables.

3.3 Data Validation

We analyzed the data with SPSS version 20.0. First, we conducted a confirmatory factor analysis (CFA) and extracted factors through principal component analysis (PCA). We deleted items that had low loadings (less than 0.5) on the appropriate factor and high cross loadings (we indicate dropped items with an asterisk in the Appendix) (MacKenzie, Podsakoff, & Podsakoff, 2011). We deleted these items prior to performing the remaining measurement assessments. See Table 2 for the results of the factor analysis. The results indicate that seven factors explained 75.51 percent of the variance (KMO = 0.921): coordination (α = 0.963), organization integration (α = 0.909), employee participation (α = 0.880), socialization capabilities (α = 0.867), prior knowledge (α = 0.743), CRM-enabled absorptive capacity (α = 0.964), and ERP-enabled absorptive capacity (α = 0.959).

Table 2. Confirmatory Factor Analysis

Items	Factor						
	1	2	3	4	5	6	7
COORD3	**0.871**						
COORD4	**0.864**						
COORD2	**0.857**						
COORD6	**0.842**						
COORD8	**0.840**						
COORD5	**0.836**						
COORD1	**0.812**						
COORD7	**0.805**						
OI2		**0.782**					
OI6r		**0.770**					
OI5		**0.762**					
OI1		**0.734**					
OI4r		**0.703**					
OI3		**0.691**					
EP4r			**0.780**				
EP6			**0.775**				
EP5			**0.736**				
EP7r			**0.684**				
EP3			**0.667**				
EP2			**0.577**				
SC7				**0.717**			
SC8				**0.702**			
SC9				**0.688**			
SC2				**0.604**			
SC4				**0.568**			
AS2CRM					**0.959**		
AS3CRM					**0.940**		
AS1CRM					**0.925**		
PK2						**0.876**	
PK1						**0.852**	
PK3						**0.666**	
AS2ERP							**0.938**
AS3ERP							**0.937**

Extraction method: principal component analysis.
Rotation method: varimax with Kaiser normalization.
Coord: coordination; **OI:** organizational integration; **EP:** employee participation; **SC:** socialization capabilities; **ASCRM:** CRM-enabled absorptive capacity; **PK:** prior knowledge; **ASERP:** ERP-enabled absorptive capacity)

Before testing the model, we evaluated descriptive statistics (means, standard deviation, skewness, and kurtosis) for the constructs used in this research using SPSS version 20.0 (see Table 3). The skewness values for the constructs were less than 1.0 and greater than -1.0, which indicates that our data was normally distributed. Only prior knowledge had an asymmetrical distribution with a tail to the left (-1.40), which makes sense because of the individuals in this sample had an average of 16.65 years of experience and 8.29 years in their job. Kurtosis is a measure of the combined sizes of the two tails and

measures the amount of probability in the tails. Research often compares the value to the kurtosis of the normal distribution, which is equal to 3. In our data, CRM-enabled absorptive capacity, ERP-enabled absorptive capacity, prior knowledge, organizational capabilities, and years in organization had a flatter distribution, while the rest of the constructs had a more peaked distribution, which indicates a lack of outliers. In order to ensure the data had no issues with multicollinearity, we calculated the variance inflation factor (VIF) values for the constructs. The highest VIF was 1.53—below the acceptable threshold of 4.0 (O'brien, 2007)—which indicates that multicollinearity was not likely an issue. We assessed common method bias using Harman's (1976) single factor test. In total, the first factor explained 38.33 percent of the variance, which indicates that no single factor contributed the majority of the variance. We conclude that common method bias was not a major issue for this study.

Table 3. Descriptive Statistics and Correlations (N = 417)

