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Abstract

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Keywords

Transformational Leadership, Organizational Learning Culture, ERP Systems, Exploitative Learning, Exploratory Learning

Disciplines

Management Information Systems

THE IMPACT MECHANISM OF TRANSFORMATIONAL LEADERSHIP STYLE ON EXPLOITATIVE AND EXPLORATORY LEARNING OF ERP SYSTEMS

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Abstract

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Keywords: Transformational Leadership, Organizational Learning Culture, ERP Systems, Exploitative Learning, Exploratory Learning

1   INTRODUCTION

In the era of environment uncertainty and globalization, more and more organizations use Enterprise Resourcing Planning (ERP) systems to support daily business operations, and the popularity of ERP systems has grown dramatically over the last two decades (Jacobson et al., 2007). However, because of the large scale and complexity of ERP systems, organizations often fail to utilize and explore the systems' functionalities to achieve business goals after the systems are committed to routine operations, and a large portion of implemented ERP systems have not fulfilled their expected effectiveness (Escalle et al., 1999; Yu, 2005). Some studies suggested that few companies have derived expected benefits from ERP systems(Sun et al.,2005), and the failure rate of ERP project is especially high in China (He, 2004; Zhu et al., 2010).

In order to increase the success rate, studies have focused on the drivers of ERP systems success in the past decades, and senior leadership has been identified as one of the most critical success factors (Somers &Nelson, 2004; Law & Nagai, 2007; Rai et al., 2009). Since the use of new systems requires mutual adaptation of the systems and the organizational context into which the technology is being introduced, it is argued that top management needs to exhibit specific behaviors to reinforce norms that value the use of the technology (Markus &Tanis, 2000; Shao et al., 2012a).

By a thorough review of the literature published in the past ten years, we found that most of the extant studies have focused on top management championship, top management belief and top management participation; few studies have explored the relationship between top management leadership style and ERP success. We were able to identify only a handful of studies that have examined the impact of senior leadership style on ERP success (e.g., Wang et al., 2005; Neufeld et al., 2007; Ke&Wei, 2008; Cho et al., 2011), yet most of these studies focused on ERP adoption and implementation, and the significant role senior leadership style plays in assimilation phase has not been explored.

The primary difference between assimilation and the two proceeding phases is that in the assimilation phase, most of the radical customizations and business process reengineering activities are complete, and how to balance the exploitation and exploration learning of ERP systems, in order to satisfy the complex demands and ensure its current and future viability, is a new challenge in front of the organization (Birkinshaw & Gibson, 2004; Crossan et al., 2008; Nemanich & Vera, 2009).

Extant literature suggests organizational learning culture plays a significant role in fostering exploitative and exploratory learning (Nemanich & Vera, 2009), and transformational leadership is a critical driver of organizational culture (Schein, 2004; Ke & Wei, 2008). However, no studies have integrated transformational leadership, organizational learning culture, exploitative and exploratory learning into a single comprehensive model in order to examine inter-relationship in detail in the context of ERP assimilation. There are significant gaps in the literature regarding how transformational leadership impacts exploitative and exploratory learning in the ERP assimilation phase in organizations.

Drawing from organizational learning theory, the main objective of this study is to examine the impact mechanism of transformational leadership on ERP systems learning during the assimilation phase of the ERP lifecycle. Specifically, we investigate the mediating effect of three types of organizational culture (psychological safety, openness to opinions and participation in decision making) on the relationship between transformational leadership and ERP systems learning.

The paper is organized as follows. In the next section we review the extant literature on transformational leadership, organizational learning, and organizational learning culture. Then we develop our research model and propose the hypotheses. The research methodology is then presented to clarify the construct operationalization and data collection procedure, followed by the section of data analysis results and hypotheses testing. At last we discuss the theoretical and practical implications.

