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ERP Decisions: the Role of Organizational Culture and SCM Practices

Mincong Tang and Waiman Cheung

Abstract: ERP has been well proved to be critical to improve company competitiveness, but not all ERP projects come out with a success. We believe that ERP decision is the first step to make ERP succeed, which is not as simple as comparing the prices of various systems (Piturro, 1999). Building on the knowledge of existing literature about organizational culture and IT behaviors, we examined the role of organizational culture and supply chain management (SCM) practices in an organization's decision upon ERP decision. Based on the data we collected from 80 companies, we found that organizational culture and SCM practices significantly affect ERP decision; we also propose the mediating role of SCM practices between organizational culture and ERP decision.

Key words: ERP Decision, Supply chain management practices, organizational culture.

1. Introduction

Today, more and more Chinese manufacturers are trying to adopt enterprise resources planning (ERP) systems to help them improve their global competitiveness. ERP has even become a “must have” system for many firms. Therefore, we witness a dramatic increase in ERP adoption and diffusion in China during the past few years (Huo, 2002). Some companies (mainly large corporations) chose Western-based ERP systems like Oracle and SAP, some chose local Chinese ERP systems like Kingdee and UFIDA, some developed their own ERP systems and still there are some companies who do not use or are not willing to use any ERP systems.

Besides its success, ERP is also well-known for its high failure rate in implementation, especially terribly high in China. It is estimated that the success rate of ERP implementation in China is approximately 10% (Zhang et al., 2003). ERP even turn into a nightmare for many implementing firms (Davenport, 1998). Many Chinese companies have found it is quite difficult to find an ERP system that is very fit for them. Western-based ERP systems like Oracle and SAP, which are functionally complicated, are not affordable for every company. Moreover, these ERP systems are built on Western management practices and culture, which are quite different from those Chinese companies, therefore, they are not necessarily fit the Chinese practices; local Chinese ERP systems like Kingdee, Digital China, UFIDA are more affordable to most Chinese companies, but they are weak in their manufacturing and supply chain functions (AMR Research, 2007). Quite some companies chose to develop their own system but not all of them have the resource, also there is a lack of reference to develop ERP by them, what is the worse is that they do not recognize the difficulties until they get into big trouble.

We conceptualize the decision that a company make in choosing an ERP system as ERP decision in this study. While the importance of adopting ERP systems has been well proved (Davenport, 1998; Sheu et al., 2004), we believe that ERP decision is very important as it is the first step to make ERP succeed in an organization (Donovan, 2001); it will affect the follow-up implementation, adoption and outcome of an ERP system, having not selected a right ERP system has also been reported as a critical factor that contribute to the failure of ERP projects (Stefanou, 2001). We also hold that ERP decision is not as simple as comparing the prices of various ERP systems, it is a process including the evaluation of an organization's resources (Stefanou, 2001), system maturity (Gable & Stewart, 1999), practices/processes (Donovan, 2001), culture (Xue et al.,

2005; Soh et al., 2000) and vendors/consultants (Piturro, 1999). Therefore, it is very important to examine the factors affecting an organization's ERP decision if one wants to help the potential adopter who is going to adopt ERP system.

Motivated by providing insights regarding of the ERP decision problem, we conduct in-depth literature search and field studies. We found that academicians and practitioners have attributed the underlying reasons of the phenomenon mentioned above to culture (AMR Research, 2007; Soh et al., 2000; Xue et al., 2005), in information system (IS) field, scholars conceptualized the development, adoption, use and management as information technology (IT) behaviors, which have been deeply studied from a cultural perspective and found that they are significantly affected by culture (Leidner and Kayworth, 2006). However, ERP decision as a kind of IT behavior has got little attention, especially from a cultural perspective. We believe that organizational culture plays a significant role in ERP decision.

In addition, building on the previous research on culture and management practices (Newman and Nollen, 1996; McDermott and Stock, 1999; Naor et al., 2008), we propose that organizational culture also influences ERP decisions through affecting an organization's management practices, specifically in this dissertation, supply chain management (SCM) practices. ERP is said to be very closely related to SCM (Gunasekaran & Ngai, 2004). Technologically, ERP is said to be the backbone of SCM, the integration of ERP and SCM is a natural and necessary process in strategic and managerial consideration, the most important trend for ERP vendors today is the integration with SCM vendors (Tarn et al., 2002). Therefore, the whole theory of this study is that organizational culture does not only directly affect an organization's decision upon ERP systems, also organizational culture affects its ERP decision through affecting an organization's SCM practices.

