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Xixi Li
Hong Kong Polytechnic University, 06900850R@polyu.edu.hk

J.J. Po-An Hsieh
Georgia State University, jjhsieh@gsu.edu

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Xixi Li
Hong Kong Polytechnic University

Po-An Hsieh
Hong Kong Polyutechnic University

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IMPACT OF TRANSFORMATIONAL LEADERSHIP ON SYSTEM EXPLORATION IN THE MANDATORY ORGANIZATIONAL CONTEXT

Xixi Li
Department of Management and Marketing
The Hong Kong Polytechnic University
Hong Kong, China
06900850r@polyu.edu.hk

JJ Po-An Hsieh
Department of Management and Marketing
The Hong Kong Polytechnic University
Hong Kong, China
JJ.Hsieh@inet.polyu.edu.hk

Abstract

Organizational investments in such complex information systems as customer relationship management (CRM) systems have reached a record high. Unfortunately, underutilization of these sophisticated technologies hinders organizations from realizing the promised returns on investment. This study tackles this issue from the perspective of intention to explore, which refers to individual intentions to explore the technology and seek new ways of using it. Drawing upon insights from concepts of exploration, extra-role behavior, technology acceptance, and transformational leadership, this paper proposes a research model for employees' intention to explore in mandatory organizational contexts, with special emphasis on the effect of transformational leadership. The model was examined in a large telecom service company that uses CRM information systems. The results suggest that transformational leadership, intrinsic motivation, and extrinsic motivation (i.e. perceived usefulness) directly affect employees' exploratory intentions. Transformational leadership also indirectly influences intention to explore through individuals' intrinsic motivation and computer self-efficacy.

Keywords: Intention to Explore, IS Use, Leadership, Intrinsic Motivation, Self-Efficacy

Introduction

Modern organizations have been making significant investments in such complex information systems (IS) as Enterprise Resource Planning (ERP) systems, Supply Chain Management (SCM) Systems, Customer Relationship Management (CRM) systems, and other similar systems in order to sharpen and sustain their competitive edge. For instance, organizations spent $20 billion on ERP system implementation in 2000 (Willcocks and Sykes 2000); such investment is expected to rise to $37 billion in 2008 (Kawamoto 2004). Similarly, organizational budget for CRM systems is expected to increase from $26.6 billion in 2005 to $41.4 billion in 2010 (ITFacts 2007). Unfortunately, the outcomes of these initiatives seldom reach satisfactory. Nearly 50% of the ERP and 80% of the CRM projects have experienced failures (Adam and O'Doherty 2003; Bolton and Tarasi 2006). Moreover, organizations seldom use the implemented complex information systems to their fullest potential and, consequently, fail to realize the promised benefits (Jasperson et al. 2005). Recent studies have shown that a company's level of system utilization indeed relates to its profitability (Aberdeen Group 2006). To address the issue of system underutilization, this study turns to the concepts of (1) *intention to explore* (IExp), that can potentially lead to a higher level of system usage, and (2) *transformational leadership* (TFLD), that may stimulate system exploration. This paper investigates the factors that influence employees' intention to explore, with a special focus on transformational leadership as the managerial explanation.

Complex IS are typically adopted at the organizational level, and employees are often required to use the adopted systems. The sophisticated design of a complex IS generally permits users to utilize it at different levels. Although, under the mandatory context, employees are obligated to use the installed system and typically use it at a basic level, and in a normal manner prescribed by the management, employee users still have considerable discretion to decide whether, and to what extent, to apply the system to support their tasks (Silver 1990; 1991). Whether organizations can realize the desired value from the implemented systems is contingent upon their ability to use the systems at a higher level (Cooper and Zmud 1990; Saga and Zmud 1994). Towards this end, system exploration by end-users is one of the feasible ways for firms to achieve higher levels of system use (Nambisan et al. 1999; Karahanna and Agarwal 2006). System exploration represents a special type of usage behavior that is different from regular and routine usage. To engage in exploratory use, users need to make extra effort during the exploration process. Some researchers have, therefore, positioned system exploration as an extra-role behavior that goes beyond the regular organizational requirements (Karahanna and Agarwal 2006). Meanwhile, others have viewed exploratory use as a form of innovation that uses IS in a novel fashion (Ahuja and Thatcher 2005; Nambisan et al. 1999). In other words, system exploration can be conceptualized as an extra-role system usage behavior that is innovative in nature. But, what are the factors that can influence system usage in a manner that is extra-role like and innovative in nature?

Receiving much attention from both scholars and practitioners in the past two decades, transformational leadership has been shown as a potent leadership style that can cultivate extra-role behaviors and simulate innovation. The transformational leadership theory is based on social exchange between leaders and followers, rather than transaction based performance–reward exchange (Bass 1985). Transformational leaders are those who lead through social exchange (Bass and Riggio 2006). They tend to behave in such a charismatic way that employees will identify themselves with the leaders. They motivate employees by articulating organizational visions and missions and make employees internalize organizational values and goals. Transformational leaders treat followers as wholesome human beings, pay personalized attention to each, and often challenge followers to think and solve problems from multiple perspectives. This powerful leadership style has been proven to be effective in developing employees' self-efficacy (Bono and Judge 2003), stimulating intrinsic motivation (Shin and Zhou 2003; Piccolo and Colquitt 2006), enhancing employees' task performance and extra-role behavior (Piccolo and Colquitt 2006), and promoting creativity (Shin and Zhou 2003). While prior studies of TFLD tend to focus on its effect on employees' creative and extra-role behaviors in general, this paper argues that TFLD can specifically affect employee IS exploration.