Variable	1	2	3	4	5	6	7	8	9
1. CRM-enabled absorptive capacity	1								
2. ERP-enabled absorptive capacity	0.61**	1							
3. Prior knowledge	0.05	-0.09	1						
4. Organizational capabilities	0.43**	0.51**	0.26**	1					
5. Age	-0.06	0.02	0.12*	-0.05	1				
6. Education level	0.03	0.05	-0.16**	-0.07	-0.11*	1			
7. Gender	-0.20*	-0.08	-0.01	-0.03	0.03	0.05	1		
8. Year in organization	-0.06	0.09	0.05	-0.03	0.38**	-0.19**	-0.11*	1	
9. Year in IS experience	-0.15	-0.06	0.11*	-0.14**	0.59	-0.04	0.09	0.29**	1
Mean	4.24	4.38	5.80	3.86	46.33	2.61	1.58	11.17	16.65
Std. deviation	1.12	1.43	0.91	1.13	9.52	0.94	0.49	8.78	9.92
Skewness	-0.31	-0.24	-1.40	-0.20	-0.19	-0.34	-0.35	0.99	0.44
Kurtosis	1.58	0.38	3.56	0.30	-0.51	-0.78	-1.89	0.20	-0.64
Valid N (listwise)	123	76	417	417	359	367	366	364	363
** Correlation significant at the 0.01 level (2-tailed).									
* Correlation significant at the 0.05 level (2-tailed).									

4 Analysis and Results

We used ordinary least squares (OLS) regression to analyze the data. Researchers in the IS field have adopted OLS to examine the direct and indirect effects of independent variables on dependent variables (Igbaria & Guimaraes, 1993; Tait & Vessey, 1989). In order to determine the possible moderating effect of IS assets on the relationship between prior knowledge and organizational capabilities, we used hierarchical multiple regression to test H1, H2, and H3 by running three models (Carte & Russell, 2003). In model 1, we used prior knowledge and IS asset adoption as independent variables. In model 2, we added the interaction effect of prior knowledge and IS asset adoption. Table 4 shows the regression results for the effect of ERP asset adoption. In model 2, the ΔR^2 was significant ($\Delta R^2 = 0.017$, F value = 4.092, $p < 0.05$), which indicates moderation. So, ERP asset adoption and prior knowledge together explained 16.0 percent of the variance in organizational capabilities.

The results do not support H1 ($\beta = 0.075$., $t = 1.081$, $p > 0.05$), which posits that an organization's prior knowledge does not influence organizational capabilities. Our results support H2a ($\beta = 0.380$, $t = 5.388$, $p < .001$), which posits that a firm's ERP adoption is positively related to organizational capabilities. We found support for H3a, which posits that ERP adoption negatively moderates the relationship between prior knowledge and organizational capabilities ($\beta = -0.140$, $t = -2.023$, $p < 0.05$). The nature of the relationship (strength) between prior knowledge and organizational capabilities changed as a function of ERP asset adoption such that a dampening effect occurred. This finding indicates that increased ERP adoption reduces the reliance on prior knowledge to increase organizational capabilities. Figure 2 shows the interaction plot for ERP adoption. At low levels of ERP asset adoption, we see a strong relationship between prior knowledge and organizational capabilities. At high levels of ERP asset adoption, we see a weak relationship between prior knowledge and organizational capabilities.

Table 4. Regression Results for Organizational Capabilities (ERP Adoption)

Variable	Model 1			Model 2		
	Beta	t-value	Sig.	Beta	t-value	Sig.
Prior knowledge	0.108	1.597	.112	0.075	1.081	.281
ERP adoption	0.336	4.971	.000	0.380	5.388	.000
Prior knowledge * ERP adoption				-0.140	-2.023	.044
R	0.378			0.400		
R^2	0.143			0.160		
ΔR^2	0.143			0.017		
F value	16.694			4.092		
Sig. F	.000			.044		