2. Research Model and Research Questions

To prove the theory we proposed, we put forward with the following research model. This model illustrates the relationships between organizational culture, SCM practices and ERP decision.

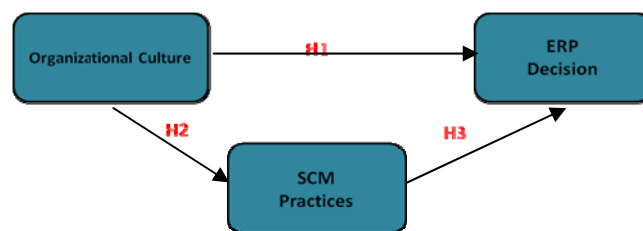


Figure 1. The research model

In this study, we aim to answer the following research questions:

Research Question 1: what insights can be provided for the Western ERP vendors to localize their ERP systems?

Western ERP vendors met many difficulties to get the dominance of the market share in China as their systems are built on Western practices, which are quite different from our Oriental. When these vendors try to sell their systems in China, they have not got fully understanding of the Chinese organizational culture and the localization problem becomes very critical for them. In literature, it has been proved that culture directly impacts various IT behaviors (Leidner & Kayworth, 2006), specifically, some cultural issues like language, report format are reported as factors that affect ERP system implementation (Xue et al., 2005). Localization of an ERP system is

more than translating the English version and changing the report formats, it's about changing the processes and functions to fit the local practices. However, only knowing the cultural elements that affect ERP is not enough as culture is hard to change (Hofstede, 1994; McDermott, 2000), it's not quite practical and possible to change the culture to fit the needs of an ERP system. We believe that management practice is a good substitute as it is comparatively easy to change. We incorporate SCM practices, which are assumed to be more closely related to ERP as discussed above. By answering this research question, we hope that Western ERP vendors can get a better understanding about their target clients' organizational culture before they can customize their systems, in addition, they can 'change' or modify their systems to fit the management practices of their Chinese clients by knowing the patterns of SCM practices of these Chinese manufacturers.

Research Question 2: what insights can be provided for local Chinese ERP vendors to develop ERP systems?

Local Chinese ERP vendors are assumed to have the advantage of knowing better about the Chinese managerial style and management practices. However, their ERP systems are also said to be weak in manufacturing and SCM functions (AMR Research 2007) as most of them are developed from financial software providers. They are in a lack of comprehensive understanding on manufacturing, without which it will far exceed their capability to develop a successful ERP system that can fully match the requirement of a user's business. We hope that the findings of this study can provide insights for the local ERP vendors to develop a comprehensive manufacturing-centric ERP system.

Research Question 3: what insights can be provided for Chinese manufacturers to choose a suitable ERP system?

As mentioned above, ERP decision is not as simple as comparing the prices of different ERP systems, it should take into consideration including the company's management practices, resources, culture, consultants etc. This study will try to provide insights from the perspectives of organizational culture and SCM practices for the manufacturers who are going to adopt ERP system to facilitate their management and operations. By finding out the dimensions of organizational culture and SCM practices that significantly affect an organization's ERP decision, manufacturers will have more knowledge when they choose the suitable ERP system among so many options in the market.

In this paper, we only discuss the impacts of organizational culture and SCM practices on ERP decision, therefore, we propose the following two hypotheses.

H1: Organizational culture significantly affects a company's ERP decision, and

H3: A company's SCM practices significantly affect its ERP decision.

3. Research Methodology

In this study, we take a survey-based method. Data are collected by the author via field visit. We started the data collection process from the beginning of June 2010 to the end of December, 2010. Till the publication of this paper, we have over 80 valid questionnaires, 85% of the questionnaires were returned with hard copy while the other 15% were returned by email.

To make sure the questionnaire is reliable enough, we consolidated the questionnaire and asked two knowledgeable professors (one from MIS area and the other from operations management area) to review the questionnaire. Then we asked a PhD student in operations management area to translate back to English, each items in the translated English version was checked against the original English version. We found that some items need to be reworded to

better indicate the original meanings of the English version.

The Chinese version of the questionnaire was then pilot-tested on 38 manufacturing firms from Guangzhou, Dongguan, Shenzhen and Foshan in China. The aim of the pilot test is to make sure the wordings of the questionnaire are well understood by the respondents. The first author visited 30 firms in the pilot test stage and other 8 questionnaire were sent to the corresponding companies and returned either with hard copies or emails. In the company visits (each took at least 60 minutes including some discussion with the respondents), the first author took the notes for any confusion or ambiguity in the wordings of the questions or scales, after which we modified the items if necessary. The combination of translation to Chinese and back translation to English together with the in-depth interviews provide strong evidence to support the reliability and validity of measurement in research in developing countries, particularly China (Qi et al., 2009).