IS scholars have long been studying such management related constructs as 'management support' (e.g., Yoon et al. 1995; Igbaria et al. 1997; Shama and Yetton 2003), 'top management support' (e.g., Sanders and Courtney 1985; Guimaraes et al. 1992; Yap et al. 1992), 'organizational support' (e.g., Igbaria 1990; Igbaria et al. 1996), and 'top/senior management involvement and participation' (e.g., Armstrong and Sambamurthy 1999; DeLone 1988;

Jarvenpaa and Ives 1991). Prior research in this area has consistently shown positive effects of these constructs on IS implementation. However, these studies tended to focus on (1) the managerial influence of top level leaders rather than that of employees' immediate superisors/managers, and on (2) leaders' management skills and professional knowledge, instead of their value appeal, emotional support, and encouragement (Faraj and Sambamurthy 2006). Indeed, the decisions for IS implementation are often made by the top management. Nevertheless, throughout the implementation process, line managers are the ones who stay closest to employee users and have more knowledge about how to effectively utilize the systems; these immediate supervisors may play roles that are even more important than those of the top management for employees' system use (Rockart et al. 1996). While some have posited that "line leadership is an absolute necessity" (Rockart 1988), there has been little empirical investigation in the IS context. Furthermore, most of IS research in this stream has not capitalized on the rich body of knowledge accumulated in leadership literature, except the recent works by Faraj and Sambamurthy (2006) and Ke and Wei (2005). Faraj and Sambamurthy investigated the performance of IS development project teams from the perspective of empowering leadership. Ke and Wei (2005) proposed to examine the effect of leadership in the context of ERP implementation. Despite its lack of empirical validation, Ke and Wei's (2005) paper provides constructive ideas regarding the function of leadership in IS implementation.

In the light of the practical importance of system exploration and the aforementioned knowledge gaps, this paper investigates the impact of transformational leadership on IS users' intentions to explore complex information systems in the organizational context. The leaders in this paper specifically refer to the immediate supervisors of IS end-users. The key purposes of this paper are (1) to identify the factors that drive individual intention to explore complex IS, (2) to introduce the transformational leadership theory (Bass 1985) into the IS field, and (3) to propose and examine the mechanisms (i.e., computer self-efficacy and intrinsic motivation for using IS) through which transformational leadership affects individual IS innovation.

Theoretical Foundation and Research Hypotheses

This paper introduces the theory of transformational leadership in order to further understand IS users' explorative usage. A research model that includes eight hypotheses is formulated, based on the concepts of exploration (March 1991), extra-role behavior (Katz and Kahn 1978; Van Dyne et al. 1995), technology acceptance (Davis 1989), motivation (Davis et al. 1992), and transformational leadership (Bass 1985). The following sections first conceptualize IS exploration as an innovative and extra-role behavior. Next, motivation and technology acceptance theories help identify factors that can affect individuals' intentions to explore. Finally, transformational leadership serves as the overarching theory that encompasses the entire research model.

Information Systems Exploration

IS scholars have suggested that information systems can be used in different manners in organizational contexts. Individuals can use information systems in a way that is habitual, routine, and standardized to support their task performance (e.g., Kim et al. 2005; Saga and Zmud 1994). On the other hand, users can also apply IS in an exploratory or innovative fashion that goes beyond routine and can further unleash the potential of the systems (e.g., Agarwal 2000; Ahuja and Thatcher 2005; Schwarz 2003). The distinct nature of these two types of system usage behaviors makes them similar to the concepts of exploitation and exploration (March 1991). According to March (1991, p. 85), exploitation refers to "the refinement and extension of existing competencies, technologies, and paradigms", whereas exploration describes organizations' "experimentation with new alternatives". Exploration, relative to exploitation, usually creates more value and builds more competitive advantages for organizations (March 1991; Benner 2002). In this vein, while system exploitation can be conceived as technology use that is repetitive and routine, system exploration can be viewed as use that is experimental and novel.[1]

[1] Although March's theory was originally conceived at the organizational level, some research contended the validity to apply March's concept to team and individual levels (Gupta et al. 2006).

Routinized usage behaviors are usually repetitive and habitual. Prior behavioral patterns, rather than reflective consideration, tend to direct future behaviors of this type (Jasperson et al. 2005). Such behaviors are rather automatic and tend to occur through a subconscious mechanism. In mandatory organizational settings, routinized behaviors usually reflect the policies and requirements of the organizations (Langer et al. 1978; Jasperson et al. 2005). In contrast, system exploration requires additional cognitive effort to consciously engage in exploratory activities to surpass the routine (Jasperson et al. 2005; Karahanna and Agarwal 2006). Karahanna and Agrawal (2006) have thus viewed system exploration as an illustration of extra-role behavior (Katz and Kahn 1978; Van Dyne et al. 1995) which goes above and beyond routine organizational requirements.

Most extant IS usage research focuses on such dependent variables as intention to use and actual usage, measured by frequency and time of use. While these variables may be suitable for investigating usage of simple information technologies, they can not faithfully capture explorative usage of complex information systems (Agarwal 2000). These variables also offer little insights when the system usage is mandated (Seddon 1997; Karahanna and Agarwal 2006). Towards this end, some have proposed alternative constructs to approach system exploration. For instance, Jasperson et al. (2005) offered the notion of 'individual feature extension', which refers to individual discovering ways to apply features that go beyond the uses conceived by the application's designers or implementers. Nambisan et al. (1999) examined the significance of "intention to explore" for users to innovate in IT. 'Intention to explore' stands for a user's willingness and purpose to explore an information system and identify its potential use. Karahanna and Agarwal (2006) referred to intention to explore as individual intentions to explore the technology and seek new ways of using it. Ahuja and Thatcher (2005) proposed a similar concept 'trying to innovate with IT', describing a user's goal of finding novel uses for information technologies. Conceptually speaking, the aforementioned concepts generally concern using IS innovatively. Following Nambisan et al. (1999) and Karahanna and Agarwal (2006), this paper turns to the concept of 'intention to explore' (IExp) as the dependent variable to approach system exploration.

Factors Affecting IS Use

A detailed literature review suggests a few factors that might affect IS exploration intention. A meta-analysis by Legris et al. (2003) suggests that the technology acceptance model (TAM) can account for a significant amount of variance in IS usage across various contexts and implementation stages. In addition to initial and continuous use, TAM has also been successfully applied for explaining alternative use behaviors that capture the number of applications used and tasks supported (Igbaria et al. 1997). Moreover, researchers have proposed alternative models based on TAM. Among these models, the revised TAM by Davis et al. (1989) is perhaps one of the most parsimonious versions. According to the revised TAM, perceived usefulness (PU), or the degree to which a user believes that using the IS would enhance his/her job performance, and perceived ease of use (PEOU), or the degree to which a user believes that using the IS would be free of effort, are the two primary cognitive beliefs that affect IS use intention. Since system exploration is also a type of usage behavior, following prior research in this stream, this study examines 'intention to explore' in the nomological network of the revised TAM.