2 LITERATURE REVIEW

2.1 Transformational Leadership

Leadership theory has developed significantly during the last century, from the earlier leader trait theory to the later leader behavior theory. The traditional leader trait theory focuses on the personal characteristics of leaders, without considering the influence of their followers (Conger et al., 1994;Yukl, 2006). A paradigm shift occurred in the mid-1970 with new theories of leadership emerging under the labels of transformational and transactional leadership.

Burns (1978) argued that transactional leadership occurs when one person takes the initiative in making contact with others for the purpose of an exchange of something valued, while transformational leadership is based on more than the compliance of follower through shifting their beliefs and values.

Bass (1985) adopted this idea into organizational literature, and divided senior leadership style into these two types. He argued that a significant function that distinguishes transformational leadership from transactional leadership is its concern for culture. Transactional leadership tends to operate within the existing culture, while transformational leaders frequently work towards changing the organizational culture in line with their vision. Thus excellent leaders are more likely to exhibit transformational leadership traits that enable them to alter aspects of their culture in order to improve their organizational performance (Basset al., 2003).

Bass and Avolio (2000) developed the Multifactor Leadership Questionnaire (MLQ) to measure transformational leadership, and refined the leadership styles into five sub-dimensions. The descriptions of each specific sub-dimension are shown in Table 1.

Leadership Style	Dimensions of Leadership Style	Descriptions
Transformational Leadership	Idealized Attributes(IA)	Instills pride, gains respect and trust.
	Idealized Behaviors (IB)	Provides strategic vision and sense of ission
	Inspiration(IS)	Communicates high expectations, uses symbols to focus efforts, express important purposes in simple ways.
	Intellectual Motivation(IM)	Promotes intelligence, rationality, and careful problem solving.
	Individualized Consideration(IC)	Gives personal attention, treats each employee individually, coaches, advises.

Table 1. Descriptions of Leadership Style

2.2 Organizational Learning

The concept of organizational learning has grown significantly in the 1970s (Aroyris & Salon, 1978). Jones (2000) defined organizational learning as a process through which managers try to increase organizational members' capabilities to better manage the organization and its environment.

According to March (1991), there are two broad types of qualitatively different learning activities between which firms divide attention and resources-exploration and exploitation learning. Exploration implies organization behaviors characterized by search, variation, risk taking, experimentation, play, flexibility, discovery and innovation, while exploitation implies organization behaviors characterized by refinement, choice, production, efficiency, selection, implementation and execution (March, 1991).

Levinthal and March (1993) argued that "the basic problem confronting an organization is to engage in sufficient exploitation to ensure its current viability and, at the same time, to devote enough energy to exploration to ensure its future viability (p. 105)."Exploration and exploitation are not the opposite ends of a continuum but could coexist within an organization (Beckman, 2006; Gilson et al., 2005). Organizations that engage in more exploration but less exploitation are more likely to suffer the costs of experimentation without gaining many of its benefits, since there are too many undeveloped new ideas and too little distinctive competence; one the other hand, organizations that engage in more exploitation but less exploration are likely to find themselves trapped in suboptimal stable equilibria (March, 1991). Thus maintaining an appropriate balance between exploration and exploitation is a primary concern in organization survival and prosperity (Nemanich & Vera, 2009).

In ERP assimilation phase, learning at organization level continues although the system is in place and functioning to a large degree. The two types of organizational learning discussed above are still salient in the context of ERP assimilation. On the one hand, the organization needs to exploit the ERP system to gain a deeper understanding of the system's functionalities and capabilities in order to fully utilize these functionalities and capabilities for existing business processes and functions; on the other hand, the organization also needs to explore how to take advantage of these capabilities and functionalities to enable and support new and innovative business processes and functions, many of which were not considered or intended when the system was designed and implemented. Thus exploitative learning and exploratory learning are both indispensable in ERP assimilation phase to organizations.

