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Impact of organizational culture and computer self-efficacy on knowledge sharing

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Abstract

Purpose – The purpose of this paper is to examine the impact mechanism of organizational culture (OC) on Enterprise Resource Planning (ERP) user's explicit and tacit knowledge-sharing behavior in the context of enterprise systems usage.

Design/methodology/approach – Drawing from social cognitive theory, the authors developed a comprehensive model that integrates OC, computer self-efficacy and employees' knowledge-sharing behaviors. In total, 343 valid questionnaires were collected from ERP users of 115 firms and structural equation modeling technique was used to test the model.

Findings – Empirical results suggest that hierarchical culture that focusses on efficacy and uniformity is positively related with employees' explicit knowledge sharing; group culture that focusses on trust and belonging is positively related with employees' tacit knowledge sharing, and their relationship is fully mediated by employees' computer self-efficacy. In addition, computer self-efficacy also partially mediates the relationship between rational culture and employees' knowledge sharing.

Practical implications – This study provides guidelines for top managers to enhance employees' computer self-efficacy and facilitate employees' knowledge-sharing behavior by developing appropriate type of OC.

Originality/value – This study unpacks the mediating mechanism between OC and knowledge sharing, and contributes to the academic research of knowledge management in the context of enterprise systems assimilation.

Keywords Organizational culture, Computer self-efficacy, Explicit knowledge sharing, Tacit knowledge sharing

Paper type Research paper

1. Introduction

With the increasing uncertainty of market environment and variety of customer requirements, firms have turned to Enterprise Systems (ES) to make their operational, tactical and strategic processes more efficient and effective, and Enterprise Resource Planning (ERP) has emerged as one of the most critical ES powering businesses since the 1990s (James and Wolf, 2000; Zhu *et al.*, 2010). However, since the complexity of system functionalities, the implementation and assimilation process is always associated with high risk, leading to a high failure rate of ERP system. In order to increase the success rate, researchers in Information System (IS) field have focussed on the transfer and application of ERP knowledge within the organization in the past decades (Schultze and Leidner, 2002; Wang *et al.*, 2007; Wang and Noe, 2010).

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ERP system is a cross-functional software package, and it usually integrates business processes across multiple departments and creates a divergence in the required knowledge of individuals. Since knowledge resides within individuals who create, recognize, archive, access and apply knowledge in carrying out their tasks, the movement of knowledge into organizational routines and practices across individual and organizational boundaries is ultimately dependent on employees' knowledge-sharing behavior (Bock *et al.*, 2005; Ho and Kuo, 2013). Empirical studies suggest that knowledge sharing among employees is helpful in enabling and encouraging employees to use IS (Chou *et al.*, 2014). In ERP assimilation phase, after the system implementation has completed and external consultants have left from the firm, knowledge sharing between ERP users is particularly important for employees to develop a deep understanding of system functionalities (Shao *et al.*, 2012).

Prior literatures indicate that organizational culture (OC) is a critical antecedent of knowledge sharing (Ho, 2009; Mueller, 2012; Vuori and Okkonen, 2012; Wiewiora *et al.*, 2013). However, by a thorough analysis of the literatures, we found that most of these studies were descriptive in nature, and little attention was paid to the mediating mechanism between the two constructs. There are glaring gaps in the extant literature regarding the theoretical understanding of how OC influences individual's explicit and tacit knowledge-sharing behavior, especially in the context of enterprise systems assimilation (ESA).

Our study is a step toward addressing the research gap. The primary objective of this study is to examine the mediating effect of computer self-efficacy on the relationship between OC and employees' knowledge-sharing behavior. Drawing from social cognitive theory, we develop a comprehensive model that integrates three types of OC, computer self-efficacy and employees' knowledge-sharing behavior. Further, we use empirical study to examine the theoretical linkage between the constructs.

2. Literature review

2.1 OC

OC is a complex construct that has been studied at different levels in different contexts, resulting in a diverse conceptualizations and dimensions being used in various studies. Drawing upon the extant literature, OC is defined as the tacit, unwritten rules for getting along in the organization; the ropes that a newcomer must learn in order to become an accepted member (Schein, 2010).

Despite the multiple interpretation of OC, there seems to be an agreement that OC includes three levels with a varying degree of awareness on the part of the culture-bearers (Hofstede *et al.*, 1990; Schein, 2010). Researchers posit that the deepest level consists of patterns of basic assumptions that the organizational members take for granted without being aware of them; the surface level consists of artifacts such as the visible and audible patterns of the culture; while the intermediate level covers values and beliefs concerning how social groups interact with each other in organizational contexts, and this level is particularly useful to explain the relationship between OC and organizational effectiveness since it is more easily to measure (Iivari and Huisman, 2007; Schein, 2010).

From two dimensions of value orientation, Quinn and Spreitzer (1991) conceptualized OC into four typologies-development culture, group culture, hierarchical culture and rational culture, as illustrated in Figure 1. The core values of the four culture typologies are different. The development culture focusses on external environment and flexibility, and its core values include growth, resource

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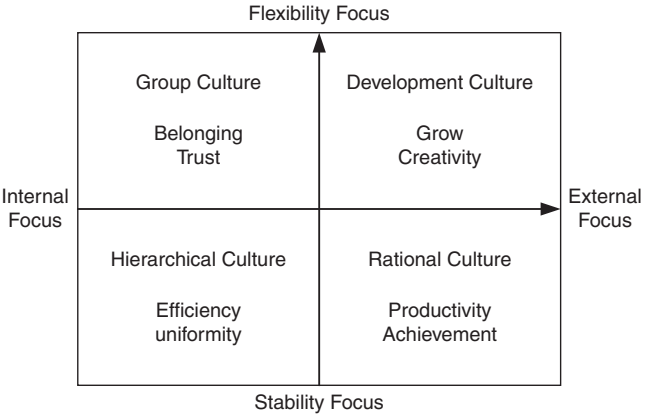

Figure 1.
Quinn and Spreitzer's (1991) organizational culture framework

acquisition and creativity; the group culture focusses on internal and flexibility, and its core values include belonging, trust and participation; the hierarchical culture focusses on internal and stability, and its core values include efficiency and uniformity; while the rational culture focusses on external environment and stability, and its core values include productivity and achievement.