Meanwhile, the motivation theory provides another perspective for explaining IS use in the organizational context (Davis et al. 1992). The motivation theory posits that extrinsic motivation and intrinsic motivation are the two focal factors that motivate people to engage in certain activities (Deci and Ryan 2002). Intrinsic motivation is the state wherein people perform an activity for nothing but the activity itself or the joy derived from the activity; while extrinsic motivation refers to the state wherein people complete tasks in order to gain benefits other than the activity, such as rewards, money, etc (Deci and Ryan 2002). In the context of IS, Moore (2002) suggested that motivation plays an important role in determining IS use, as well as the level of use. Drawing on the motivation theory, Davis et al. (1992) differentiate between extrinsic motivation and intrinsic motivation for ICT usage. Whereas extrinsic motivation refers to the utilitarian benefits derived from system usage (i.e., perceived usefulness)[2], intrinsic

[2] Davis (1989) defined perceived usefulness as the degree to which a person believes that using a particular system would enhance his/her job performance. The implicit assumption here is that usefulness serves as a synonym for better performance, which usually leads to "raises, promotions, bonuses, and other rewards" (Davis 1989, p. 320). Davis et al. (1992) later used the concept of Perceived Usefulness to capture individual extrinsic motivation for IS use.

motivation stands for the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any material returns anticipated (Davis et al. 1992). Compared with extrinsic motivation, intrinsic motivation is more effective and sustainable in arousing people's commitment to activities; as a result, intrinsic motivation in relation to extrinsic motivation often leads to better performance outcomes (Vallerand 1997). In this vein, system exploration, given its property of extra-role behavior, may be affected by intrinsic motivation for using the technology.

In addition to TAM and motivation factors, computer self-efficacy (CSE) is another critical factor in understanding technology acceptance (e.g., Taylor and Todd 1995; Compeau and Higgins 1995). Perceived computer self-efficacy refers to the belief in one's capabilities to use an information system (Taylor and Todd 1995). Empirical evidences suggest that computer self-efficacy can significantly affect perceived ease of use (e.g., Venkatesh 2000; Agarwal et al. 2000; Agarwal and Karahanna 2000) which may, in turn, impact IS exploration intention.

Transformational Leadership

As discussed earlier, transformational leaders are those who lead through social exchange (Bass and Riggio 2006). In theory, transformational leadership (TFLD) is characterized by four inter-related dimensions: idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Bass 1985). Idealized influence refers to transformational leaders' conveying a charismatic image with professional knowledge and outstanding performance. In addition, transformational leaders provide inspirational motivation by showing their enthusiasm toward work and by effectively articulating compelling visions and missions. Moreover, transformational leaders often challenge subordinates to find new ways to resolve problems. Last but not the least, transformational leaders provide humanized and personalized consideration to their followers.

Transformational leadership is perhaps one of the most powerful leadership styles. Extant studies have consistently shown positive effects of transformational leadership on employees' performance. Transformational leaders motivate employees by internalizing the organizational visions and values, aligning individual interests with those of the organizations, and even reflecting employees' needs towards a higher level of self-actualization (Bass 1998; Bass and Riggio 2006). The impact of TFLD on employee behaviors is believed to be mediated through factors like self-efficacy and intrinsic motivation. For instance, transformational leaders can enhance followers' task performance by bolstering their self-efficacy (Bono and Judge 2003). Transformational leaders can also promote followers' creativity and extra-role behaviors by cultivating their intrinsic motivation in job related activities (Shin and Zhou 2003; Piccolo and Colquitt 2006). As indicated by Bass (1985, 1998), the brilliance of transformational leadership, that differentiates it from transaction-based leadership, lies in that transformational leaders can stimulate followers' intrinsic insterests in tasks, thereby fostering creativity (also see Amabile 1988, 1997, 1998).

Transformational leadership can not only influence employees' general activities but also promote innovative and extra-role behaviors. In modern organizations, IS usage has become a critical and indispensable means to accomplish tasks and achieve organizational objectives. It is, therefore, reasonable to expect that transformational leadership can also impact employees' IS usage behaviors. Furthermore, complex information systems are typically adopted by the top management without much lower-level participation in the organizational decision-making process; employees are then mandated to use the systems (Jasperson et al. 2005; Kim et al. 2005). In such mandatory contexts, transformational leaders may play an even more important role for stimulating higher level usage. Transformational leaders can make the users' intention to explore more firmly connected with organizational values and goals; hence, followers become more determined and stick to exploration of their own choice. Towards this end, this paper proposes computer self-efficacy and intrinsic motivation toward using the implemented IS as the two core mechanisms through which transformational leadership takes effect. The following sections describe these mechanisms in detail.

Research Model and Hypotheses

The research focus of this study, i.e. individual users' intention to explore, rests on the theory of exploration. The revised TAM and motivation theory shed light on identification of factors that might affect users' exploration intention. Finally, transformational leadership is the focal theory that offers a novel perspective to the IS field to understand individual system exploration. A research model consisting of eight hypotheses is formulated as follows.

