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ERP Implementation: A Technological Diffusion and Knowledge Transfer Perspective

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Abstract

As a recent IT innovation, Enterprise Resource Planning (ERP) system has become strategically important to organizations. Yet ERP is difficult to implement, high failure rate has been reported. Researchers and practitioners have pointed out that ignorance of knowledge transfer from consultancy to client was the reason for poor ERP implementation experience considering ERP's complexity and high knowledge barrier on adopters. Although IT implementation and Innovation diffusion research has identified and empirically investigated various implementation success factors, few studies have empirically examined influential factors from knowledge transfer perspective.
In this study, a model of ERP success antecedents is developed from the knowledge transfer, IT implementation, and innovation diffusion literatures. The purpose of this study is to investigate how the knowledge transfer related factors, together with well-established influential factors in both IT implementation and innovation literature, predict and explain the success of ERP implementation, which is complex and impose high knowledge barrier. A cross-sectional survey is being conducted in China to empirically examine this model.

Keywords: ERP Implementation, Knowledge Transfer, China

1. Introduction

A recent IT innovation which enhances organizational performance through providing end-to-end connectivity is Enterprise Resource Planning System (ERP). It is defined as "customizable integrated application software that supports the core business processes and the main administrative areas of enterprise in different industries" (Rosemann, 1999).
With the promise of a variety of spectacular business benefits, the rate of diffusion and implementation of ERP systems has been extremely rapid over the last few years (Bancroft et al.1998). Davenport (1998) hailed ERP as "the most important development in the corporate use of IT in the 1990's". The global market for ERP software is expected to grow to US $ 66 billion by 2003 (AMR Research 1999). Since the early 1990s, ERP systems have become the de facto standard for the replacement of legacy systems in large and MNC (Holland and Light 1999).
However, ERP system is large and complex, and its implementation is an extensive, lengthy and costly process, typically measured in millions of dollars (Pan et al. 2001). Moreover, it was reported that three quarters of the ERP projects were judged to be unsuccessful by the ERP implementing companies (Griffith and Zammuto 1999).
Therefore, how to better implement and diffuse ERP successfully have been the focal interests of many researchers and practitioners. Two streams of research – IT implementation and innovation diffusion have provided insights on this question, and numerous success factors have been identified (For a summary of success antecedents, see Larsen 2003). However, researchers in both streams have pointed out the exceptional knowledge barrier in

the implementation of new, complex technology innovation (such as ERP), and called for examining technology innovation implementation from the knowledge perspective (e.g. Fichman 2000; Pan et al 2001; Robey et. al 2002). Few studies have empirically investigated ERP success factors from this knowledge perspective.

In this study, we extended current research on ERP by viewing ERP as "a special class of technological innovation which impose an exceptional knowledge burden on would-be adopters" (Attewell 1992). An integrative model was derived from three related research stream -- IT implementation (Larsen 2003), innovation diffusion (Rogers 1995), and Knowledge transfer (Argote 1999). The objective of this study is to investigate the conditions under which ERP can be implemented successfully even facing high knowledge barrier. A cross-sectional survey study is currently being conducted in China to empirically test this model.

2. Literature Review

The three major areas of research that provide the necessary theoretical foundations for this study are IT implementation, innovation diffusion and knowledge transfer. Each of these literatures is briefly discussed in the following sections.

2.1 IT Implementation Perspective

Research on IS success antecedents has progressed enormously in terms of examining different antecedents of IS success (Larsen 2003). Specifically, success factors on ERP implementation have also been widely researched in IS success literature. (For a comprehensive list of CSFs, see Somers and Nelson 2001). Some generic critical factors in IT implementation, such as top management support, champion, project management, training, have also been found important in ERP implementation context. However, due to the unique nature of ERP, ERP implementation differs from traditional system in scale, scope, complexity, organizational changes, project costs, and need for BPR. Researchers have identified some ERP-specific factors, such as software configuration, BPR, understanding corporate cultural change (Bancroft et al., 1998; Davenport 2000; Sumner 2000). However, Research on this stream has been criticized as descriptive, low generalizability (Robey et al. 2002), and limited perspective and progress (Kwon and Zmud 1987). Researchers had called to broaden IT implementation research by borrowing from innovation adoption and diffusion research.