Quinn and Spreitzer's (1991) cultural typology was widely used in empirical studies since it has a strong theoretical foundation of Competing Values Framework and has fairly short, validated measurement instruments for OC. Extant literature indicates that an organization is unlikely to reflect only one type, and overemphasizing any culture type may become dysfunctional. Thus the four types of culture could co-exist within an organization, and a high rating on one culture typology does not exclude high rating at the other end (Denison and Spreitzer, 2001; Iivari and Huisman, 2007; Cameron and Quinn, 2011).

Table I lists a comparison between Quinn and Spreitzer's (1991) cultural typology and other cultural typologies proposed in extant literature. From Table I we can see all of the cultural typologies proposed in extant literature correspond with development culture, group culture, hierarchical culture and rational culture. Thus in this study, we use Quinn and Spreitzer's (1991) organizational culture framework (OCF) to measure OC quantitatively.

2.2 Knowledge sharing

Knowledge sharing has become a popular topic in the past decades. Since organizational knowledge largely resides within individuals, the willingness of organizational members to share with others the knowledge they acquired or created is

Table I.
Comparison between culture typologies

Quinn and Spreitzer (1991)	Denison and Mishra (1995)	Ogbonna and Harris (2000)	Xenikou and Simosi (2006)
Development culture	Adaptability	Innovative culture	Adaptive culture
Group culture	Involvement	Community culture	Humanistic culture
Hierarchical culture	Consistency	Bureaucratic culture	Not defined
Rational culture	Mission	Competitive culture	Achievement culture

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critical in realizing the potential value of knowledge (Tohidinia and Mosakhani, 2010; Wang and Noe, 2010; Kuo *et al.*, 2014).

Knowledge shared among employees can be classified into two types: explicit and tacit knowledge. Explicit knowledge is formal and systematic, and can be achieved through readings of project manuals and team discussions; while tacit knowledge is highly personal, subjective and difficult to verbalize or communicate (Alavi and Leidner, 2001; Selamat and Choudrie, 2004). It is usually difficult to articulate tacit knowledge through a formal use of language since it is expressed in the form of human actions such as evaluations, attitudes, points of view, commitments and motivation. Instead, the tacit knowledge could be represented in the form of metaphors, drawings, non-verbal communications and is equivalent to practical expertise (Koskinen *et al.*, 2003; Jones *et al.*, 2006; Nonaka and Von, 2009).

In ERP assimilation phase, most of the radical customizations and business process reengineering have been completed, and the system is considered officially "rolled out" for routine usage (Liang *et al.*, 2007; Liu *et al.*, 2011; Chang and Chou, 2011). In this phase, both explicit and tacit knowledge sharing are important to ensure that diverse organizational knowledge and experience can be incorporated into the system to support daily business operations and strategy decision-making (Shao *et al.*, 2012).

2.3 Computer self-efficacy

Self-efficacy is an essential factor developed from social cognitive theory and represents an individual's judgment of his/her ability to perform a particular course of action or behavior (Bandura, 1997). Individuals with high self-efficacy tend to be more perseverant in the face of obstacles and more active in knowledge acquisition and sharing (Cabrera *et al.*, 2006; Lin, 2007). Extant literature indicates that self-efficacy is not a static or stable trait, rather a dynamic judgment that changes with environment settings, and OC was identified as a critical contextual factor that influence self-efficacy (Sheng *et al.*, 2003).

Compeau and Higgins (1995) applied self-efficacy in the context of IT utilization and defined computer self-efficacy as one's belief in his/her ability to apply computer skills to a wider range of tasks. It was suggested that IT-based business initiatives such as ERP systems require high computer self-efficacy among employees because these changes require a large-scale use of computers (Compeau *et al.*, 1999; Chou *et al.*, 2014).

In the context of ESA, most of the radical customizations and business process reengineering have been completed, and the system is considered officially "rolled out" for routine usage (Liang *et al.*, 2007; Chang and Chou, 2011). The complexity of ERP system functionalities usually poses a high-knowledge cognitive burden that challenges users. During the utilization of system functionalities, ERP users need to switch from paper-based work to IT-based work, and computer self-efficacy is an important internal psychological cognitive factor that is positively related with individuals' intention and behavior toward IT utilization (Gattiker and Goodhue, 2005; Hsieh *et al.*, 2011; Wang *et al.*, 2011).

2.4 The missing link within the extant literature

Although OC was considered as an important factor fostering knowledge sharing, most of the previous studies were conducted in organizational literatures. To our knowledge, only two studies have examined the impact of OC on knowledge sharing in ERP implementation (Jones, 2005; Jones *et al.*, 2006). What has been missed is a theory-driven

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empirical study on the impact of OC on individual level knowledge-sharing behavior, especially in the context of ERP assimilation.

Another gap existed in the extant literature is the neglect of psychological cognitive mechanism between OC and knowledge-sharing behavior. Extant literature indicates that self-efficacy is a key psychological cognitive factor that facilitates knowledge sharing (Lin, 2007; Chen *et al.*, 2012), and OC is a critical contextual factor that influences computer self-efficacy (Sheng *et al.*, 2003). However, few studies have examined the joint effect of OC and computer self-efficacy on knowledge-sharing behavior. There is a great call for more empirical studies to identify appropriate OC typologies for enhancing employees' computer self-efficacy in the context of new technology utilization (Sheng *et al.*, 2003; Jones *et al.*, 2006; Shao *et al.*, 2012).

In this study, we draw upon social cognitive theory and develop a theoretical model to examine the mediating effect of computer self-efficacy on the relationship between three typologies of OC and individual's explicit vs tacit knowledge-sharing behavior in the context of ERP assimilation. We then use a survey-based empirical study to examine the theoretical linkage between the constructs, as described in the following sections.