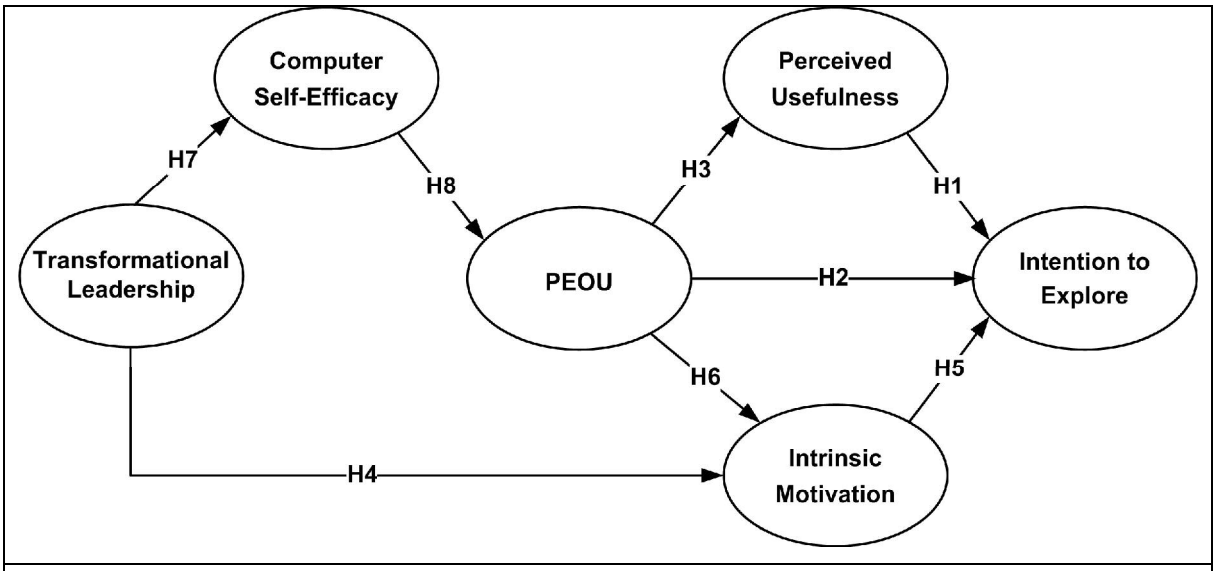

Figure 1. The Research Model

Research Hypotheses

According to the revised TAM (Davis et al. 1989), a person's intention to use a technology is basically determined by two factors, i.e. perceived usefulness (PU) and perceived ease of use (PEOU). While both PU and PEOU positively affect behavioral intention, PEOU also affects PU positively (Davis et al. 1989).

Prior research suggests that PU and PEOU can explain a variety of usage related variables, including intention to adopt (adoption), intention to use (use) (Szajna 1996), continuance intention (e.g., Hong et al. 2006), and the number of applications used and tasks supported (e.g., Igbaria et al. 1997). Indeed, given the limited resources of human beings, utilitarian outcome evaluation (PU) and effort estimation (PEOU) are logical assessments of individual decisions to engage in a specific behavior. If a user perceives using an IS as positively contributing to better job performance, s/he would be more likely to explore and learn new system uses. Meanwhile, since system exploration deals with the novel aspect of system application, it requires additional cognitive effort for coping with the complexity embedded in the system. A user-friendly system may require less cognitive effort for system exploration, thereby leading to higher intention to explore. The above discussions lead to the first three hypotheses:

H1: Perceived Usefulness will positively influence Intention to Explore

H2: Perceived Ease of Use will positively influence Intention to Explore

H3: Perceived Ease of Use will positively influence Perceived Usefulness

Transformational leadership is effective in promoting creativity among subordinates by fostering their intrinsic motivation towards the behavior of interest (e.g., Amabile 1996; Oldham and Cummings 1996; Shin and Zhou 2003). Transformational leaders can help followers internalize organizational values and goals; convinced employees are then more likely to personally identify with their organizations and be more intrinsically motivated (Shin and Zhou 2003; Piccolo and Colquitt 2006). Also, when a leader intellectually stimulates his/her followers, they are more inclined to pay attention to their intellectual curiosity and to be flexible with ideas and solutions (e.g., Avolio et al. 1999), thus being more immersed in their tasks, rather than external concerns (Shin and Zhou 2003). Similarly, leaders' personal understanding, support, and encouragement can also make subordinates less sensitive to extraneous worries and focus more on their core tasks. It is also suggested that transformational leaders' emphasis on intrinsic rewards "increases the chances that followers will attribute their behavior to internal self-related causes" (Shamir et al. 1993, p. 583), thereby adding to the followers' commitment to a course of action. Taken together, these unique characteristics of transformational leaders cultivate subordinates' intrinsic motivation towards their job-related activities.

In the context of IS, organizations implement complex information systems to achieve their objectives; and employees' system usage is critical and indispensable for attaining these objectives. Since transformational leadership converts followers' values in a way that the followers would internalize and align themselves with organizational goals, the followers would find their system usage to be congruent with their internalized values. As a result, employees will be more likely to find their system usage meaningful and, therefore, would be intrinsically motivated towards using the technologies. Furthermore, when leaders practice intellectual stimulation and personalized consideration, followers will be more inclined to focus on their job-related activities, including their system usage, and pay less attention to factors extrinsic to the activities. In other words, transformational leadership can foster subordinates' intrinsic motivation towards using the information systems.

H4: Transformational Leadership will positively influence subordinate users' Intrinsic Motivation towards using the IS

Intrinsic motivation is associated with several positive characteristics that can facilitate innovation and extra-role behaviors. According to the intrinsic motivation theory of creativity, heightened interest in an activity itself can motivate individuals to search for novel and superior ways of doing things (e.g., Amabile 1996). Similarly, intrinsically motivated employees tend to be more enduring and cognitively more flexible (McGraw and Fiala 1982; McGraw and McCullers 1979). They are more inclined to search for alternative solutions, to address issues in unconventional ways, and to be generally more persistent. These employees would, therefore, demonstrate a high level of creativity (Shin and Zhou 2003).

Meanwhile, it is suggested that intrinsic motivation can lead to extra-role behaviors. Piccolo and Colquitt (2006) argued that performing activities that surpass formal requirements helps satisfy individuals' higher-order needs and/or harmonize personal values and work behaviors. Since extra-role behaviors, relative to officially required activities, are less likely to be rewarded, they are most likely driven by intrinsic causes (Piccolo and Colquitt 2006). Viewed together, the above discussions suggest that employees' intrinsic motivation in their tasks can enable a higher level of creativity and facilitate extra-role behavior.

As discussed earlier, in the mandatory organizational context, exploratory system usage can be viewed as an extra-role behavior that goes beyond formal requirements and, at the same time, is innovative by nature. Consequently, employees who are intrinsically motivated to use the technology will be more willing to invest extra effort in exploring new ways of using it.