2.3   Organizational Learning Culture

The concept of organizational learning culture comes from organizational learning. Schein (2004) defined organizational learning culture as a pattern of basic assumptions—invented, discovered or developed by a given group as it learns to cope with its problems of external adaptation and internal integration. Firms that have developed a strong learning culture are good at creating, acquiring and transferring knowledge, as well as at modifying behavior to reflect new knowledge and insight (Garvin, 1993).

Nemanich and Vera (2009) posited that organizational learning culture is a multi-dimension concept, and the most widely used three constructs are psychological safety (Edmondson, 1999; Lipshitz et al., 2007), openness to diversity of opinion (Baker & Sinkula, 1999; Tagger, 2002;Yang, 2003), and participation indecision making (Hurley & Hult, 1998; Thompson & Kahnweiler, 2002). Each of the three constructs promotes different learning behaviors. Specifically, psychological safety refers to the degree to which team members feel they are safe from punishment for risk taking (Edmondson, 1999), and openness to diversity of opinions assesses the degree to which employees feel they are encouraged to bring forth different ideas (Baker & Sinkula, 1999), while participation in decision making refers to the degree that team members are involved in determining future strategies (Hurley & Hult, 1998).

The combination of the three established social dimensions focuses on both external adaptation and internal integration, which is consistent with Schein's definition of organizational learning culture (Nemanich & Vera, 2009). Thus, in this study, we define and measure organizational learning culture from the three social dimensions.

3   RESEARCH MODEL AND HYPOTHESES

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. In this phase, how to facilitate a learning culture in order to maintain the exploitative and exploratory learning of ERP systems is a new challenge facing top executives (Purvis et al., 2001; Liang et al., 2007; Liu et al., 2011).

Extant literature suggests that leadership is a critical guiding force behind organizational learning culture (Nemanich & Vera, 2009). Psychological safety learning culture refers to the degree to which team members feel they are safe from punishment (Edmondson, 1999), and transformational leadership creates a context of psychological safety by providing personal attention and giving advising to individuals (Shin & Zhou, 2003).

ERP systems is complex and of large scale, and switching to a new system will cause uncertainty among users since they are unsure about the resulting changes (Kim & Kankanhalli, 2009). In order to reduce or eliminate this uncertainty, the top executives need to care about the individuals' personal needs towards ERP systems and provide attention by communication and advisory, so as to foster a psychological safety learning culture within the organization by making individuals to feel that they are cared and directed (Nemanich & Vera, 2009; Seibert et al., 2011). This is beneficial to enhance individuals' psychological expectation and motivate them to learn ERP systems actively. This leads to the following hypotheses:

H1a: Transformational leadership is positively related with the organizational learning culture of psychological safety.

H1b: The learning culture of psychological safety is positively related to exploitative learning of ERP systems.

The learning culture of participation in decision making refers to the degree that individuals are involved in determining future strategies, and transformational leadership is more likely to stimulate individuals to participation in decision making by articulating a clear strategic vision and inspiration (Nemanich & Vera, 2009).

An ERP system is a cross-functional transaction platform, and it requires an organizational wide participation from different units to share information and knowledge related to the organization and the ERP system (Jones et al., 2006; Shao et al., 2012b). However, this process may conflict with the vested interest of stakeholders from different departments (Zhu et al., 2010). In order to resolve the conflicts and stimulate individuals to link their personal benefits with the organizational benefits, top executives needs to articulate a strategic vision on the firm's long term goals and communicate how the system might enable the business to accomplish its goals (Ke & Wei, 2008). This is beneficial to facilitate a learning culture of participation in decision making, thus to stimulate the individuals to have a deep understanding of system functionalities (Dreu et al., 2001; Nemanich & Vera, 2009). By involving team members indecision making, transformational leaders can also motivate individuals to explore new ways of systems utilization in support of organizational strategy (Wanberg & Banas, 2000; Jansen, 2009). Thu we argue that:

H2a: Transformational leadership is positively related with organizational learning culture of participation in decision making.