3. Research model and hypotheses

In this section, we integrate different theoretical paradigms and analyze the role of OC in shaping up employees' computer self-efficacy and their knowledge-sharing behavior. The conceptual model is depicted in Figure 2.

Drawing upon Quinn and Spreitzer's (1991) OCF, the development culture emphasizes flexibility and change, and maintains a primary focus on the external environment. It may be directly related with knowledge creation instead of knowledge sharing (Quinn and Spreitzer, 1991; Nonaka and Von, 2009). Since the objective of this study is to examine the impact mechanism of OC on individual's knowledge-sharing behavior, we do not consider development culture in our research model.

3.1 Hierarchical culture and knowledge sharing

Hierarchical culture focusses on organizational internal stability, and emphasizes security, control, order and rules. In hierarchical culture, leaders tend to be conservative and cautious, and pay close attention to the execution of regulations (Quinn and Spreitzer, 1991; Cameron and Quinn, 2011). When there is a clear concentrated decision-making style within the firm, ERP users from different management levels, including top managers, middle managers and employees, will receive and send hard data such as manuals and documents according to the regulations, which is beneficial for the

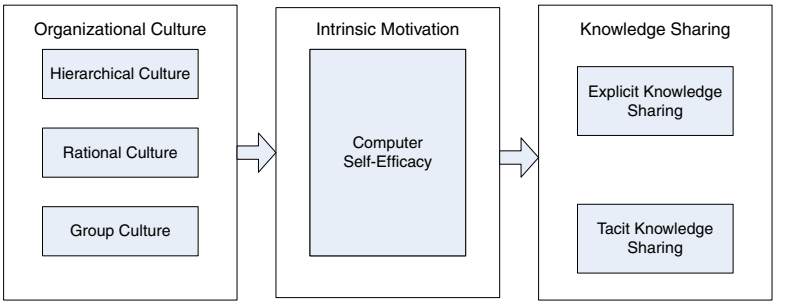

Figure 2.
Conceptual model

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sharing of ERP-related explicit knowledge (Jones *et al.*, 2006). However, the regulation of data transfer may not be beneficial for tacit knowledge sharing, since tacit knowledge sharing is more likely to occur in informal ways instead of formal regulations (Suppiah and Sandhu, 2011). The above analysis leads to the following hypothesis:

H1.1 Hierarchical culture is positively related with employees' ERP explicit knowledge-sharing intention.

3.2 Rational culture and knowledge sharing

The rational culture emphasizes productivity, performance, goal fulfillment and achievement. In rational culture, employees are motivated by the competition and the successful achievement of predetermined ends (Quinn and Spreitzer, 1991; Cameron and Quinn, 2011). Extant literature suggests that truth and rationality oriented culture is beneficial for sharing of both hard and soft data. In some organizations, truth is considered to be a product of systemic study, and hard data such as documents and manuals are vital to problem solving. While in other firms, truth is considered as a product of the exchange of unique, specialized knowledge possessed by individuals, and is more likely to gauge effectiveness through personal experience and intuition (Jones, 2005; Jones *et al.*, 2006).

Social cognitive theory suggests that self-efficacy is a dynamic judgment that changes with organizational context, and it can be affected by individual's forethought of the trade-offs between required effort and motivation (He and Freeman, 2010). In ERP assimilation phase, contingent rewards and periodical meetings are necessary to assess individuals' system usage level, in order to achieve the goal of ERP system in support of business process (Liu *et al.*, 2011). Employees in an environment that focusses on productivity and achievement are more likely to orchestrate and construct adaptive goals to achieve expected organizational performance, and this is beneficial to enhance their self-confidence in the face of obstacles in ERP-related tasks (Chen *et al.*, 2012). Thus we propose the following hypothesis:

H2.1 Rational culture is positively related with employees' computer self-efficacy.

Drawing upon Quinn and Spreitzer's (1991) OCF, rational culture focusses on the pursuit and attainment of well-defined objectives, and its motivating factors include the successful achievement of predetermined ends. Leaders that articulate rational culture tend to be directive, instrumental and are constantly encouraging productivity. This is beneficial to overcome the public good dilemma associated with knowledge sharing and increase employees' perception that organizational practices are equitable, thus lead employees to share what they know with others through both formal regulations and informal communications, in order to achieve predefined goals and realize the global optimization of ERP system with the integration of transactions-oriented data and business processes across different departments throughout the organization (Jones *et al.*, 2006; Ke and Wei, 2008). Drawing upon the above analysis, we argue that:

H2.2 Rational culture is positively related with employees' ERP explicit knowledge-sharing intention.

H2.3 Rational culture is positively related with employees' ERP tacit knowledge-sharing intention.

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3.3 Group culture and knowledge sharing

Group culture emphasizes flexibility and change. It is characterized by strong human relations, affiliation and focusses on the internal organization. In group culture, employees are encouraged to participate in the team by interaction and collaboration. Organizations that emphasize group culture tend to be group maintenance by focussing on belonging and trust, and employees are encouraged to work collaboratively through teamwork than working alone to accomplish a task (Quinn and Spreitzer, 1991; Cameron and Quinn, 2011).

In ERP assimilation phase, users will encounter various types of problems related with ERP system functionalities, which cannot be easily solved by themselves (Liu *et al.*, 2011). Within a collaborative teamwork environment, ERP users can share experiences and learn systems skills from each other by private and informal communication, and they will not feel alone and isolated while performing tasks using ERP system since they can get help conveniently when confronted with difficulties. This is beneficial to improve ERP user's confidence and judgment of their capability to accomplish a task using system functionalities (Sheng *et al.*, 2003; Shao *et al.*, 2013). This leads to the following hypothesis:

H3.1 Group culture is positively related with employees' computer self-efficacy.