H5: Intrinsic Motivation towards using the IS will positively influence Intention to Explore

Davis et al. (1992) argued that PEOU is associated with individuals' perceptions of their self-efficacy, competence, and self-determination. In theory, these are factors that influence intrinsic motivation (Bandura 1982; Deci 1975). Empirical evidences reveal support for this association in both workplace and non-workplace settings (Davis et al. 1992; Van der Heijden 2004). Following this line of reasoning, this study proposes

H6: Perceived Ease of Use will influence Intrinsic Motivation towards using the IS

Self-efficacy in general refers to "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura 1986, p. 391). Empirical studies have proved that transformational leadership is an effective source for improving followers' self-efficacy. Shamir et al. (1993) suggested that charismatic leaders could enhance followers' self-efficacy by providing constructive evaluation feedback, expecting high performance standards, and conveying their confidence in followers' aptitudes and skills. Eden (1992) also supported the view that transformational leaders tend to have higher expectations and at the same time convince followers of their capabilities to achieve such expectations. When leaders show individualized consideration, they focus on developing followers' capabilities, providing information and resources, and granting discretion to followers (Avolio et al. 1999; Bass 1985). Consequently, followers may be encouraged to operate in a more independent manner and to develop their capacity to think on their own (Bono and Judge 2003). The above influences from transformational leaders are instrumental in increasing followers' self-efficacy in general.

Since IS usage represents a critical component of individuals' job-related activities in modern organizations, the positive effect of transformational leadership on followers' self-efficacy in general may be extended to followers' computer self-efficacy. When leaders pose their faith in their subordinates' overall capabilities, the subordinates may feel confident in their own abilities to perform their tasks, including their system usage. In addition, transformational leaders' high expectations and emphasis on developing competencies and independence can motivate subordinates to learn important skills (e.g., computer knowledge and techniques) that can enhance their capabilities. The resources and discretion offered by the leaders further facilitate the development of their computer competencies. The above influences from the transformational leaders may all contribute to the cultivation of employees' computer self-efficacy.

H7: Transformational Leadership will positively influence subordinate users' Computer Self-Efficacy

One's computer self-efficacy surrogates his/her internal control to use IS (Taylor and Todd 1995; Venkatesh 2000). It is suggested that one's experience, knowledge, and confidence in computer related capabilities will affect his/her evaluation about whether a technology is easy to use (Venkatesh 2000). Indeed, previous empirical studies have consistently supported the positive effect of computer self-efficacy on perceived ease of use (e.g., Agarwal and Karahanna 2000; Venkatesh 2000; Venkatesh and Davis 1996). Although not the focus of this study, this relationship is included for examination.

H8: Computer Self-Efficacy will positively influence Perceived Ease of Use

In conclusion, the proposed research model attempts to investigate individual intentions to explore IS from the perspective of transformational leadership. Contextualized for the IS context, intrinsic motivation and computer self-efficacy are proposed to be the primary mechanisms transmitting the impact of transformational leadership on individual system exploration intentions. PU and PEOU are also expected to be important determinants of users' intention to explore.

Research Method

This paper aims at investigating exploratory use of complex IS. Specifically, we examine how direct leaders' transformational leadership behaviors affect followers' intention to explore the mandated complex information systems. The target systems of this study are Customer Relationship Management (CRM) information systems. CRM IS can facilitate management of long-term customer relationships through establishment and application of huge customer databases (Kim et al. 2004), which mainly contain contact information, customer preferences, and historical service records. Compared with typical office systems like Windows, CRM IS has more specific features for such organizational activities as service delivery, customer support, decision-making, and so forth. The sophisticated design of CRM IS permits higher potential for system exploration. Since 1990s, CRM systems have been widely adopted by organizations to sharpen their competitive edge (Rigby and Ledingham 2004). Faced with the ever-increasing global competition, enterprises in China have started realizing the importance of CRM information systems. Trend-setting corporations in such industries as banking and telecommunications in China are among the first to implement CRM IS and have been investing significant amounts of resources in this type of technologies.

A survey instrument was developed to collect the quantitative data needed for model and hypothesis testing. A pilot test was conducted first, before the formal data collection. The source of data is one of the largest telecom service companies in China. Service employees in the company were mandated to use the implemented CRM IS to meet organizational and management requirements (McCalla et al 2003), but not mandated to find new ways of use. Twenty employees from the sampled firm were invited to fill in the questionnaire. The data of the pilot test reported good psychometric properties for all constructs. Next, a total of 380 copies of questionnaires were officially administered to employee users of CRM IS in the same company. 346 subjects responded, yielding a high response rate of 91.05%. The demographic information of the respondents is presented in Table 1.

Table 1. Sample Demographics

Category		Number of Respondents	Percentage (%)
AGE	19-25	271	78.3
	26-30	61	17.6
	31-35	12	3.5
	36-40	1	0.3
	41 or above	1	0.3
	TOTAL	346	100.0
EDUCATION	Senior High School	61	17.6
	College	231	66.8
	Bachelor's Degree or above	54	15.6
	TOTAL	346	100.0
GENDER	Female	263	76.0
	Male	83	24.0
	TOTAL	346	100.0

Measures

The theorized model (see Figure 1) consists of six constructs. All constructs in this study were operationalized with multi-item scales. These measures were adapted from established scales with minor modifications tailored for the context of investigation. A seven-point Likert scale was employed for every item in the questionnaire, ranging from '1 = strongly disagree' to '7 = strongly agree'. Three items for intention to explore (IExp) were adapted from Karahanna and Agarwal's (2006), Ahuja and Thatcher (2005), and Nambisan et al. (19999). Scales for perceived usefulness, perceived ease of use, and intrinsic motivation were all drawn from Davis (1989) and Davis et al. (1992). Three items for computer self-efficacy were adapted from Compeau and Higgins (1995) and Taylor and Todd (1995). Lastly, twenty items of Multifactor Leadership Questionnaire (Form 5X) (Bass 2000) were used to measure

the four dimensions of transformational leadership: idealized influence (eight items), inspirational influence (four items), intellectual stimulation (four items), and individualized consideration (four items). Sample items include "s/he instills pride in being associated with him/her" (idealized influence), "s/he talks optimistically about the future" (inspirational motivation), "s/he reexamines critical assumptions to question whether they are appropriate" (intellectual stimulation), and "s/he individualizes attention" (individualized consideration). Following Piccolo and Colquitt (2006), leadership items were framed to inquire individuals' perceptions about their immediate leaders. To control for the threat of common method bias, the instrument was carefully designed to counterbalance the order of items of the predictor and criterion variables (Podsakoff 2003).