2.2 Innovation Diffusion Perspective

Studies in innovation diffusion have been mostly based on DOI (Diffusion of Innovation) theory (Rogers 1995). Characteristics of Innovation, individual, organization, and environment have been identified and investigated as influential factors. Various innovation process stages have also been proposed and investigated (For thorough review, see Tornatzky and Klein 1982; Fichman 1992; Wolfe 1994; Gallivan 2001; Fichman 2000). Kwon and Zmud (1987) first linked innovation diffusion perspective and IT implementation perspective together by proposing the technological innovation perspective. IT implementation is defined as organizational effort to diffuse an appropriate information technology within a user community (Kwon and Zmud 1987). Kwon and Zmud (1987) further pointed out the functional parallels between IS implementation and technological diffusion research, and the reasons for IS researchers to borrow from innovation perspective: 1) it offers a way to break the mental set of the existing model, 2) it already has in place many essential concepts, and 3) the theoretical and methodological issues are already identified. Taking this perspective, Cooper and Zmud (1990) empirically examined the implementation of MRP system;

Premkumar et al. (1994) examined the EDI implementation; Lai (1997) examined the ISDN implementation; Cho and Kim (2002) examined OOPL assimilation.
However, innovation studies have been characterized as "inconclusive, inconsistent, low levels of explanation" (Wolfe 1994). Researchers suggested that the challenge rests in the complex, context-sensitive, nature of innovation phenomenon itself. They argued that there is no one theory of innovation, and different theories apply under different conditions. Fichman (2000) called for developing theories of middle range – theories tailored to specific classes of technologies and/or particular adoption contexts. In addition, researchers also pointed out that traditional innovation models are only well-suited to a particular range of adoption scenarios and technology types, i.e., voluntary, individual, simple technology use, but are not suitable for complex technology which are mandated to use, have strong interdependencies across multiple adopters, and impose high knowledge burden (Fichman 1992; Fichman 2000). Fichman (1992) called for integrating traditional models with new metaphors and theories, such as learning.

2.3 Knowledge Transfer Perspective

As requested by Fichman (1992), researchers in innovation research have also sought to incorporate knowledge perspective into their studies to develop innovation diffusion models for complex technology innovation, which impose high knowledge burden on adopters. Attewell's (1992) work provides a re-conceptualization of diffusion theory for what he calls "complex organizational technology". Attewell argues that acquiring technical knowledge and know-how is far more important in diffusion of complex technology than does signaling, and should move to center stage in any theory of complex technology diffusion (Attewell 1992). Fichman (1997) followed this line of research by empirically investigating the influence of three learning related organizational factors – learning related scale, prior related knowledge, diversity. However, Fichman (1997)'s study only examined factors relevant to the knowledge recipient's learning capability, left out other factors which have been shown are important to Knowledge transfer outcome in the knowledge transfer literature (e.g. Argote 1999).
Argote (1999; 2003) synthesized this broad literature and classified these knowledge transfer influential factors into 3 categories: 1) properties of units (e.g., an individual, a group, or an organization) such as source credibility (Perloff, 1993), absorptive capacity (Cohen and Levinthal, 1990); 2) properties of the relationships between units such as relationship quality (Szulanski 1996); 3) properties of the knowledge itself such as knowledge codifiability (Zander and Kogut 1995).
In the context of ERP implementation, organization needs a wide range of knowledge and skills to implement such complex, comprehensive system (Chan 1999). However, organizations usually lack the requisite knowledge and skills, and often have to rely on outside expertise, or consultants to implement ERP. Moreover, to effectively use and manage ERP even after consultants withdraw from the implementation effort, the client organization must request consultants to transfer requisite ERP knowledge to them. Without this requisite ERP knowledge, organization employees will not likely be able to effectively and correctly use and manage ERP, they will not be satisfactory with the system, and the organization will not likely realize the potential benefits from ERP implementation. Davenport (2000) pointed out that client organizations often experience poor ERP implementation because of their ignorance on ERP knowledge management issues, such as requesting (contracting for) knowledge transfers from consultants. Bancroft et al., (1998) suggested the effective transfer of knowledge from the consultants to the clients is critical to the success of ERP implementation effort.