Drawing upon Quinn and Spreitzer's (1991) OCF, employees working in group culture are more likely to trust each other and consider others as friends and family members, thus they are more likely to interact and communicate with each other. When a group of people engage in a common endeavor come together to share stories and experiences, they are more likely to inform one another's knowledge about how to perform their work (Ke and Wei, 2008; Nonaka and Von, 2009; Mueller, 2012). This is beneficial to facilitate skills learning and knowledge sharing (Jones, 2005; Jones *et al.*, 2006; Wiewiora *et al.*, 2013). In an empirical study, Shao *et al.* (2012) found that group culture that supports collaboration and communication can reduce employees' fear and increase their openness to share their knowledge with others informally. This leads to the following hypothesis:

H3.2 Group culture is positively related with employees' ERP tacit knowledge-sharing intention.

3.4 Computer self-efficacy and knowledge sharing

Self-efficacy refers to the self-appraisal of what people believe they can accomplish, and it is identified as a critical intrinsic motivator that influences individuals' behavior by affecting their confidence to overcome difficulties and improve performance (Lin, 2007; Chen *et al.*, 2012; Witherspoon *et al.*, 2013).

In the context of ERP assimilation, computer self-efficacy is the perception and judgment of personal capability in performing EPR-related tasks. Researchers found that computer self-efficacy can help motivate employees to share knowledge with colleagues. Specifically, employees with high confidence in their capability to accomplish specific tasks is more likely to share valuable knowledge with others, since they believe that their knowledge can help solve ERP-related problems and improve work efficacy (Kankanhalli *et al.*, 2005; Chou *et al.*, 2014). In empirical studies, Lin (2007) found a positive relationship exists between self-efficacy and employees' knowledge-sharing behavior. Drawing upon the extant literature,

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we argue that employees with high computer self-efficacy will develop more positive attitudes toward ERP knowledge sharing. This leads to the following hypotheses:

H4.1 Computer self-efficacy is positively related with employees' ERP explicit knowledge-sharing intention.

H4.2 Computer self-efficacy is positively related with employees' ERP tacit knowledge-sharing intention.

3.5 Control variables

In order to control the other variables that may affect employees' knowledge sharing, we add employees' education background, work experience, ERP use experience and job type as control variables in the research model because their potential impact on knowledge sharing has been suggested by the prior literature (Wang and Noe, 2010). Figure 3 illustrates our research model and the corresponding hypotheses.

4. Research methodology

4.1 Operationalization

We referred to the extant literature and developed a questionnaire to measure OC, computer self-efficacy and knowledge sharing. OC was measured using the instrument suggested by Quinn and Spreitzer (1991), and three items were designed for each typology of OC. We adapted Bock *et al.*'s (2005) study to measure employees' explicit and tacit knowledge-sharing intention, and revised their original scale by adding critical words such as "ERP system" to adapt to the context in our study. The scale of computer self-efficacy was adapted from Compeau and Higgins (1995), and three items were designed for the construct.

All items were assessed using seven-Likert scale by asking people to respond to the designed items of the constructs in terms of the extent to which they agree with them. The Likert scale ranges from 1 to 7, on which 1 represents "strongly disagree" and 7 represents "strongly agree." We choose seven-Likert scale in our study since it is the most widely used psychometric scale in survey research. The corresponding items for each construct are described in Table II.

The original English items were translated into Chinese by two PhD students. To guarantee the content validity of the items, we asked a professor from our university and a top executive from one of the sample firms to examine if there is any ambiguity in the questionnaire. Revisions were made based on their suggestions.

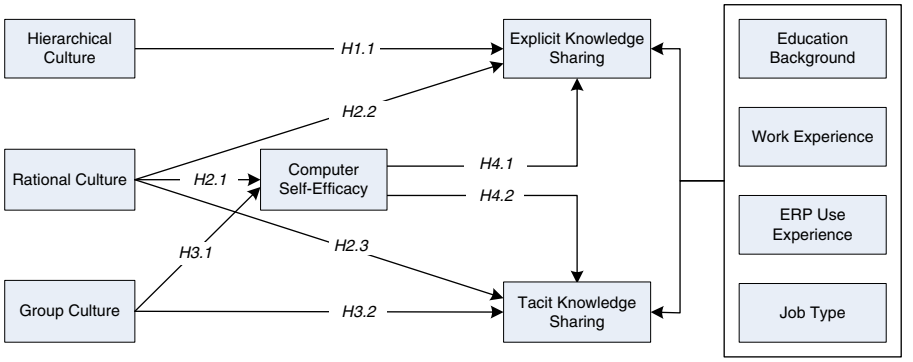

Figure 3.
Research model

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Construct	Items	Item description
Group culture	GRO1	The organizational I work is like an extended family and people would like to share what they know with each other
	GRO2	The organization I work emphasizes trust and loyalty
	GRO3	Our commitment to the organization runs high
Rational culture	RAT1	The organization I work emphasizes tasks and goal accomplishment
	RAT2	In our organization accomplishing measurable goals is important
	RAT3	A production and achievement orientation is commonly shared in our organization
Hierarchical culture	HIE1	In our organization people are encouraged execute tasks according to bureaucratic procedures
	HIE2	The organization I work pay attention to formal rules and policies
	HIE3	In our organization, following rules and maintaining a smooth running business is important
Explicit knowledge sharing	EKS1	I am pleased to share my work reports on ERP system with other members
	EKS2	I would like to provide my manuals related with ERP system to other members
	EKS3	I would be pleased to share ERP-related official documents with other members
Tacit knowledge sharing	IKS1	I am pleased to communicate with other members on my personal experience of ERP system
	IKS2	I would like to provide my expertise on ERP system with other members
	IKS3	I would be pleased to share know how, know where and know whom knowledge on ERP system at the request of other members
Computer self-efficacy	CSE1	I am confident in my ability to use ERP system to complete my work
	CSE2	I have the expertise required to use ERP system to complete my work
	CSE3	I understand how to use ERP system to complete my work

Table II.
Constructs and items

A pilot study was conducted before the final data collection. In total, 50 employees from two firms located in Harbin of China were invited to complete the questionnaires, and 45 valid questionnaires were received. Based on PLS analysis results, we adjusted the items with factor loadings lower than 0.7 to improve the validity and reliability of the constructs (Chin *et al.*, 2003).