Data Analyses and Results

Structural Equation Modeling (SEM) was applied for data analysis using AMOS 6.0. Before testing the structural model (see Figure 2), Confirmatory Factor Analysis (CFA) was performed in order to assess the psychometric properties of the six latent constructs. In addition to the theorized research model, an alternative model was also examined, *post hoc*, to further examine the effect of transformational leadership in the context of investigation. Age, educational level, gender, and prior usage time were operationalized as control variables.

Measurement Model

Following the common practice in extant leadership studies (e.g., Bono and Judge 2003; Piccolo and Colquitt 2006), the measurement model of the four sub-dimensions of TFLD was first examined, which resulted in no major problem; a single factor based on unit means of indicators was next calculated for each dimension of TFLD; and the four factors were then used to model TFLD reflectively in the subsequent analyses. The final measurement model consisting of six latent constructs revealed a good fit (see Table 5). The descriptive statistics are given in Table 2.

Cronbach's alpha, composite reliability, and average variance extracted (AVE) of each construct were also evaluated (Fornell and Larcker 1981). As can be seen in Table 3, the values of Cronbach's alpha and composite reliabilities are all higher than the recommended 0.707 (Nunnally 1994); and values of AVE are all above 0.50 (Fornell and Larcker 1981). Next, discriminant validity was supported because the value of AVE of a construct should be higher than its squared correlations with other constructs (see Table 4). The above results collectively suggest good measurement properties.

Table 2. Descriptive Statistics

Constructs	Mean	S.D.
Transformational Leadership (TFLD)	4.676	0.860
Self-efficacy (SE)	4.604	0.877
Perceived Ease of Use (PEOU)	4.559	0.875
Perceived Usefulness (PU)	4.605	0.978
Intrinsic Motivation (IM)	3.955	1.101
Intention to Explore (IExp)	5.116	0.988

Table 3. Internal Consistency and Convergent Validity

Dimensions	Number of Items	Cronbach's Alpha	Composite Factor Reliability (> 0.707)	Average Variance Extracted (AVE) (> 0.5)
TFLD	4	0.876	0.890	0.678
SE	3	0.773	0.790	0.563
PEOU	4	0.782	0.762	0.516
PU	4	0.886	0.877	0.706
IM	3	0.921	0.920	0.795
IExp	3	0.865	0.873	0.699

Table 4. AVE and Squared Correlation

	TFLD	SE	PEOU	PU	IM	IExp
TFLD	***0.678***					
SE	0.072	***0.563***				
PEOU	0.028	0.338	***0.516***			
PU	0.033	0.118	0.345	***0.706***		
IM	0.087	0.026	0.125	0.139	***0.795***	
IExp	0.068	0.041	0.046	0.062	0.099	***0.699***

Notes: The diagonal elements are the AVEs; the off-diagonal elements are the squared correlations. Discriminant validity is supported when all diagonal elements are larger than the corresponding off-diagonal elements.

Table 5. Goodness of Fit

Index	Measurement Model	Theorized Model	Full Model	Desired Levels
SRMR	0.041	0.067	0.057	< 0.08
χ^2/df	1.544	1.695	1.662	< 3.0
GFI	0.941	0.917	0.919	> 0.9
AGFI	0.918	0.892	0.893	> 0.8
CFI	0.980	0.962	0.964	> 0.95
RMSEA	0.040	0.045	0.044	< 0.06

Common Method Bias: Since all data were obtained from end-users through a single survey study, it is necessary to control the threat of common method bias. In addition to the aforementioned procedure of counterbalancing the order of measurement items of predictors and criterion variables, the Harmon one-factor test recommended by Podsakoff and Organ (1986) was also performed. A factor analysis combining all latent constructs revealed no sign of a single-factor accounting for the majority of covariance. Furthermore, results of the structural models (see Figures 2 and 3) demonstrated different levels of significance for path coefficients. The above evidence collectively suggests that common method bias is not a significant issue in this study.

Structural Models

The Theorized Model

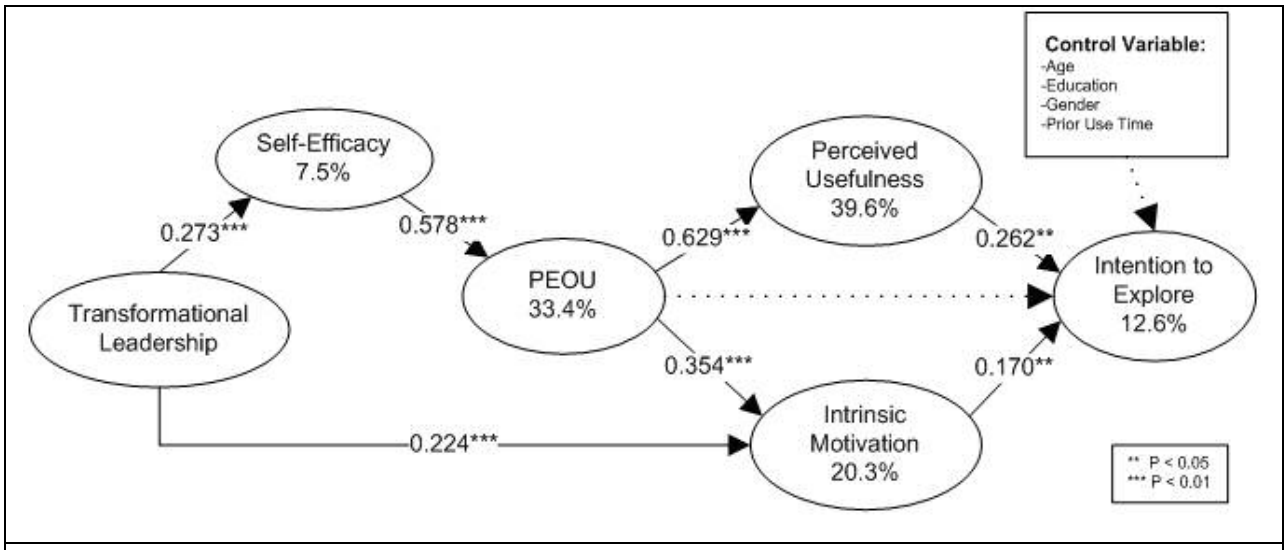

Figure 2. The Theorized Model

The structural model was evaluated after the establishment of the measurement model. The fit indices of the theorized model provide evidence of adequate model fit (see Table 5). As can be seen in Figure 2, intrinsic motivation and perceived usefulness together explained 12.6% of the variance in 'intention to explore'. Consistent with TAM, perceived ease of use predicted perceived usefulness. As hypothesized, transformational leadership accounted for 7.5% of the variance in individual users' computer self-efficacy which, in turn, influenced perceived ease of use. Also, in line with the hypothesis, transformational leadership and perceived ease of use both affected intrinsic motivation, explaining 20.3% of its variance.