However, knowledge transfer from a consultant to a client organization in the context of ERP is especially difficult due to the embeddedness of knowledge (Pan et al. 2000), complexity of the system, and the "severe knowledge gap" (consultants lack of in-house knowledge, and business clients lack of ERP package knowledge) (Soh et al. 2000). So understanding ERP implementation from this knowledge transfer perspective is increasingly important for both researchers and practitioners.

In this study, knowledge transfer is defined as the communication of knowledge from a source that is learned, understood, and applied by a recipient (Argote, 1999; Szulanski, 1996). The recipient is a business client who adopted ERP, and the source is the client's implementation partner (consultant or ERP vendor). The implementation partner brings two types of ERP knowledge to its client: business knowledge (such as the knowledge of procurement process in ERP) and technical knowledge (how to configure the system to align with client's business) (Brancroft et al., 1998; Lozinsky, 1998). The client then learned, understood and applied this knowledge.

Several studies on ERP implementation have been done from this knowledge transfer perspective. Lee and Lee (2000) first examined an ERP implementation case from knowledge transfer perspective. Robey et al. (2002) identified two types of knowledge barriers: configuration of ERP package and assimilation of new work processes, and suggested several ways to overcome them. Based on Szulanski (1996)'s Transfer model, Timbrell et al. (2001) investigated the impediments to knowledge transfer in the context of ERP implementation. However, none of these studies provided a comprehensive, generalizable ERP implementation model from the knowledge transfer perspective.

Hence, in view of the gaps in current research, we developed an integrative research model on ERP implementation by taking an innovation diffusion and knowledge transfer perspective.

3. Research Model

The research model consists of three sets of variables: organization characteristics, innovation characteristics and knowledge transfer related factors. DOI theory states that organization's innovation and organizational characteristics and the environment in which it operates can influence the diffusion and success of IT initiatives (Fichman, 2000; Rogers, 1995). We exclude the environment domain, which has previously been investigated in innovation literature but applied mostly to the stages of initiation and adoption, since we are interested in implementation stage. For organization and innovation domains, we only include well-established factors which have been found consistently significant in past IT implementation and innovation diffusion research. Factors which are specific to ERP are also examined and incorporated into our model. Finally, considering the "knowledge-intensive" characteristics of ERP implementation, we also incorporate knowledge transfer factors from KT literature, which we propose will influence the outcome of ERP implementation. The research model is illustrated in figure 1.

In the following sections, we will present our model in terms of dependent variables, independent variables, and control variables. Hypothesis is also made for each influential variable.