4.2 Data collection

Before the final field study, we first contacted with a large and established ERP software corporation in Zhengzhou of Henan province. The software corporation has more than thousands of clients all over Henan province. We selected the organizations that have used ERP system for at least one year as the samples in our study. Within each organization, we required that there are two to three critical ERP users to complete our questionnaires, and these respondents need to be in the existing organization for more than half of a year, in order to guarantee that they have in-depth knowledge on the organization. We selected 300 firms from diverse locations of Henan province based on the requirements, and contacted these organizations using e-mail facilities or mobile phones. Finally 115 organizations agreed to participate in this research. A research team consisting of four doctoral students and eight employees visited the 115 organizations separately to disseminate the questionnaires and provide

face-to-face directions. Totally 413 ERP users from the 115 organizations cooperated to complete the questionnaires, with two to four employees in each firm averagely.

Data collection were conducted from August 19, 2010 to August 25, 2010. We deleted the blank data to avoid the disturbance of the analysis. Finally we got 343 valid questionnaires from ERP users of the 115 organizations, with a valid response rate of 83 percent. The profiles of the sample organizations and individuals are listed in Table III.

As indicated in Table III, we can see that most of the samples are from small and medium-sized firms, and most of the respondents have used ERP system for more than one year. This is consistent with China's economic development since the government has launched the policy of using IT technologies to speed up industrialization, and small and medium-sized firms are encouraged to use ERP system to support business operations and achieve market competitive advantage, especially in the middle-east location of China such as Henan province (Chien *et al.*, 2007).

5. Data analysis and results

Structural Equation Model (SEM) technique was used to examine our research model since SEM is able to process multiple dependent variables and is able to handle errors of measurement within unobserved latent variable in a better manner (Chin *et al.*, 2003; Kline, 2011). We used SmartPLS as the primary statistical tool and adopted a two-step analysis approach to examine the measurement and structural model (Anderson and Gerbing, 1988; Hair *et al.*, 2012).

5.1 Measurement model

First, we examined the measurement model to assess internal consistency reliability, convergent validity and discriminant validity of key constructs.

Internal consistency assesses if the measures consistently represent the same latent construct, and it is considered as acceptable if each construct's composite reliability and item loadings has exceeded 0.7 (Chin *et al.*, 2003). Convergent validity refers to the degree to which the items measuring the same construct correspond by checking the average variance extracted (AVE) of each construct from its indicators. Studies reported that AVE should be 0.5 or greater to suggest adequate convergent validity (Pavlou and Fygenson, 2006). Table IV lists the factor loadings, composite reliability and AVE of the six constructs in our study.

From Table IV we can see that all of the factor loadings have exceeded 0.8, and all of the loadings are significant at the 0.01 level with *t*-values far above 1.96. Besides, the composite reliability of all the constructs have exceeded 0.8 and their AVE have exceeded 0.6. The above analysis suggests a strong reliability and convergent validity of the constructs.

Discriminant validity refers to the degree to which items differentiate between constructs, and it is assessed by applying the following two criteria: first, the square root of the AVE of each latent variable from its indicators exceeds that construct's correlation with other constructs; and second, the items load more highly on constructs they are intended to measure than on other constructs (Chin *et al.*, 2003).

To examine discriminant validity, we compared the AVE of each construct and their correlation coefficient with other constructs, and calculated the cross-loadings of the six constructs, as shown in Tables V and VI separately.

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		Category	%
Demographics of organizations	Firm ownership	State Owned	10.23
		Joint Venture	4.55
		Private	67.05
		Foreign invested	4.55
		Others	13.62
	Revenues (million dollars)	< 10	36.36
		10-100	35.23
		101-500	12.5
		501-1,000	4.55
		> 1,000	5.68
		Missing	5.68
Demographics of individuals	Education background	High school	53.49
		Bachelor's degree	43.02
		Master's degree	0.87
		Missing	2.33
	Job type	IT employees	16.03
		Non IT employees	70.26
		Missing	13.70
	Work experience	Less than 1 year	1.75
		1-5 years	41.69
		5-10 years	26.82
		More than 10 years	27.41
		Missing	2.33
	ERP use experience	Less than 1 year	8.45
		1-5 years	62.39
		5-10 years	13.99
		More than 10 years	4.08

Table III.
Demographics of organizations and individuals

Construct	Items	Factor loadings	*t*-statistical test	Composite reliability	AVE
Group culture	GRO1	0.898	42.64	0.917	0.787
	GRO2	0.883	38.91		
	GRO3	0.904	57.91		
Rational culture	RAT1	0.912	54.05	0.903	0.756
	RAT2	0.913	52.55		
	RAT3	0.884	42.77		
Hierarchical culture	HIE1	0.916	56.26	0.844	0.658
	HIE2	0.933	79.28		
	HIE3	0.898	36.45		
Explicit knowledge sharing	EKS1	0.950	84.30	0.962	0.895
	EKS2	0.961	114.32		
	EKS3	0.940	56.26		
Tacit knowledge sharing	IKS1	0.945	73.27	0.967	0.908
	IKS2	0.969	113.09		
	IKS3	0.950	97.32		
Computer self-efficacy	CSE1	0.931	75.22	0.925	0.805
	CSE2	0.874	32.92		
	CSE3	0.886	42.23		

Table IV.
Factor loadings, composite reliability and AVE

	Group culture	Rational culture	Hierarchical culture	Explicit knowledge sharing	Tacit knowledge sharing	Computer self-efficacy
Group culture	*0.887*					
Rational culture	0.686	*0.869*				
Hierarchical culture	0.719	0.689	*0.811*			
Explicit knowledge sharing	0.440	0.556	0.620	*0.946*		
Tacit knowledge sharing	0.475	0.523	0.621	0.915	*0.953*	
Computer self-efficacy	0.483	0.565	0.594	0.654	0.647	*0.897*