H2b: The learning culture of participation in decision making is positively related to exploitative learning of ERP systems.

H2c: The learning culture of participation in decision making is positively related to exploratory learning of ERP systems.

Openness to diversity of opinion learning culture is the degree to which employees feel they are encouraged to bring forth different ideas (Baker &Sinkula, 1999). Transformational leaders are more creative and innovative in their ideas, and is more likely to create a culture that is open to diverse ideas by intellectual stimulation and interpersonal consideration (Nemanich & Vera, 2009; Gong et al., 2009).

Another important aspect of ERP assimilation is to have a large number of high-level users in an organization who not only can use the system effectively for routine business activities but also think innovatively for new possibilities with the current system (Liu et al., 2011). This requires top

executives to offer the vision to users about the strategic directions of the organization and inspire the users to think innovatively about how the system might enable the business to accomplish its goals (Shao et al., 2012a). In addition, the top executive also needs to pay attention to individuals' personal characteristics such as their IT innovation and IT competence, thus to stimulate the high level users to explore system functionalities (Wang et al., 2013). This discussion leads to the following hypotheses:

H3a: Transformational leadership is positively related with organizational learning culture of openness to opinions.

H3b: The learning culture of openness to opinions is positively related to exploratory learning of ERP systems.

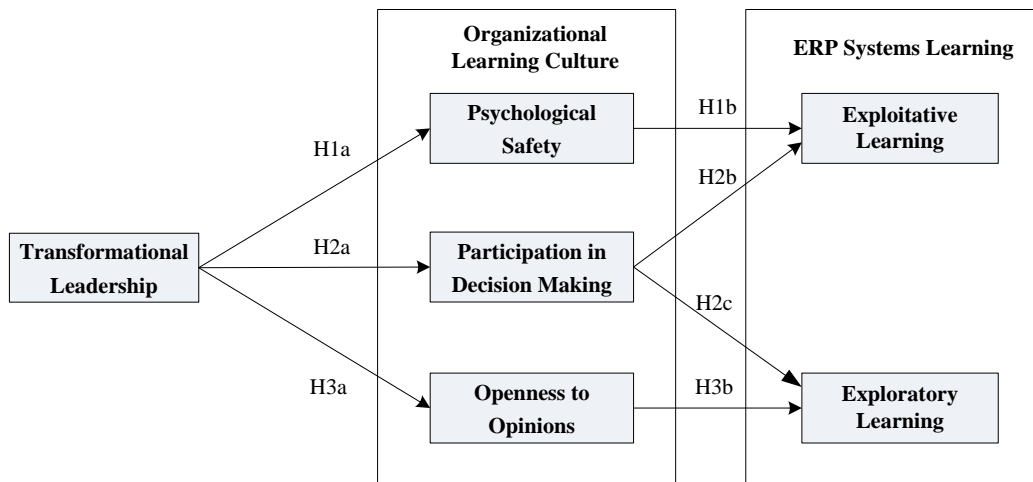The research model and the seven hypotheses can be illustrated as Figure 1.

Figure 1 Research Model and Hypotheses

4 RESEARCH METHODOLOGY

4.1 Measures

We conducted a survey-based empirical study to examine the research model. The questionnaire was designed based on the extant literatures and adjusted according to the context of ERP assimilation. All the items were measured on a five-point likert scale, anchored from 1 (strongly disagree) to 5(strongly agree). The theoretical references of each construct are provided in the Table 2.