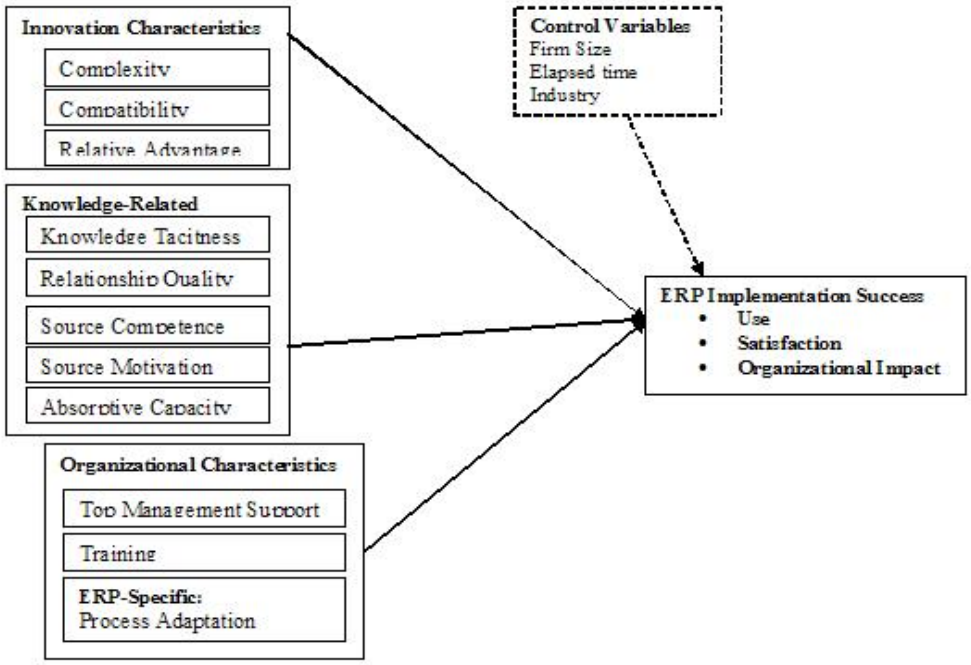

Fig1. Research Model

3.1 Dependent Variable

According to Thompson (1967), there are three stages for innovation process: initiation, adoption, and implementation. Initiation is the scanning of opportunities and IT solutions when the organization feels the pressure to change. Adoption is the decision to commit resources to acquisition of the innovation. Implementation is the development, installation, usage, and maintenance of the innovation to increase organizational effectiveness. In this study, we will focus on implementation stage, in which knowledge factors become more salient than the initiation and adoption stage.

Research in innovation diffusion has tended to use extent of diffusion (e.g., Mcgrowan and Madey 1998) or assimilation stage achieved (e.g., Fichman 1997) as dependent variable (see Fichman 2000 for a summary). However, mere measurement of diffusion may not be sufficient indicators of success until all the parties involved were satisfied with its implementation and use (Prekumar et al. 1994). The Delone and Mclean (1992)'s IS success model provide a comprehensive framework to capture the different aspects of implementation success.

According to this model, there are six dimensions: system quality, information quality, use, user satisfaction, individual impact and organizational impact (Delone and Mclean 1992). Our study is less interested in the system per se, more focus on use and influence of system. Hence, we adopt three dimensions which capture the influence of system from organizational level: use, user satisfaction, and organizational impact.

3.2 Independent Variable

3.2.1 Innovation Characteristics

Although some variance exists in the literature, three innovation attributes have been consistently found to be significant -- relative advantage, compatibility, and complexity

(Tornatzky and Klein 1982). We incorporate these three generic, classical factors into our model.

Relative advantage Relative advantage refers to the degree to which an innovation is perceived to be superior to its precursor (Rogers, 1995; Premkumar et al. 1994). It has been studied in various technology innovation, e.g. OOPL (Cho and Kim 2002), EDI (Premkumar et al. 1994), ISDN (Lai 1997), etc. Research in ERP indicates that adoption of ERP can not only bring technical benefits (such as solve Y2K, reduce software maintenance, etc.) but also business benefits (such as reduce inventory carrying costs and stockouts, etc) (Markus and Tanis 2000b). It is logical to expect that those organizations that perceive significant benefits from ERP are more likely to vigorously adopt and diffuse ERP system in their organization, and realize greater satisfaction and success in implementation. Hence, we posit:

H1: The perceived degree of relative advantage of ERP system will have a positive relationship with ERP implementation success.

Compatibility Compatibility refers to the degree to which an innovation is consistent with the existing values, experiences, and needs of the adopters (Cooper and Zmud 1990). Lack of compatibility of an innovation discourages its adoption and leads to greater difficulty in its subsequent assimilation or use within the adopting unit (Rogers 1995). One of the problems associated with implementing packaged software is the incompatibility of features with the organization's information needs and business processes (Janson and Subramanian 1996). Compatibility has been cited as one of major success factors for ERP implementation (Cooper and Zmud 1990; Hong and Kim 2002; Bradford and Florin 2003). If ERP system is perceived to be compatible with present work practices, existing systems, and value systems of the potential adopters, it's more likely ERP will be successfully implemented. We hypothesized:

H2: The perceived degree of compatibility of ERP systems will have a positive relationship with ERP implementation success.