The unit of analysis is the manufacturing firms in South China, Pearl River Delta region as mentioned above. Supply chain manager, operations manager, CIO, general manager and an experienced staff (who has more than 3 years working experience in the target company) were selected as potential respondents for this study. They are assumed to have good knowledge about the organizational culture of their companies, also their SCM practices. A significant problem with organizational-level research is that senior and executive-level managers receive many requests to participate and have very limited time (Qi et al., 2009). Therefore, we catch the opportunity and conduct the survey in the visited companies by ourselves.

As the dependent variable (ERP Decision) is a categorical one, we select multinomial logistic regression as our main analytical technique. To examine the data quality, we use SPSS16 and AMOS to check the reliability of each construct and also discriminant and convergent validities of the constructs.

4. Data Analysis and Results

With the 80 valid samples, we conducted our analysis. By conducting this preliminary analysis, we see the existence of the relationships between organizational culture, SCM practices and ERP decision. As there are 13 independent variables in our research model, which requires a minimum case to variable ratio 10 to 1 to make sure the validity to conduct multi-nominal logistic regression, we are still collecting data when this paper is finished, with more data we can get more confidence to prove the theory we proposed. As most of the questionnaires were finished under the monitoring of the author at site, there is no missing data in the questionnaire.

4.1 Data quality checking

Before we run the main test of the theory, we examine the quality of the data we collected. The 80 sample data from the survey were subjected to exploratory factor analysis (EFA) to gain insights as to the multidimensionality of the items. We excluded the items if the factor loadings to the construct are less than 0.5. SPSS 16 is applied to test the reliabilities (here we used Cronbach's Alpha) of each construct. All the Cronbach's Alphas are greater than the edge (.70), which means the reliability of the data is good.

To test the convergent validity and discriminant validity of the constructs, we used AMOS to do the confirmative factor analysis (CFA). Items (here we separate the items of organizational culture with those of SCM practices and run the test separately) were linked to their target factors, and covariances among the said factors were freely estimated. Model fit indices Chi-square/df, root mean square error of approximation (RMSEA), non-normed fit index (NNFI), comparative fit index (CFI), and standardized root mean square residual (SRMR) were used to examine the measurement

models. These tests show good convergent and discriminant validities of our data. Limited by the length of this conference paper, we did not report the results here.

4.2 Results of the model and hypotheses testing

After checking the quality of the data, we conducted the multinomial logistic regression. As there are three categories in the dependent variable (namely, using Chinese ERP system; using self-developed ERP system; and using Western ERP system), we separated the cases between those companies who are using ERP and those who are not. There are 64 companies who are using ERP system now in our 80 samples.

4.2.1 Direct effects of organizational culture on ERP decision

In our research model, we postulated that organizational culture significantly affects ERP decision (H1). We constructed a base model with intercept only and then added the independent variables (7 dimensions of organizational culture) to the nested model. We checked the model fitting information as follows.

Table 1: Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	114.550			
Final	88.774	25.776	14	.028

In this analysis, the probability of the model chi-square (22.776) was 0.028, less than or equal to the level of significance of 0.05. The null hypothesis that there was no difference between the model without independent variables and the model with independent variables was rejected. The existence of a relationship between organizational culture and ERP decision is supported.

By checking the likelihood ratio tests, we can see which dimensions of organizational culture would have significant impacts on ERP decision.

Table 2: Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	92.915	4.141	2	.126
Guanxi	91.150	2.376	2	.305
Processoriented	95.230	6.456	2	.040
Joboriented	91.361	2.587	2	.274
Professional	96.134	7.360	2	.025
OpenSystem	88.854	.080	2	.961
LooseControl	103.615	14.841	2	.001
Normative	89.383	.609	2	.738

From table 2, we can see there is a statistically significant relationship between the independent variables (Processoriented, Professional and LooseControl) and the dependent variable (ERP decision).