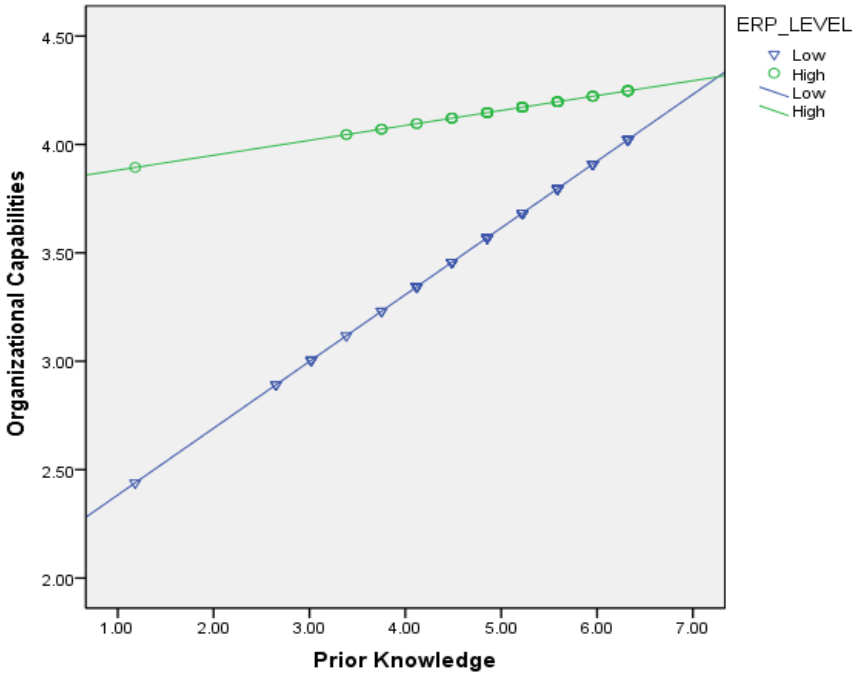

Figure 2. Interaction Plot

Table 5 shows the regression results for the effect of CRM asset adoption on organizational capabilities. As Table 5 shows, the ΔR^2 for model 1 was significant ($\Delta R^2 = 0.128$, F value = 28.492, $p < 0.001$), and the ΔR^2 for model 2 was non-significant ($\Delta R^2 = 0.129$, F value = 0.001, $p > 0.05$), which indicates that model 1's superiority over model 2. The results show that CRM asset adoption had a direct effect only on organizational capabilities and did not moderate the relationship between prior knowledge and organizational capabilities. CRM adoption and prior knowledge together explained 12.8 percent of the variance in organizational capabilities.

The results also support H1 ($\beta = 0.243.$, $t = 5.118$, $p < .001$), which posits that a firm's prior knowledge positively impacts organizational capabilities. Our results also support H2b ($\beta = 0.248$, $t = 5.214$, $p < .001$), which posits that an organization's CRM adoption positively influences organizational capabilities. The results do not support H3b, which posits that CRM adoption positively impacts the relationship between prior knowledge and organizational capabilities.

We used hierarchical multiple regression to test H4. In model 1, we used the control variables (age, education level, gender, organizational tenure, and years of IS experience) as the independent variable. In model 2, we added organizational capabilities as an independent variable. Table 6 and Table 7 report the regression results for H4a and H4b, which reveals the relationship between organizational capabilities and IS asset specific IS-enabled absorptive capacity in the IT department.

Table 6 shows that organizational capabilities significantly and positively affected ERP-enabled absorptive capacity, which supports H4a ($\beta = 0.573$, $t = 5.238$, $p < .001$). This finding shows that increased organizational capabilities enhances ERP-enabled absorptive capacity and explained an additional 30.6 percent of the variance in ERP-enabled absorptive capacity. In addition, none of the control variables influence ERP-enabled absorptive capacity. Table 7 shows the regression results. They show that organizational capabilities significantly and positively affected CRM-enabled absorptive capacity, which supports H4b ($\beta = 0.398$, $t = 4.378$, $p < .001$). This finding shows that increased organizational capabilities enhances CRM-enabled absorptive capacity and explained an additional 21.5 percent of the variance in CRM-enabled absorptive capacity. Figure 3 and Figure 4 graphically present the results for each IS asset under study.

Table 5. Regression Results for Organizational Capabilities (CRM Adoption)

Variable	Model 1			Model 2		
	Beta	t-value	Sig.	Beta	t-value	Sig.
Prior knowledge	0.243	5.118	.000	0.242	5.079	.000
CRM adoption	0.248	5.214	.000	0.245	5.133	.000
Prior knowledge * CRM adoption				0.028	0.593	.554
R	0.358			0.359		
R^2	0.128			0.129		
ΔR^2	0.128			0.001		
F Value	28.492			0.351		
Sig. F	.000			.554		

Table 6. Regression Results for ERP-enabled Absorptive Capacity

Variable	Model 1			Model 2		
	Beta	t-value	Sig.	Beta	t-value	Sig.
Organizational capabilities				0.573	5.238	.000
Age	0.026	0.183	.855	-0.021	-0.175	.862
Education	0.044	0.355	.724	0.079	0.742	.460
Gender	-0.067	-0.534	.595	-0.080	-0.753	.454
Years in IS	-0.083	-0.576	.567	0.131	1.018	.312
Years in organization	0.112	0.827	.411	0.167	1.454	.151
R	0.149			0.533		
R^2	0.022			0.306		
ΔR^2	0.022			0.244		
F Value	0.309			27.437		
Sig. F	.906			.000		