Complexity Complexity refers to the degree to which an innovation is perceived as being difficult to understand and use (Tornatzky and Klein 1982). Complexity has been usually observed to discourage its adoption and lead to greater difficulty in its implementation and further diffusion (Cooper and Zmud 1990; Tornatzky and Klein 1982). ERP has been notorious for its complexity. For example, SAP R/3 has more than 3000 configuration tables. Dell Computer spent more than a year on only going through these tables (Davenport 1998). Difficulties in understanding and applying the new technology may result in slower recognition of its value, fear of failure, and resistance, thereby inhibiting the extent of implementation success. Hence, we hypothesized:

H3: The perceived degree of complexity of ERP systems will have a negative relationship with ERP implementation success.

3.2.2 Organizational Characteristics

Among the numerous organizational characteristics, Top mgmt support and Training has almost always emerged as key variables in the past research on both IS implementation and innovation diffusion literature. We included these two well-established variables into our model.

Top Management Support The innovation and IS implementation literature has consistently regarded top management support as an important factor in bringing about the changes required during the adoption and diffusion of an innovation (Prescott and Conger, 1995; Somers and Nelson 2001). The top management can help developing an understanding of the capabilities and limitations of IT, establishing reasonable goals for IT systems, exhibiting strong commitment to the successful introduction of IT, and communicating the corporate IT strategy to all employees (Merkise and Walton 1991). The active involvement, vision, and

direction of high-level executives provide the impetus needed to sustain the implementations of ERP (O'Leary, 2000). In addition, users tend to conform to the expectations of management, and they are more likely to accept a system that they perceive to be backed by the management of their organization. (Karahanna et al.1999). Therefore, we hypothesized:
H4: The degree of top management support of ERP implementation will have a positive relationship with ERP implementation success.
Training Training has been found positively correlated with adoption, diffusion and implementation of complex information technology, which impose high learning barrier, such as EDI (Mcgrowan and Madey 1998), OOPL (Cho and Kim 2002), and ERP (Bradford and Florin 2003). Lack of user training and failure to completely understand how enterprise applications change business processes frequently appear to be responsible for problem ERP implementations and failures (Crowley 1999). Hence, we hypothesized:
H5: Training on ERP will have a positive relationship with ERP implementation success.
Process Adaptation One of the characteristics that distinguish ERP from other system is that it is "package" software built around "best practices" to support many organizations in specific industries. This often leads to misfit between the ERP and the way a particular organization does business (Markus and Tanis 2000). In such cases, either the package is customized to better fit a company's needs or the company must change its business processes to conform to the package (Jenson and Johnson, 1999). There is consensus among experts that adopting organizations must commit themselves to some degree of BPR instead of customizing the software. Also, customization of the software is believed to result in higher implementation costs and longer implementations (Bingi et al., 1999; Davenport 1998). It has been found that appropriate process adaptation can improve the fit between the ERP and adopters, and increase the chance of implementation success (Bradford and Florin 2003; Hong and Kim 2002). However, with the degree of process adaptation increase, more changes has to be made to the organization, more efforts and resources are required, and more resistance and difficulties will be encountered. So we hypothesized:
H6: The degree of process adaptation to best practices of an ERP system will have a negative relationship with ERP implementation success.