In short, seven of the eight hypotheses were supported, except the path from perceived ease of use to intention to explore. Such insignificant relationship is not uncommon in IS acceptance research. Prior studies have found that PEOU exerts little behavioral impact among users who had direct experience of operating the technology (e.g., Davis 1989; Szajna 1996; Gefen and Keil 1998). Users' direct experience represents a learning process through which they become more knowledgeable and familiar with the technology (Saga and Zmud 1994). As a result, PEOU has little direct impact and only affects usage behaviors indirectly, through other variables like perceived usefulness (e.g., Davis 1989; Szajna 1996). The subjects in this study were users who had hands-on experience in operating the system. Such personal experience might render this relationship from PEOU to intention to explore insignificant.

The Full Model

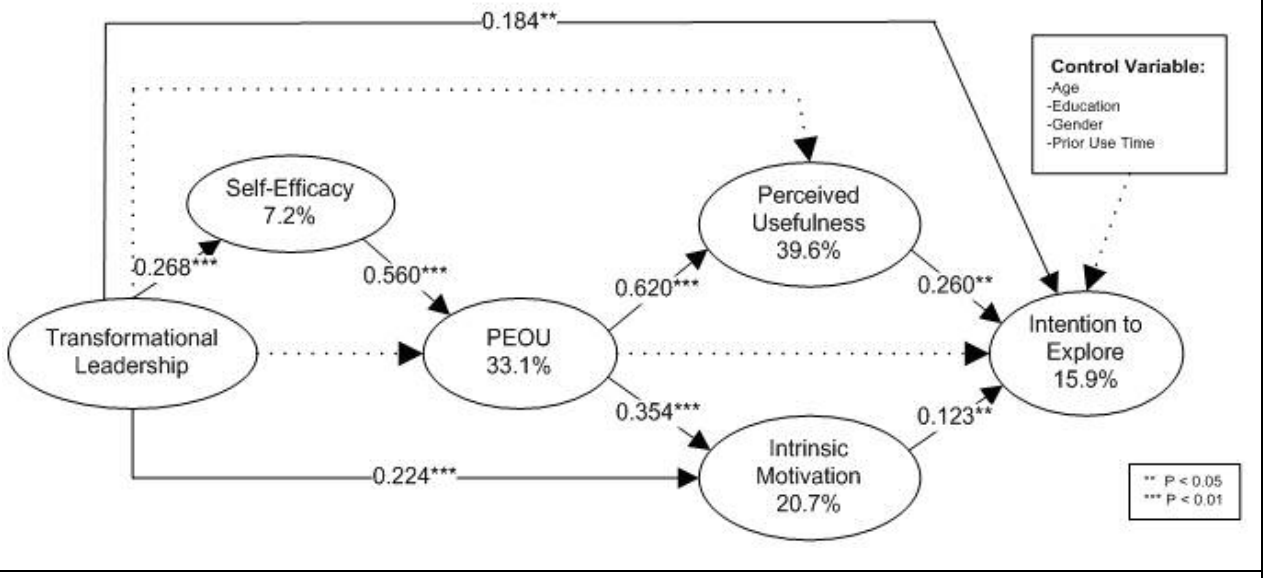

Figure 3. The Full Model

To further investigate the effect of transformational leadership' in the IS context, a *post hoc* analysis was conducted to evaluate a full model. Three additional paths from transformational leadership to perceived ease of use, perceived usefulness, and intention to explore were added to the theorized model. This full model demonstrates good model fit (see Table 5). The results in Figure 3 reveal a significant influence from transformational leadership to intention to explore. The addition of this path increased the explained variance in intention to explore by 26% (i.e. R^2 increased from 12.6% to 15.9%). This suggests that beyond its indirect impact via self-efficacy and intrinsic motivation, transformational leadership also influenced intention to explore directly.

On the other hand, transformational leadership showed no impact on either PU or PEOU. Theoretically speaking, transformational leadership transforms subordinates' values so that they internalize and align themselves with organizational values and goals. In other words, transformational leadership functions largely on emotional and value appeals (Faraj and Sambamurthy 2006). In the context of information systems, PEOU relates to the technological design of a system, whereas PU is regarded as a type of extrinsic motivation that aims for higher productivity and better performance through IS use (Davis et al. 1992). Neither PU nor PEOU resorts to personal emotion or value. It is therefore not surprising that transformational leadership did not influence PU and PEOU directly.

In sum, the proposed research model successfully explained individual employees' intention to explore. The theorized model and the full model respectively accounted for 12.6% and 15.9% of variance in intention to explore, representing a medium effect size (Cohen 1988). Both intrinsic and extrinsic motivations of users drove their exploratory intentions. Furthermore, transformational leadership had both direct and indirect effects on subordinates' intention to explore. The indirect effect was channeled via such psychological factors as computer self-efficacy and intrinsic motivation towards using the IS.

Limitations

As with all empirical research, this investigation has several limitations. Firstly, the cross-sectional design of this research captures only a snapshot of the phenomenon. Such a design is limited in inferring the causal relationships between variables. For example, in contrast to our hypothesis that perceived ease of use leads to intrinsic motivation,

Venkatesh (2000) found the perceived ease of use was actually caused by intrinsic motivation. Although our reliance on theory for causal inferences is an acceptable approach in social science in general, a longitudinal study tracing transformational leadership's impact on system exploration will certainly offer richer insights.

It is also noteworthy that female employees accounted for more than three quarters of the total sample (see Table 1), which is similar to the composition of the service personnel in the investigated company. While the effect of gender in IS research is known (e.g., Venkatesh and Morris 2000), gender was treated as a control variable and had no salient influence on the dependent variable.