Table 7. Regression Results for CRM-enabled Absorptive Capacity

Variable	Model 1			Model 2		
	Beta	t-value	Sig.	Beta	t-value	Sig.
Organizational capabilities				0.398	4.378	.000
Age	0.094	0.745	.458	0.027	0.230	.818
Education	0.036	0.358	.721	0.024	0.264	.792
Gender	-0.172	-1.789	.077	-0.119	-1.326	.188
Years in IS	-0.195	-1.646	.103	-0.083	-0.733	.465
Years in organization	-0.063	-0.567	.572	-0.035	-0.344	.731
R	0.265			0.464		
R^2	0.070			0.215		
ΔR^2	0.070			0.170		
F value	1.584			19.169		
Sig. F	.171			.000		

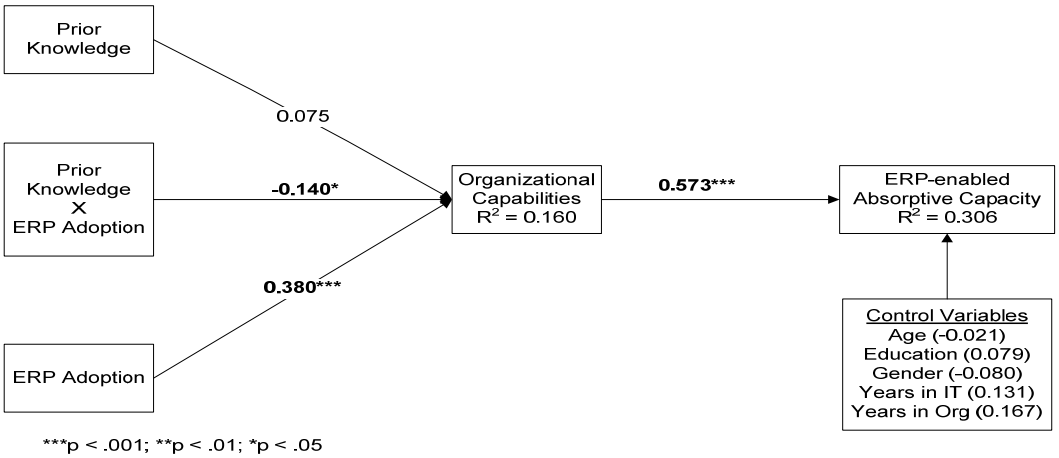

Figure 3. Results for ERP Asset

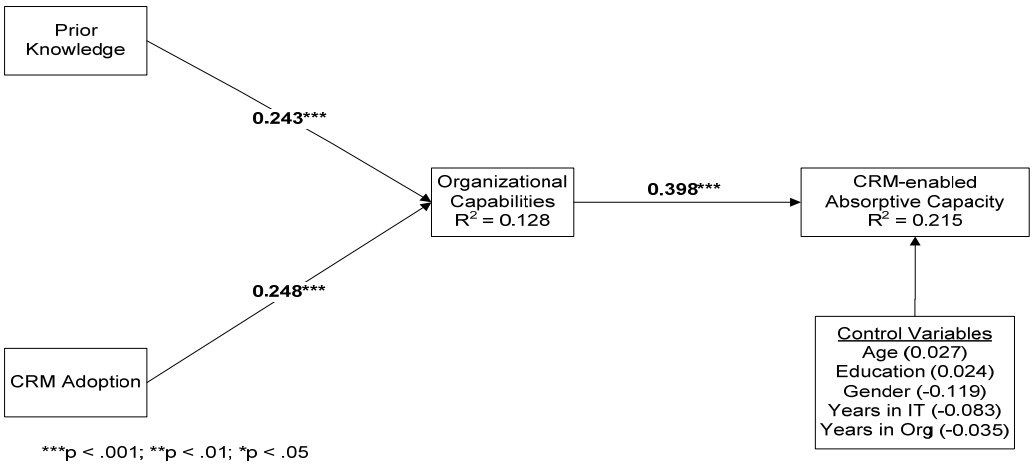

Figure 4. Results for CRM Asset

5 Discussion

In this paper, we examine the extent to which the type of IS asset state IT departments adopt influences the relationship between organizational capabilities and the department's degree of absorptive capacity.. We found that IS asset adoption does influence organizational capabilities and that the type of asset matters. For ERP adoption, the IS asset directly and positively influenced organizational capabilities and provided a negative (dampening) moderating effect on the relationship between prior knowledge and organizational capabilities. In contrast, for CRM adoption, the IS asset directly and positively influenced organizational capabilities but did not moderate the relationship between prior knowledge and organizational capabilities.

Our findings suggest that IS assets are an important distal antecedent of IS-enabled absorptive capacity—particularly in U.S. state government IT departments. This finding is interesting because U.S. state governments have historically not been on the cutting edge of technology implementation (Cinite, Duxbury, & Higgins, 2009; Fernandez & Rainey, 2006). However, in more recent years, several states, often in response to tight fiscal conditions or demands for greater efficiency and effectiveness regarding public sector services, have challenged their IT departments to respond (Tolbert, Mossberger, & McNeal, 2008).

Before discussing the implications of our results, we note our study's limitations. One such limitation concerns the potential selection bias from having the CIO of each state IT department distribute the questionnaire link to the IS employees and request participation. We do not know if each CIO included all potential employees of the agency or selected some employees to participate, but we confirmed that the participants held non-managerial roles in the IT departments. A second limitation is that the sample did not include all 50 states. However, the response rate is appropriate for public sector research (Riemenschneider, Allen, Armstrong, & Reid, 2010), and the sample did contain a variety of states based on location and their state grade. A third limitation concerns the level of analysis of the control variables. Future research may want to add control variables collected at the department level to supplement the individual-level control variables we included in this study. A fourth limitation is that we only examined two IS assets (i.e., CRM