Table 3: Parameter Estimates

ERP3 ^a		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
1	Intercept	8.325	4.543	3.357	1	.067			
	Guanxi	-.184	.698	.069	1	.793	.832	.212	3.269
	Processoriented	.139	.583	.057	1	.811	1.149	.367	3.600
	Joboriented	-.360	.411	.768	1	.381	.698	.312	1.561
	Professional	-.069	.388	.032	1	.859	.933	.436	1.998

	OpenSystem	.038	.502	.006	1	.939	1.039	.388	2.781
	LooseControl	-1.903	.647	8.636	1	.003	.149	.042	.531
	Normative	.118	.493	.058	1	.810	1.126	.429	2.957
2	Intercept	2.278	8.372	.074	1	.786			
	Guanxi	2.304	1.921	1.439	1	.230	10.018	.232	432.337
	Processoriented	-2.134	1.127	3.589	1	.058	.118	.013	1.076
	Joboriented	-1.253	.858	2.132	1	.144	.286	.053	1.535
	Professional	2.181	1.120	3.794	1	.051	8.858	.986	79.541
	OpenSystem	.280	.980	.081	1	.775	1.323	.194	9.034
	LooseControl	-2.327	.977	5.677	1	.017	.098	.014	.662
	Normative	-.491	.875	.315	1	.574	.612	.110	3.397

a. The reference category is: 3.

From table 3, we can see the independent variable LooseControl is significant in distinguishing category 1 (using Chinese ERP system) of the dependent variable from category 3 (using Western ERP system) of the dependent variable. ($0.003 < 0.05$). Also LooseControl is significant in distinguishing category 2 (Using self-developed ERP system) of the dependent variable from category 3 of the dependent variable ($0.017 < 0.05$). Here it is worthy of notice is that the independent variables (Processoriented and Professional) are at the edge of significance level (0.058 and 0.051), we believe this is due to the small sample problem.

4.2.2 Direct effects of SCM practices on ERP decision

To test hypothesis 2, we also conducted the same technique but run with the dimensions of SCM practices as independent variables. We got the overall significance level $0.027 < 0.05$, which means the hypothesis that the existence of a relationship between organizational culture and ERP decision is supported.

Table 4: Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	114.550			
Final	91.419	23.131	12	.027

Table 5: Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	92.470	1.052	2	.591
SupplierRelation	98.783	7.365	2	.025
CustomerRelationship	92.499	1.080	2	.583
InformationSharing	92.860	1.442	2	.486
LeanProduction	101.223	9.804	2	.007
InformationQuality	94.407	2.988	2	.224
AigleManufacturing	96.236	4.818	2	.090

From table 4, we can see that the independent variables (SupplierRelation, Lean Production) significantly impacts ERP decision.

Table 6: Parameter Estimates

ERP3 ^a		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
1	Intercept	1.075	2.647	.165	1	.685			
	SupplierRelation	-.789	.772	1.045	1	.307	.454	.100	2.061
	CustomerRelationship	.602	.618	.949	1	.330	1.826	.544	6.130

	InformationSharing	-.871	.940	.857	1	.355	.419	.066	2.645
	LeanProduction	2.469	1.056	5.465	1	.019	11.806	1.490	93.537
	InformationQuality	-.130	.854	.023	1	.879	.878	.165	4.677
	AgileManufacturing	-1.585	.940	2.842	1	.092	.205	.032	1.294
2	Intercept	-3.265	5.221	.391	1	.532			
	SupplierRelation	-3.446	1.414	5.937	1	.015	.032	.002	.510
	CustomerRelationship	.042	1.591	.001	1	.979	1.043	.046	23.562
	InformationSharing	.281	1.558	.032	1	.857	1.324	.062	28.060
	LeanProduction	3.867	1.566	6.101	1	.014	47.802	2.222	1028.149
	InformationQuality	2.258	1.744	1.676	1	.195	9.568	.313	292.163
	AgileManufacturing	-2.981	1.590	3.514	1	.061	.051	.002	1.145

a. The reference category is: 3.

From table 6, we can see the independent variable (LeanProduction) is significant in distinguishing category 1 (using Chinese ERP system) of the dependent variable from category 3 (using Western ERP system) of the dependent variable. ($0.019 < 0.05$). Also SupplierRelation and LeanProduction are significant in distinguishing category 2 (Using self-developed ERP system) of the dependent variable from category 3 of the dependent variable ($0.015 < 0.05$, and $0.014 < 0.05$). Here it is worthy of notice is that the independent variables (AgileManufacturing) are at the edge of significance level (0.061), we believe this is also due to the small sample problem.

5. Conclusions

As the preliminary result of the first author's thesis, the purpose of this paper is to present the theory and discuss with the participants of this conference to get useful inputs to complete the whole thesis. From the discussion above, we can see the existence of the relationships between organizational culture, SCM practices and ERP decision. We need more data to examine the relationships between organizational culture and SCM practices, also the potential mediating role of SCM practices between organizational culture and ERP decision, which is also the key contribution of the whole thesis.

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