Constructs	Items	References
Transformational Leadership	Idealized Attributes (IA1-IA4)	Bass et al. (2004)
	Idealized Behaviors (IB1-IB4)	
	Inspiration (IS1-IS4)	
	Intellectual Motivation (IM1-IM4)	
	Personal Consideration (PC1-PC4)	
Organizational Learning Culture	Psychological Safety(PS1-PS4)	Edmondson (1999)
	Participation In Decision Making(PD1-PD4)	Bontis&Crossan (2002)
	Openness to Opinions(OP1-OP4)	Dreu et al.(2001)
ERP Systems Learning	Exploitative Learning(EIL1-EIL4)	Nemanich&Vera (2009)
	Exploratory Learning(EOL1-EOL4)	

Table 2 Measures

A pilot study was conducted first before the final data collection. 70 EMBA students enrolled in a large Chinese university were invited to complete the questionnaire, and 50 valid questionnaires were received. PLS analysis suggests that most of the items load high on the intended constructs. We delete the items with factor loadings lower than 0.7 to improve the validity of the constructs (Chin et al., 2003).

4.2   Data Collection

For the survey study, we initially contacted a large software company in Harbin of China and select their clients that as a convenient sample. In addition, we also contacted with firms from Shanghai, Beijing and Zhengzhou of China to improve the sample distribution. All of the firms in the sample must have used ERP systems for at least one year and have appointed a top executive to be in charge of the ERP systems. In the end we got 190 firms that satisfied our requirements.

In order to reduce the common method bias in survey based research, we collected data from different sources (Podsakoff et al., 2003). The questionnaires were sent by email to a top executive and his direct subordinate (e.g., director of IT department) separately. The top executive was asked to evaluate his leadership style, the organizational learning culture and basic organizational information, while the IT director was asked to evaluate the top executive's leadership style and organizational learning culture (exploitative learning and exploratory learning) in the context of ERP systems.

A total of 322 questionnaires were received from the 190 firms, with 160 from the top executives and 172 from the IT directors. We matched the questionnaires from the top executives and the middle managers and deleted the unmatchable one from the sample. This resulted in 306 questionnaires from 153 firms. We then examined the missing items in each questionnaire, and removed 52 incomplete questionnaires. In the end, we got 202 valid questionnaires from 101 firms. The profiles of the firms in the sample are illustrated in Table 3.

Firm Characteristics	Categories	Percentage
Firm Ownership	State Owned	39.6%
	Joint Venture	6.9%
	Private	49.5%
	Foreign Invested	4%
Industry Type	Manufactures	35.6%
	Retails	12.9%
	Public Administration	12.8%
	Construction	7.9%
	IT Service	5.9%
	Others	24.9%
Sales Income (Million)	10-100	27.7%
	101-500	49.5%
	501-1000	13.9%
	1001-5000	6.9%
	>5000	2%

Table 3 Profiles of the Sample Firms

4.3   Data Analysis

We first conducted a pair-wised t-test of transformational leadership with the two data sources to examine the consistency of leadership style evaluated by the top executive themselves and their subordinates. Following Bono and Judge (2003)'s study, the items for each sub-dimension of

transformational leadership were averaged to form a synthesized score, and the five synthesized score on idealized attributes, idealized behaviours, inspiration, intellectual motivation and personal consideration were used to measure transformational leadership style as reflective items. The pair-wised t-test result suggests that there is no significant difference between self-reported and the subordinates' evaluation on leadership style. Thus we use the average score of a top executive's self-reported values and his/her subordinate's evaluation to measure transformational leadership for each executive.

4.3.1   Measurement Model

We examined the measurement model to analyze the convergent and discriminant validity. Convergent validity refers to the degree to which the items measuring the same construct correspond by checking the item loadings, composite reliability, and the average variance extracted (AVE) of each construct from its indicators. The quality indicators of convergent validity in our study are illustrated in Table 4.