and ERP) in a U.S. state government context. While we used two of the most commonly deployed IS assets, this choice may limit our understanding the role of IS assets in forming IS-enabled absorptive capacity. Thus, future research could examine different IS assets (e.g., GIS, VoIP, Web 2.0, SoA) from participants in other organizational forms (e.g., for-profit, federal government) to develop a more comprehensive understanding of this topic. Future research could also extend this study by exploring the details of the ERP implementation (e.g., standard versus customized). In addition, future research could explore the idea that the adoption of ERP systems might allow an increased focus on novel, higher value-added activities. The development of new knowledge via adopting IS assets may influence organizational capabilities. A fifth limitation is that, in the IT department, IS employees may play specific roles such as business process support and functional SAP/applications experts that we did not identify. Future research could investigate the influence of specific IS job roles (perhaps using center of excellence unit structures: Sullivan, 2014; Wood, 2010) on the relationships proposed in this study to either confirm or refute our findings. A sixth limitation concerns our investigating the phenomenon from an operational-level perspective. Future research could investigate multiple perspectives (managerial and/or end-users) to provide a more complete understanding of the role of IS assets in IS-enabled absorptive capacity for state government IT departments.

This study contributes to and extends prior research by finding that the role of IS asset adoption in creating organizational capabilities may not be consistent across different types of IS assets. One explanation for this variance may be that different types of IS assets serve different strategic purposes and have different functionalities in supporting business processes in state agencies. Since organizational capabilities play an important role in absorptive capacity, which is associated with organizational innovation or performance (Armstrong, Liu, & Riemenschneider, 2015), state governments should develop IT departments that encourage and help employees to share knowledge with one another. Understanding the different effects of IS asset adoption on organizational capabilities can help decision makers leverage their IS resources to maximize organizational capabilities.

Our results indicate that states should build critical organizational capabilities in conjunction with IS asset adoption efforts. As the National Association of State Chief Information Officers (2011, p. 29) states: "A key responsibility of all public servants is to be accountable for government spending, program performance and their actions. CIOs enable transparency with technology platforms, interfaces and tools

that support this public policy agenda.”. These tasks require organizational capabilities that support the agency’s ability to scan their environment for new knowledge, absorb it, and, ultimately, disseminate it throughout the agency.