Note: Diagonal italic values are the square roots of AVE of each construct

Table V. Correlation between constructs

	Group culture	Rational culture	Hierarchical culture	Explicit knowledge sharing	Tacit knowledge sharing	Computer self-efficacy
GRO1	*0.894*	0.581	0.600	0.375	0.426	0.432
GRO2	*0.864*	0.505	0.469	0.327	0.372	0.376
GRO3	*0.902*	0.580	0.717	0.443	0.462	0.479
RAT1	0.571	*0.899*	0.556	0.516	0.516	0.526
RAT2	0.486	*0.817*	0.398	0.351	0.357	0.499
RAT3	0.572	*0.890*	0.565	0.482	0.523	0.506
HIE1	0.679	0.598	*0.926*	0.536	0.525	0.491
HIE2	0.626	0.571	*0.933*	0.584	0.588	0.529
HIE3	0.657	0.631	*0.898*	0.559	0.578	0.612
EKS1	0.410	0.498	0.581	*0.946*	0.843	0.581
EKS2	0.426	0.494	0.544	*0.960*	0.873	0.525
EKS3	0.397	0.503	0.551	*0.932*	0.884	0.647
IKS1	0.451	0.525	0.560	0.879	*0.945*	0.610
IKS2	0.464	0.527	0.564	0.884	*0.963*	0.622
IKS3	0.448	0.507	0.560	0.855	*0.951*	0.615
CSE1	0.451	0.539	0.546	0.581	0.592	*0.931*
CSE2	0.417	0.465	0.483	0.524	0.526	*0.874*
CSE3	0.431	0.514	0.563	0.647	0.617	*0.886*

Table VI. Cross-loading analysis of constructs

From Table V and Table VI we can see that the square root of AVE of each construct exceeds that construct's correlation with other constructs, and each item loading in the table is much higher on its assigned construct than on the other constructs, providing an adequate support for discriminant validity.

5.2 Common method bias (CMB)

Since all data were self-reported, we conducted a Harman one-factor test to examine the CMB in SPSS. The six constructs of group culture, rational culture, hierarchical culture, ERP explicit knowledge sharing, ERP tacit knowledge sharing and computer self-efficacy were all included in the Exploratory Factor Analysis.

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The analysis results suggest that the variance explained by the first factor is no more than 30 percent, indicating that the CMB is not a major concern in our study (Podsakoff *et al.*, 2003).

Podsakoff *et al.* (2003) posited that although the use of a single-factor test may provide an indication of whether a single factor accounts for all of the covariance among the items, it cannot statistically control for method effects, and some other statistical remedies were needed to examine the CMB. Following Williams *et al.* (2003) and Liang *et al.*'s (2007) study, we added a common method factor whose indicators included all the principal constructs' indicators in the SEM in SmartPLS. We calculated each indicator' variances substantively explained by the principal construct, and the analysis result is illustrated in Table VII (R_1^2 represents indicator's variances explained by the principal construct; R_2^2 represents indicator's variances explained by the method construct).

Table VII indicates that all of the substantive factor loadings are significant, while most of the method factor loadings are insignificant. In addition, the average variances explained by the principal and factor construct are 0.842 and 0.009 separately, and ratio of substantive variance to method variance is about 93:1. The results suggest that the method is not a serious concern in our study (Liang *et al.*, 2007).

5.3 Structural model

We examined the structural model using SmartPLS. The required sample size is either ten times of the larger measurement number within the same construct or ten times of the larger construct number affecting the same construct (Chin *et al.*, 2003). There is only five constructs in our research model and the total measurement number of the constructs is 18, thus the collected sample size of 343 can satisfy the requirement of SmartPLS. The bootstrapping procedure with re-sampling method was used in our study to estimate the statistical significance of the parameter estimates to derive valid standard errors or *t*-values as suggested by Temme *et al.* (2006). The path analysis result is described in Figure 4.

First, we examined the explained variance of the research model without adding the construct of computer self-efficacy. The hierarchical culture, rational culture and group culture can account for a substantial 42.3 and 32.3 percent variance of explicit knowledge sharing and tacit knowledge sharing separately. As shown in Figure 4, hierarchical culture is significantly associated with explicit knowledge sharing at the 0.01 level (*H1.1*: $\beta = 0.511$, $p < 0.01$), rational culture is significantly associated with both explicit knowledge sharing and tacit knowledge sharing at the 0.01 level (*H2.2*: $\beta = 0.290$, *H2.3*: $\beta = 0.429$, $p < 0.01$). While group culture is significantly related with tacit knowledge sharing at the 0.05 level (*H3.2*: $\beta = 0.181$, $p < 0.05$).

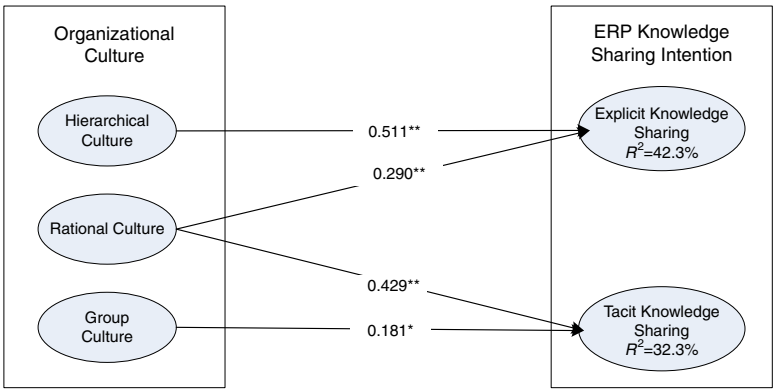
We then added computer self-efficacy in the research model to examine its mediating effect on the relationship between OC and knowledge sharing. The path analysis result is described in Figure 5.

As shown in Figure 5, after adding the construct of computer self-efficacy, the R^2 of explicit knowledge sharing has increased from 42.3 to 52.5 percent, and the R^2 of tacit knowledge sharing has increased from 32.3 to 47.5 percent. The R^2 of computer self-efficacy explained by group culture and rational culture is 33.7 percent, and this indicates a good explanatory power of the research model (Liang *et al.*, 2007; Kline, 2011).