Constructs	Items	Loadings	Cronbachs Alpha	CompositeReliability	AVE
Transformational Leadership	IA-AVE	0.93	0.97	0.97	0.85
	IB-AVE	0.94			
	IM-AVE	0.93			
	IS-AVE	0.92			
	IC-AVE	0.94			
Psychological Safety	PS2	0.91	0.90	0.94	0.83
	PS3	0.92			
	PS4	0.92			
Openness to Opinions	OP2	0.91	0.85	0.91	0.77
	OP3	0.91			
	OP4	0.91			
Participation in DecisionMaking	PD1	0.87	0.91	0.94	0.84
	PD2	0.87			
	PD3	0.89			
ERP Systems ExploitativeLearning	EIL2	0.96	0.95	0.97	0.91
	EIL3	0.94			
	EIL4	0.96			
ERP Systems ExploratoryLearning	EOL2	0.98	0.95	0.97	0.92
	EOL3	0.95			
	EOL4	0.95			

Table 4 Convergent validity

Table 4 suggests that the item loadings, composite reliability and cronbachs alpha of each construct is greater than 0.85, and the average variance extracted (AVE) of each construct is greater than 0.75, providing a good reliability and convergent validity (Pavlou & Fygenson, 2006).

Discriminant validity refers to the degree to which items differentiate between constructs, and it is assessed by satisfying the following two criteria: (1) The square root of the average variance extracted of each latent variable from its indicators should exceed that construct's correlation with other constructs; (2) The items should load more highly on constructs they are intended to measure than on other constructs (Chin et al., 2003).

In this study, we used the first criterion to evaluate the discriminant validity of the measurement model, and the latent variables correlation analysis results are illustrated in Table 5.
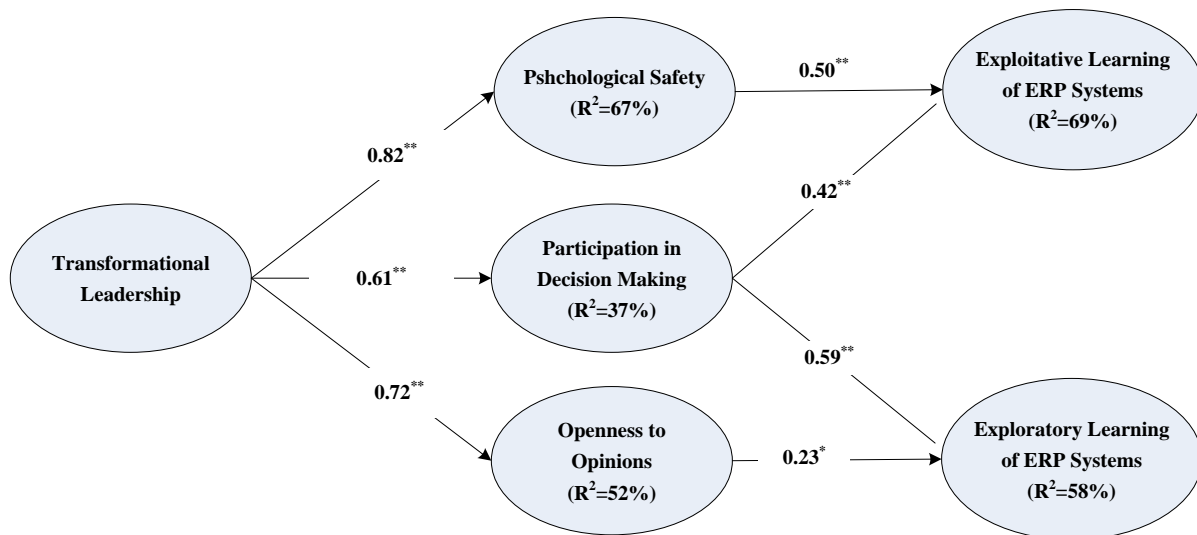
	Transformational Leadership	Openness to Opinions	Participation in Decision Making	Psychological Safety	ERP Systems Explorative Learning	ERP Systems Exploratory Learning
Transformational Leadership	**0.92**					
Openness to Opinions	0.63	**0.91**				
Participation in Decision Making	0.72	0.79	**0.88**			
Psychological Safety	0.62	0.65	0.72	**0.92**		
ERP Systems Explorative Learning	0.73	0.77	0.65	0.74	**0.95**	
ERP Systems Exploratory Learning	0.66	0.71	0.65	0.75	0.91	**0.96**

Table 5 Correlation Analysis of Latent Variables

As shown in Tables 4 and 5, the square root of the average variance extracted (AVE) of each latent construct is greater than that construct's correlation with other constructs, and the results suggest a good discriminant validity.