Next, the study was conducted in a large company operating nation-wide in the telecom service industry in China. While the research is controlled by collecting data from a single site, caution should be exercised when generalizing the results to other industrial and cultural contexts.

Although we have tried to control the common method bias, the common source problem in this study deserves equal attention. Future studies may consider collecting data from multiple sources (e.g., leaders as well as employees). Meanwhile, collecting qualitative data by conducting in-depth interviews with leaders would permit triangulation between different data sources and formats, leading to further insights.

Finally, our focus on the mechanisms (i.e., computer self-efficacy and intrinsic motivation) through which transformational leadership affects system exploration may have sacrificed the parsimony of the research model. However, as noted by Bass (1995, p. 475), more studies are needed to examine the "many networks of linkages proposed to explain how transformational leadership works." Pillai et al. (1999) responded to this call by testing the role of trust and justice in mediating the impact of transformational leadership on followers' citizenship behaviors. Following this line of reasoning, this study does not simply test the "whether or not" questions but goes deeper to answer the "how and why" questions.

Implications

Implications for Theory

This paper contributes to the IS field in three main aspects. To begin with, this is one of the first studies that formally introduces and examines the effects of the transformational leadership theory (Bass 1985) to and in the IS field. As mentioned earlier, extant IS research has tended to study management related constructs like management support (e.g., Igbaria et al. 1997; Shama and Yetton 2003), top management support (e.g., Guimaraes et al. 1992; Yap et al. 1992), organizational support (e.g., Igbaria 1990; Igbaria et al. 1996), or top/senior management involvement and participation (e.g., Armstrong and Sambamurthy 1999; DeLone 1988). While these factors focus mainly on the managerial functions of top management teams or organizational management in general, little is known about the effect of immediate leaders of the employees. Towards this end, this paper bridges this knowledge gap by specifically looking into the impact of direct leaders on subordinates' IS innovative behaviors. Researchers interested in this area can look into other related leadership theories, such as charismatic leadership (House 1977; House et al. 1991; Howell and Frost 1989), transactional leadership (Bass 1985; Burns 1978), and empowering leadership (Arnold et al. 2000). Future studies may examine these leadership theories across various IS settings.

Also, prior IS studies focus primarily on the management functions of IS leaders. Indeed, the situation faced by IS leaders are unique in that they need not only to possess good management skills to make sound decisions and deploy IS strategies, but also to master professional knowledge and have an in-depth understanding of information technologies (Karahanna and Watson 2006). Yet, only a handful of studies pay specific attention to the influence of leadership styles (e.g., Faraj and Sambamurthy 2006; Ke and Wei 2005). The empirical findings of this study demonstrate that transformational leadership's value appeal, emotional support, and encouragement indeed contribute, directly and indirectly, to IS users' exploration intentions. The observed effects of transformational leadership warrant elaboration and further examination as they represent promising avenues for insights into IS innovation in organizations.

This study also enriches the understanding of individual system exploration. Consistent with findings in most technology acceptance studies in organizational contexts, utilitarian evaluation (i.e. PU) promotes users' exploratory intentions. Moreover, users under the influence of transformational leadership are more intrinsically motivated and have higher confidence in their abilities to use the implemented systems, thereby increasing their intention to explore. Prior leadership studies suggest that in addition to self-efficacy and intrinsic motivation, transformational leadership also affects subordinates' behaviors through other mechanisms. For example, transformational leaders

can nurture subordinates' organizational citizenship behavior (OCB) by enhancing the quality of Leader-Member-Exchange (LMX) (Wang et al. 2005) or cultivating subordinates' trust in leaders (Podsakoff et al. 1990). To advance the understanding of the role of transformational leadership, interested researchers should further examine the effects of these factors in the IS context.

Finally, the mandatory usage setting of this study is an interesting context that deserves more scholarly attention. The majority of existing IS studies were conducted in settings where users had voluntary control over their usage behavior (e.g. Agarwal and Karahanna 2000; Davis et al. 1992; Davis et al. 1989; Karahanna and Agarwal 2006); whereas a relatively smaller number of studies were carried out in mandatory contexts, in which routine use was expected by organizations (e.g., Wang and Hsieh 2006). Some have claimed that system usage in mandatory contexts would be less interesting because of limited variance (Seddon 1997). However, the sophisticated design of complex IS allows users to utilize the systems at different levels (Moore 2002). Under this situation, individual users may have volitional control over higher level usage behaviors like exploratory use (Silver 1990; 1991). In this vein, factors such as transformational leadership that can motivate employees to excel in their task performance may offer valuable insights into higher level usage behaviors other than simple and routine use, particularly in mandated organizational contexts.

Implications for Practice

While prior studies have pointed out the importance of top management and organizational support for the success of IS implementation (e.g., Sharma and Yetton 2003; Igbaria et al. 1997), findings in the paper dwells upon the value of influence of direct leaders on followers' system exploration intentions. Therefore, to drive employees' IS behaviors that are innovative, require extra-effort, and go beyond regular organizational expectations, firms should recruit, select, and promote leaders with more transformational potential.

In addition, the plausible argument that end-user acceptance can lead to IS success has led to much management attention on providing employee training programs and improving technical and functional design of information technologies. While end-user training and user-friendly design are certainly instrumental in facilitating IS implementation, it is perhaps equally important to formulate leadership development programs that foster transformational leadership. In this vein, managers can learn to utilize the special charisma of "transformational language, imagery, and symbols" (Piccolo and Colquitt 2006, p. 337) to stimulate IS users' exploration behavior.

Conclusions

Complex information systems are of vital importance for modern organizations to create and sustain competitive advantages. However, underutilization of complex IS prevents organizations from achieving the systems' fullest potential and earning the intended return on investment. The present study addresses this problem by investing employees' intention to explore complex IS through the perspectives of exploration, transformational leadership, motivation, and technology acceptance. The results suggest that individuals' intention to explore is motivated by both intrinsic and extrinsic reasons. More importantly, transformational leaders' idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration affect users' system exploration intentions directly, as well as indirectly through computer self-efficacy and intrinsic motivation to use the implemented systems. This study synthesizes current knowledge in transformational leadership and IS innovation, bridges the gap between two streams of research, and offers insights into the leverage points for fostering exploratory IS usage. The findings warrant further research on leadership in the IS field.

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