Figure 5 indicates that rational culture and group culture is significantly associated with computer self-efficacy at the 0.01 level (*H2.1*: $\beta = 0.442$, *H3.1*: $\beta = 0.181$, $p < 0.01$),

Construct	Indicator	Substantive factor loading	R_1^2	Method factor loading	R_2^2
Group culture	GRO1	0.88	0.77	0.02	0.00
	GRO2	0.98	0.96	−0.16	0.03
	GRO3	0.79	0.62	0.14	0.02
Rational culture	RAT1	0.81	0.66	0.10	0.01
	RAT2	0.99	0.98	−0.22	0.05
	RAT3	0.80	0.64	0.10	0.01
Hierarchical culture	HIE1	0.98	0.96	−0.07	0.01
	HIE2	0.94	0.88	−0.02	0.00
	HIE3	0.92	0.85	−0.02	0.00
Explicit knowledge sharing	EKS1	0.95	0.90	0.00	0.00
	EKS2	0.99	0.98	−0.03	0.00
	EKS3	0.90	0.81	0.04	0.00
Tacit knowledge sharing	IKS1	0.91	0.83	0.04	0.00
	IKS2	0.96	0.92	0.00	0.00
	IKS3	0.98	0.96	−0.04	0.00
Computer self-efficacy	CSE1	0.95	0.90	−0.02	0.00
	CSE2	0.96	0.92	0.10	0.01
	CSE3	0.79	0.62	0.12	0.01

Table VII.
Common method bias analysis



Notes: **$p<0.01$; *$p<0.05$

Figure 4.
SmartPLS analysis results of the research model I

which in turn has significant impact on ERP explicit and tacit knowledge sharing (*H4.1*: $\beta = 0.412$, *H4.2*: $\beta = 0.479$, $p < 0.01$), suggesting that computer self-efficacy is a significant mediator between rational culture, group culture and ERP knowledge sharing.

As illustrated in Figure 5, after adding computer self-efficacy, the direct relationship between group culture and ERP tacit knowledge sharing is not significant, and this suggests that computer self-efficacy fully mediates the relationship between group culture and ERP tacit knowledge sharing. While, the link between rational culture and ERP explicit vs tacit knowledge sharing is still significant at the 0.01 level, indicating that computer self-efficacy partially mediates the relationship between rational culture and ERP knowledge sharing.

We then added control variables in the research model. We found that employees' work experience is negatively related with their explicit and tacit knowledge-sharing

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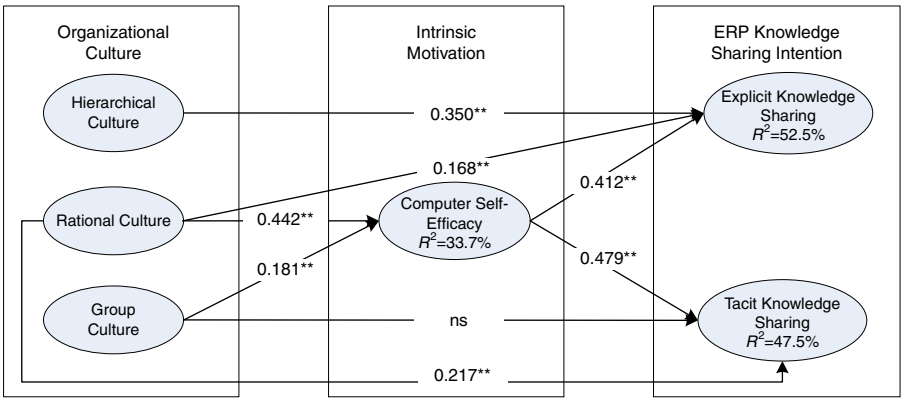

Figure 5.
SmartPLS analysis results of the research model II

Notes: $^{**}p<0.01$, ns, not significant

intention, while their ERP use experience is positively associated with their knowledge-sharing intention. This result suggests that younger employee that is more familiar with ERP system prefer to share what they know with others. The control variables of education background and job type are not significantly related with employees' knowledge-sharing intention. Figure 6 shows the analysis results after adding the control variables.

We illustrate the hypotheses testing results of the research model in Table VIII.

6. Discussions and implications

6.1 Theoretical implications

Our study makes at least two major theoretical contributions. First, our study enriches the understanding of knowledge-sharing behavior at individual level from an OC perspective. While there is a rich body of literature examining factors that impact knowledge sharing, most of the studies focus on organizational absorptive capacity, management support, rewards and incentives and few studies have concentrated on the role OC plays in fostering knowledge sharing. Drawing on Quinn and Spreitzer's (1991) OCF, our study develops a theoretical model that examines the impact of three dominant culture types in terms of group culture, hierarchical culture and rational culture on ERP user's explicit and tacit knowledge sharing. The research model was examined with a large-scale of sample data. Empirical results suggest that hierarchical culture is positively related with explicit knowledge sharing; group culture is positively related with tacit knowledge sharing; and rational culture has positive impact on both explicit knowledge and tacit knowledge sharing.