4.3.2 Structural Model

We used PLS to examine the structural model since it is able to accommodate smaller data sample models without requirements of normality distribution of the data (Chin et al., 2003). The sample size meets the common standards for PLS modeling in the literature (Chin et al., 2003; Gefen et al., 2000). The analysis result is illustrated in Figure 2.

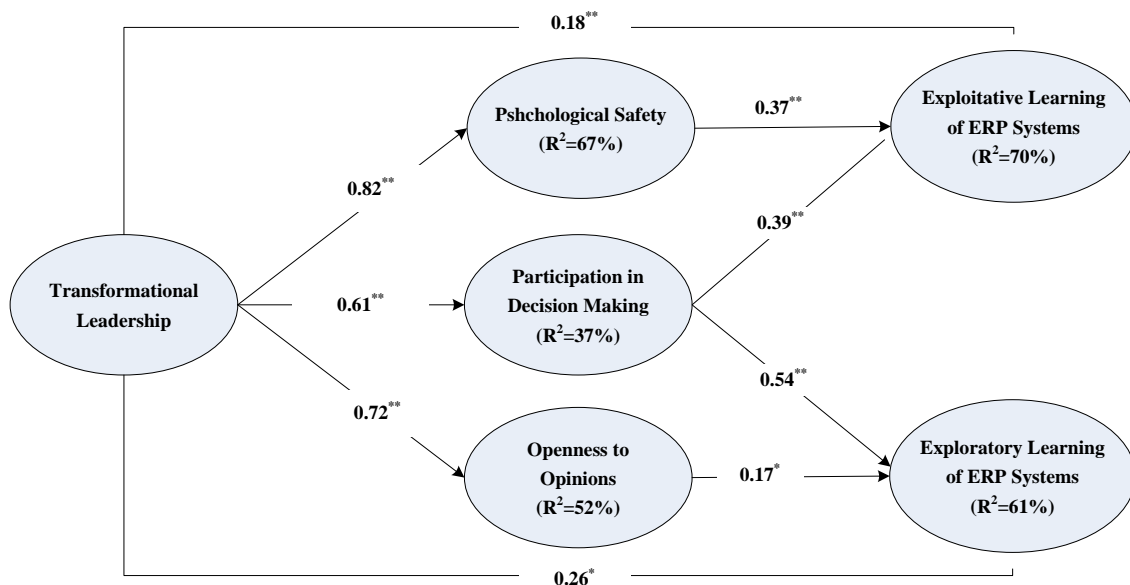*(**represents the significant level p<0.01, *represents the significant level p<0.05)*
Figure 2 Structural Equation Model Analysis Results (I)

From Figure 2 we can see that transformational leadership is positively related all three types of organizational culture, which provides support for hypotheses H1a (regression coefficient β = .82), H2a (regression coefficient β = .61) and H2c (regression coefficient β = .72).

Psychological safety is positively related with ERP exploitative learning, and this provides support for hypotheses H1b (regression coefficient β = .50). Participation in decision making learning culture is

positively related with both ERP exploitative and exploratory learning, hence supporting hypotheses H2b (regression coefficient β = .42) and H2c (regression coefficient β = .59). Openness to opinions learning culture is positively related with ERP exploratory learning, and this provide support for hypothesis H3b (regression coefficient β = .23). The statistical suggests most of the hypotheses are significant at $p<0.01$ level (except for the path between openness to opinions and exploratory learning).