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Appendix A: Constructs, Items, and Sources

Table 8. Descriptive Statistics and Correlations (N = 417)

Construct	Items	Source
ERP-enabled absorptive capacity	The IT department is able to recognize the value of knowledge received regarding Enterprise Resource Planning (ERP) systems.*	Kwok & Gao (2005)
	The IT department is able to assimilate knowledge received regarding Enterprise Resource Planning (ERP) systems and turn it into its own knowledge base.	
	The IT department is able to apply the knowledge received regarding Enterprise Resource Planning (ERP) systems to solve business problems.	
CRM-enabled absorptive capacity	The IT department is able to recognize the value of knowledge received regarding Customer Relationship Management (CRM) technology.	Kwok & Gao (2005)
	The IT department is able to assimilate knowledge received regarding Customer Relationship Management (CRM) technology and turn it into its own knowledge base.	
	The IT department is able to apply the knowledge received regarding Customer Relationship Management (CRM) technology to solve business problems.	
Coordination capabilities (coordination)	We ensured that our work tasks (activities, designs, and reports) fit together very well.	Pavlou & El Sawy (2006)
	Overall, our project team was well coordinated.	
	We ensured that the output of our work was synchronized with the work of others.	
	We ensured that the output of our work was of a form useful to others when needed (the right thing at the right time).	
	We ensured an appropriate allocation of resources (e.g. information, time, reports) within our project team.	
	Project team members ensured a fair sharing of resources.	
	Project team members were assigned to tasks commensurate with their task-relevant knowledge and skills.	
	We ensured that there was compatibility between project team members expertise and work processes.	
Coordination capabilities (employee participation)	Employees in the IT department are genuinely encouraged to participate in broad organizational policy matters.*	Van der Post, De Coning, & Smit (1997)
	Managers in the IT department have a participative management style.*	
	Employees in the IT department are consulted about decisions regarding what the organization plans to do.	
	The IT department does not allow employees to participate in the decision-making process. (Reverse)	
	IT employees have a say in the IT department's work methods.	
	Employees in the IT department are involved in decisions that directly impact their work.	
	Employees in the IT department have very little say regarding their own work goals. (Reverse)	
Socialization capabilities	The IT department has strong values that are widely shared by its members.*	Pandey & Rainey (2006), Van der Post et al. (1997)
	IT employees have a clear understanding of what the department's values and philosophies are.	
	There is little that binds members of the IT department to one another. (Reverse) *	
	The IT department consistently makes employees aware of how they are expected to behave at work.	
	Managers seldom communicate to employees what the IT department's values and philosophies are. (Reverse)*	
	Managers seldom do anything that shows employees what is important for the IT department's long term success. (Reverse)*	

Table 8. Descriptive Statistics and Correlations (N = 417)

	The IT department's mission is clear to almost everyone who works here.	
	It is easy to explain the IT department's goals to outsiders.	
	The IT department has clearly defined goals	
Prior knowledge	Members of our IT department vary widely in their areas of expertise.	Medsker & Campion (1997)
	Members of our IT department have a variety of different backgrounds and experiences.	
	Members of our IT department have skills and abilities that complement each other.	
Coordination capabilities (organizational integration)	Employees from different departments are encouraged to work together for the overall good of the state government.	Van der Post et al. (1997)
	In state government support across work groups and departmental boundaries is strongly encouraged.	
	State government managers go out of their way to ensure that different departments operate in a coordinated way.	
	In state government the sharing of information between departments and work groups is not encouraged. (Reverse)	
	In this state government inter-departmental cooperation is very strongly encouraged.	
	The different sub-units in state government are not encouraged to work together effectively to achieve strategic goals. (Reverse)	
IS adoption	Please identify where your IT department is in the process of adopting the information systems listed below using the following scale: 1 = Not considering adopting the technology 2 = Initiation (considering adoption of the technology) 3 = Adoption decision made 4 = Adaptation (initial implementation of the technology) 5 = Acceptance (employees are urged to commit to using the technology) 6 = Routinization (use of the technology is encouraged as a normal activity) 7 = Infusion (increased effectiveness obtaining by using the technology)	Adapted from Somers & Nelson (2004)
All items excluding IS adoption used the anchors (1 = strongly disagree, 7 = strongly agree). * Indicates deleted item		

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