3.2.3 Knowledge-Transfer Related Factors

As we discussed earlier in the literature review section, Argote (1999, 2003) synthesized knowledge transfer influential factors into 3 categories: 1) properties of units such as source credibility (Perloff, 1993) and absorptive capacity (Cohen and Levinthal, 1990); 2) properties of the relationships between units such as relationship quality (Szulanski 1996); and 3) properties of knowledge itself such as knowledge codifiability (Zander and Kogut 1995). We incorporate representative factors in each category into our model in the context of ERP implementation.
Knowledge Tacitness Tacit knowledge which can not be easily communicated and shared is highly personal, deeply rooted in action and in an individual's involvement with a specific context (Nonaka, 1994). Research has found tacit knowledge or knowledge that is not well understood is more difficult to transfer than explicit knowledge. Reed and DeFillippi (1990) define tacitness as the implicit and non-codifiable accumulations of skills that results from learning by doing, and found that tacitness increase the ambiguity of knowledge, thus affecting the knowledge transferability. In their study of factors affecting the speed of transfer of manufacturing capabilities, Zander and Kogut (1995) found that knowledge that was codified in documents and software and that could be readily taught to new workers transferred more easily than capabilities not codified. In the context of ERP, lots of knowledge is embedded in ERP systems and the brains of consultants. The more tacit the

relevant knowledge is, the more difficult this knowledge can be transferred, and the less likely the implementation will be smooth. We hypothesized:

H7: The degree of tacitness of ERP knowledge will have a negative relationship with ERP implementation success.

Relationship Quality Studies have also suggested that the quality of the relationship is one of the important factors affecting knowledge transfer between a source and a recipient (e.g., Argote 1999). Szulanski (1996) defined relationship quality as an emotionally non-laborious, close and good relationship between a source and a recipient. Lee and Kim (1999) suggested five components of relationship quality in IT outsourcing context: trust, business understanding, benefit and risk share, conflict and commitment. Nonaka (1994) asserted transferring knowledge that has tacit components requires frequent and numerous interactions between the involved parties. Thus, development of a good relationship is likely to affect knowledge transfer (Baum and Ingram 1998). This is extremely true in the case of ERP, in which adopting organization highly dependent on vendor or consulting with ERP knowledge and expertise and this knowledge are deeply embedded (Pan et. al 2001). We hypothesized that:

H8: The degree of relationship quality among ERP implementation parties will have a positive relationship with ERP implementation success.

Source Competence Source competence is defined as the extent to which a recipient perceives a source to be expert, competent and knowledgeable. This construct was adapted from "Source credibility", which is defined as the extent to which a recipient perceives a source to be trustworthy and an expert (Dholakia and Sternthal 1977). The reason to only adopt "expert" dimension of source creditability, is due to the concern of conceptual overlap between the "trustworthy" dimension and relationship quality. An expert and trustworthy source is more likely than others to influence the behavior of a recipient (Perloff, 1993). When the source unit is not perceived as reliable and is not seen as trustworthy or knowledgeable, initiating a transfer from that source will be more difficult and its advice and example are likely to be challenged and resisted. (Walton 1975). Timbrell et al. (2001) found that "source not perceived as reliable" was the most important source of stickiness during SAP implementation. Hence, we postulate:

H9: The degree of knowledge source (i.e. ERP vendor, consultants) credibility will have a positive relationship with ERP implementation success.

Source Motivation Client's learning or improved client's understanding has been recognized as an important objective or result of consulting engagement. Arygris (1985), suggests that the consultant should help the organization to achieve its objectives in such a way that it can continue to do so with decreasing "outside" aide. Lots of consulting companies have also claimed "knowledge transfer" as major service content. However, some of them may still be reluctant to share crucial knowledge for fear of losing ownership, a position of privilege, superiority; it may resent not being adequately rewarded for sharing hard-won success; or it may be unwilling to devote time and resources to support the transfer. Szulanski (1996) found that lack of source motivation to engage in knowledge transfer is a barrier of best practice transfer. Timbrell et al. (2001) found, in the context of ERP, source motivation remains to be a barrier for effective knowledge transfer. We hypothesized:

H10: The degree of motivation of ERP vendor or consultants to share their knowledge with clients will have a positive relationship with ERP implementation success.