Extant literature suggests that transformational leadership could have a direct impact on organizational learning without being mediated by the organizational learning culture (Jansen et al., 2009). To test this thesis, we then add a link between transformational leadership and ERP systems exploitative and exploratory learning, to examine if there is a direct relationship between these constructs. The structural equation modelling analysis results are illustrated in Figure 3.

(**represents the significant level p<0.01, *represents the significant level p<0.05)
Figure 3 Structural Equation Model Analysis Results (II)

From Figure 3 we can see that the direct link between transformational leadership and ERP systems exploitative learning is significant ($p <0.05$), indicating that their relationship is partially mediated by psychological safety and participation in decision making learning culture. In addition, transformational leadership is also positively ($p <0.1$) related with exploratory learning of ERP systems directly, suggesting that their relationship is partially mediated by participation in decision making and openness to opinions learning.

The structural equation model also shows that the R^2 of exploitative learning and exploratory learning of ERP systems is 70% and 61% respectively, indicating a strong explanatory power of the research model.

5   CONCLUSIONS

In this study, we examined the important question of how transformational leadership style impact the two forms of organizational learning – exploitive and exploratory – in the context of ERP assimilation. Using a sample of 101 firms that have been using ERP systems for at least one year, we tested a theoretical model and argued that the impact of leadership on organizational learning is mediated by the learning culture of the organization. We found that while organizational learning culture, operationalized in three sub-cultures, indeed mediate the impact of transformational leadership, such mediation is only partial. Transformational leaders could also have a direct impact on the two forms of organizational learning.

For theoretical contribution, our study contributes to leadership theory by integrating transformational leadership and organizational learning culture in the same model and examines their joint effect on organizational learning in the context of ERP systems. The empirical results highlight the significant role that transformational leadership plays in learning ERP systems, and enrich the extant literature with the mediating effect of three types of organizational learning culture on the relationship between transformational leadership and ERP systems learning. We found that transformational leadership is directly related to exploitative learning and exploratory learning of ERP systems, and psychological safety, participation in decision making and openness to opinions learning culture partially mediates the relationship between transformational leadership and ERP exploratory learning.

Our study also contributes to organizational learning theory. Continuous learning of ERP systems is identified as a major challenge in ERP assimilation phase (Liu et al., 2011; Shao et al., 2012a). However, few studies have examined the critical antecedents for learning ERP systems. By applying March's (1991) exploitative and exploratory learning theoretical framework, we argue that three types of organizational learning culture are positively related with exploitative and exploratory learning, and transformational leadership is a significant driver of all three organizational learning cultures.

In terms of contribution to practice, our study may provide guidelines for top executives to use the most appropriate leadership traits to foster a balance between exploitative learning and exploratory learning of ERP systems in organizations. On the one hand, top executives need to provide personal consideration to employees, such as one-to-one communication and advisory, in order to facilitate a psychological safety learning culture, which is beneficial for improving the exploitative learning of ERP systems. On the other hand, top executives also need to articulate a clear strategic vision to employees, using inspiration and charisma, to facilitate a participation and innovation learning culture, in order to improve the exploratory learning of ERP systems.

This study also offers a number of potential future research directions. For one, transformational leadership can be further broken up into its first order constructs, to empirically examine the impact of idealized attributes, idealized behaviors, inspiration, intellectual stimulation and personal consideration on exploitative learning and exploratory learning of ERP systems, and how such impacts are mediated by organizational learning culture, at a finer level. In addition, it is also interesting to examine if there is a relationship between transformational leadership and the level of ERP assimilation and identify the mediators between these two constructs. Another interesting study is to contrast with the impact of transactional leadership on exploitative learning and exploratory learning, to see if there are any differences between the impacts of transformational and transactional leadership and understand why such differences may exist. In addition, future studies need also add appropriate control variables such as industry type and ERP utilization time in the theoretical model and use larger dataset to validate the hypotheses more accurately.

Acknowledgment

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