Second, our study unpacks the impact mechanism of OC on ERP knowledge sharing from a social cognitive theoretical perspective. Drawing upon social cognitive theory, we submit that computer self-efficacy is a critical mediator between OC and ERP knowledge sharing. We integrate OC and computer self-efficacy into a single model and empirically examine their joint impact on ERP user's knowledge-sharing behavior. The explanatory power of the research model has been significantly increased by incorporating computer self-efficacy. Specifically, we found that computer self-efficacy is a critical mediator between group culture and ERP tacit knowledge sharing, illustrating that a collaborative teamwork environment is beneficial to

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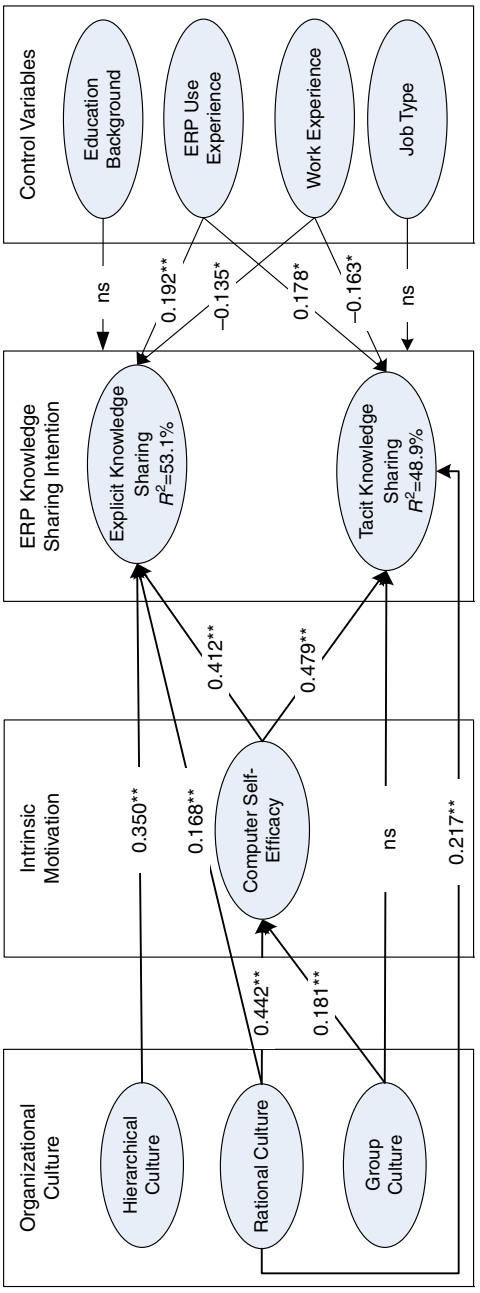

Notes: **$p<0.01$; *$p<0.05$, ns, not significant

Figure 6.
SmartPLS analysis results of the research model III

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Hypotheses testing	Significant level	Results
H1.1: hierarchical culture is positively related with employees' ERP explicit knowledge sharing intention	0.01	Supported
H2.1: rational culture is positively related with employees' computer self-efficacy	0.01	Supported
H2.2: rational culture is positively related with employees' ERP explicit knowledge sharing intention	0.01	Supported
H2.3 rational culture is positively related with employees' ERP tacit knowledge sharing intention	0.01	Supported
H3.1: group culture is positively related with employees' computer self-efficacy	0.01	Supported
H3.2: group culture is positively related with employees' ERP tacit knowledge sharing intention	0.05	Supported
H4.1: computer self-efficacy is positively related with employees' ERP explicit knowledge sharing intention	0.01	Supported
H4.2: computer self-efficacy is positively related with employees' ERP tacit knowledge sharing intention	0.01	Supported

Table VIII.
Hypotheses test

improve individual's confidence to accomplish daily task using ERP system, which in turn enhance their tacit knowledge-sharing intention. Computer self-efficacy also positively mediates the relationship between rational culture and ERP explicit as well as tacit knowledge sharing. This indicates that a climate that focusses on productivity and achievement is beneficial to foster knowledge sharing by enhancing employees' self-efficacy to use ERP systems. The empirical findings filled a significant gap in the extant literature by identifying that at least two types of OC (group culture and rational culture) manifest positive effect on ERP user's knowledge-sharing behavior through influencing their computer self-efficacy.

6.2 Practical implications

For IS practitioners, our study calls for top managers to pay more attention to ERP users' knowledge-sharing behavior in the post-implementation (assimilation) phase, since individuals' knowledge-sharing behavior is critical in utilizing and realizing the potential value of ERP system in support of business strategy. Senior managers should be well aware of the significance of knowledge sharing even after the system has gone alive and been devoted into daily use.

Our study also offers an effective approach for the top managers to enhance employees' confidence and facilitate their knowledge-sharing behavior by promoting appropriate OC. Specifically, rational culture that focusses on productivity and achievement contributes most to computer self-efficacy. This provides guidelines for the top executives to set up clear goals and inspires employees to achieve goals by rational and qualified effectiveness criteria, so as to increase employees' perception that organizational practices are equitable and lead them to actively share what they know with others through both formal and informal discussion and communication. The managers should also recognize that various types of OC are needed in fostering ERP users' explicit and tacit knowledge-sharing behavior. For example, tacit knowledge-sharing behavior could also be fostered by nurturing group culture within the organization, and this requires the managers to be participative and supportive, and establishes effectiveness criteria that focussed on human potential development and member commitment.

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Finally, our study examined the impact of personal characteristics on individual's ERP knowledge-sharing behavior, in terms of ERP use experience, work experience, educational background and job type. The empirical result suggests that ERP users who are familiar with the system functionalities are more likely to share what they know with others, while old employees contradict to share what they know with others. Thus managers need to arrange younger employees who are expert at ERP systems in critical nodes of organizational network, so as to foster an effective sharing of ERP knowledge in the long-term assimilation process.

6.3 Limitations and future research directions

Although we have developed a theoretical model and used rigorous empirical study to prove the robustness and credibility of our research findings, some limitations still need to be addressed and several future research directions are provided.

The first limitation existed in our study is that we only collected data in Henan province of China, and most of the samples are small and middle-sized firms, thus we are limited in generalizing our finding widely. Future studies could collect data from a random sample including large-scale firms to further examine if the research findings can be generalized.

The second limitation is that the empirical study in our study was self-reported by ERP users, and the single data source may cause CMB. In order to examine if CMB exists in our study, we conducted the Harmon one-factor test for our data set and the one-factor analysis combining all of the variables showed no sign of a single factor accounting for the majority of covariance. In addition, we also followed the analytical procedure proposed by Liang *et al.* (2007) and the results suggest that CMB is not a significant concern in our study. Future studies can collect data from different data sources to better avoid the CMB issues.

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