Absorptive Capacity Absorptive capacity is defined as the ability for a recipient of knowledge to recognize the importance and value of the external information, assimilate it, and apply it. The capacity depends on the firm's ability to recognize and link new knowledge to its existing in-house expertise, and is a function of firm's level of prior related knowledge (Cohen and Levinthal, 1990). Absorptive Capacity has been long recognized as an

important factor affecting knowledge transfer in alliance. Hamel (1991) reported that a wide gap in knowledge and skill between the source and the recipient impairs the transfer of knowledge. Previous experience with technology transfers minimized the initial productivity loss associated with transfer of manufacturing technology to new establishments (Galbraith 1990). In a study of the transfer of best practices within a firm, Szulanski (1996) found that high absorptive capacity of recipients facilitated the transfer of best practices. Timbrell et al. (2001) found that "Recipient lacks absorptive capacity" was the second most important source of knowledge stickiness during SAP implementation. We hypothesized:
H11: The client's absorptive capacity to acquire ERP knowledge will have a positive relationship with ERP implementation success.

3.3 Control Variable

Some variables that are expected to affect the dependent variable outside the scope of this research were selected as control variables: elapsed time, firm size, and industry.
Elapsed time Researchers have suggested elapsed time since initial adoption and diffusion is related to adoption and diffusion (E.g. Ramanurthy and Premkumar 1995). The earlier firms begin implementation, the more organizational learning that takes place and the greater the chance of realization of benefits. Additionally, the more time that has elapsed, the more comfortable employees are with the package and thus the greater the satisfaction (Bradford and Florin 2003). Here, we incorporate it as control variable to capture the variation due to timing issues.
Firm size Researches have shown mixed result about the effect of firm size on innovation adoption and diffusion. Firm size has served as a proxy for other variables, such as organizational complexity, slack resources, specialization, scale, and other factors (Tornatzky and Fleischer (1990, p.162). To control these factors, organization size was set as a control variable.
Industry Importance of ERP within the organization may differ depending on the industry to which a certain organization belongs. Also task characteristics of a specific industry would result in different functional or performance requirements for IT, thus it would facilitate or inhibit a certain technology's assimilation (Cho and Kim 2002).

4. Research Methodology

The unit of analysis of this study is the ERP project. A cross-sectional field survey was applied to collect data. Partial Least Squares (PLS) method will be employed to test and analyze the collected data.

4.1 Instrumentation

A questionnaire has been developed to collected data by using Five-point Likert scale items. Each variable is measured wherever possible with multiple indicator items. Items for all variables have been adopted and/or adapted from previous study on innovation diffusion, IT implementation, and knowledge transfer. Some items were modified to reflect the specific context of the study. Questionnaire was originally developed in English, and then translated into Chinese. Back-translation was employed as a procedure to ensure comparability of the original and translated versions of the questionnaire (Singh, 1995).

4.2 Data Collection

The survey is currently being conducted in China. Questionnaires are sent to organizations in China which are using ERP system. Due to the difficulty of collecting data, we adopted convenience sampling method. Questionnaire will be sent to potential respondents through contacts wherever available. Only well-established brands of ERP system are eligible for this

study considering the numerous brands in Chinese ERP market. They are the leading worldwide ERP vendors – such as SAP, Oracle, PeopleSoft, JDE, Baan, QAD and two major Chinese ERP vendors -- Kingdee and Usoft. The eligible potential respondents are the people who possess the needed information and understanding on ERP implementation in their organization, such as CEO, CIO, ERP project manager, senior system analyst, etc.

4.3 Data Analysis and Preliminary Findings

PLS-Graph Version 3.000 is used for data analysis. Preliminary analysis found knowledge-transfer related factors are significantly related with ERP success. Specifically, tacitness of knowledge being transferred, the client's absorptive capacity and the relationship quality between client and its implementation partners are significantly related with ERP success.

5. Conclusion

We have several expectorations for this study. Firstly, we expect to broaden the current literature on ERP by adding the knowledge transfer perspective. We also expect to provide new insights by empirically exploring the roles of knowledge transfer factors on ERP success for the first time. Thirdly, we expect to develop a model for ERP, a new complex technology innovation, which traditional theory and models can't predict and explain well because of its distinctive characteristics (such as high knowledge barrier) from traditional technology. Finally, we expect to help practitioners increase ERP implementation success rate by considering the knowledge transfer factors.

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