Critical Success Factors of Enterprise Resource Planning Systems Implementation Success in China

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Abstract

ERP implementation issues have been given much attention since two decades ago due to its low implementation success. Nearly 90 percent of ERP implementations are late or over budget [16] and the success rate with ERP implementation is about 33%. In China, the success rate of implementing ERP systems is extremely low at 10% [28] which is much lower than that in West countries. This study attempts to study critical success factors affecting enterprise resource planning (ERP) systems implementation success in China with focus on both generic and unique factors. User satisfaction and White's ABCD classification method are used to judge whether an ERP system implementation is a success or a failure. Survey methodology and structural equation modeling technique of PLS-Graph are used to collect and analyze data. Discussions on the results of data analysis are made.

1. Introduction

Kumar et al (2000) define enterprise resource planning (ERP) systems as "configurable information systems packages that integrate information and information-based processes within and across functional areas in an organization". ERP systems are expensive, and once ERP systems are implemented successfully, significant benefits such as improved customer service, better production scheduling, and reduced manufacturing costs can be gained. However, the successful implementation rate is low and many firms that have gained some benefits from ERP have yet to exploit the full potential of ERP in their organizations. About 90 percent of ERP implementations are late or over budget [16] and ERP implementation success rate is only about 33%. However, the success rate of implementing ERP systems in China is extremely low at 10% [28]. The steep difference of ERP systems implementation success rates between Western countries and China produces a need of research to examine general and specific-to-China critical success factors.

ERP systems were introduced to China at the beginning of 1980s when several state-owned companies adopted foreign ERP packages. Until now, nearly 1,000 companies in China have implemented material requirements planning (MRP), manufacturing resources planning (MRP II) or ERP systems. During the past twenty years, foreign ERP vendors dominated China's ERP market in that ERP represents best-practice process. Figure 1 describes 98' ERP market share distribution in China, foreign ERP vendors took up more than 90 percent. In this pie chart, only Kingdee (2.3%) is a domestic ERP vendor. Thus, in this research foreign ERP packages are considered as the research objects.

While a formal scheme for classifying ERP systems has long existed, its definition still differs widely among practitioners. Small companies may claim that a full-fledged ERP system has been implemented, while some big companies did not even think their systems have achieved MRP or MRP II. As a result, it is not meaningful to separate the different ERP versions. Thus, in this study, the term "ERP" is used as a general term to represent all ERP versions, namely, MRP (i.e., materials requirements planning), closed-loop MRP (i.e., MRP with capacity planning and shop floor), and MRP II (i.e., closed-loop MRP integrated with the other functions such as finance and marketing).

The organization of this paper is as follows: in the next section, literature review is illustrated. Research methodology follows with literature review and research framework is developed after the literature review. In the section of research framework, details of the proposed model and variables are explained. Then data analysis is conducted to explain the findings. Discussion is made on issues in the research and conclusion about the study ends the paper.

2. Literature Review

Limited study has been conducted in the ERP implementation area, with most research consisting of case studies in individual organizations which can be described as "how I implemented ERP in my company" case. The authors were typically employees

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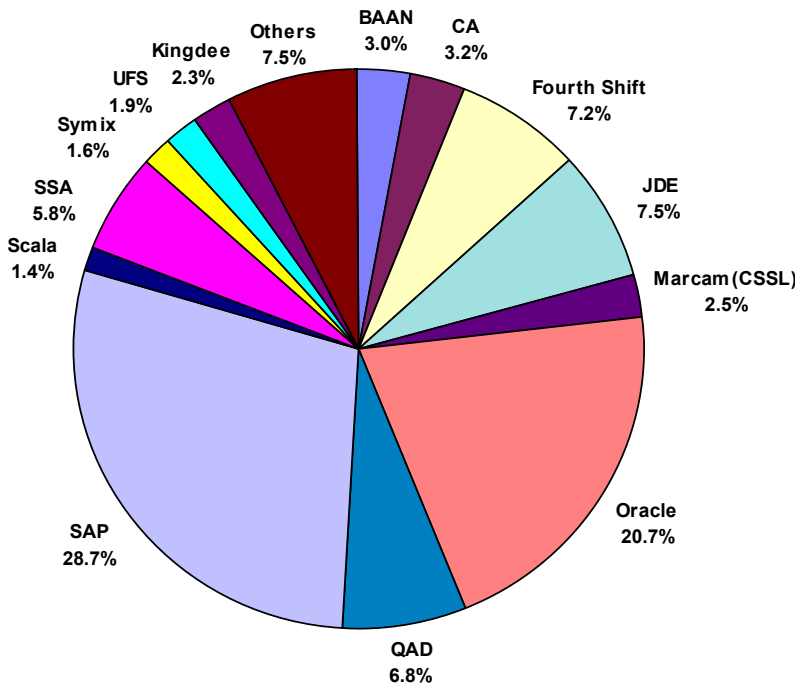

Figure 1. 98' ERP Market Share and Major ERP Vendors in China (IDC Group 1998)

of (or consultants to) the company described in the case. A major problem with such ERP case studies is that very few implementation failures are recorded in the literature; perhaps because few companies wish to publicize their implementation failures. Thus, the reasons why implementation fails were not recorded in the literature, which motivates empirical studies to explore critical factors that affect ERP implementation.

The literature varies regarding which variables are required for implementation success or responsible for failure. A review of relevant literature suggests that problems with the implementation of ERP systems occur for a number of reasons. These include:

1) The need for business process change during the implementation of an ERP system is needed [10], [14];
2) Lack of top management support, data accuracy, and user involvement can attribute to system implementation failures [5].
3) Education and training are frequently underestimated and are given less time due to schedule pressures, and less understanding of cross-functional business processes are often reported [18].
4) When adopting an ERP system, there is a need to recognize the unique Asian context in that the embedded business models typically reflect Western practices [9].
5) Wilson et al (1994) claims that ERP packages, lack of top management support, changes in personnel, lack of discipline, resistance, and lack of broad-based company commitment are the major factors that slow down the process of implementation.

In brief, there is no general consensus as to which set of factors are the keys to success in ERP implementation. It is probably a combination of factors that are important in explaining success rather than single elements. The exact combination of factors varies over time and should be decided regarding a given specific set of company circumstances.

There is growing evidence that failures to adapt ERP packages to fit different organizational and national cultures leads to projects that are expensive and late. Prior studies on China's use of information systems indicate that China's organizations making comparatively limited use of computer-based information systems is primarily due to the misfit between the Chinese business culture and computer-based information systems [15], [19], [29]. Unlike traditional software development approach, which promotes building systems from scratch, ERP packages encapsulate reusable best business processes and software [17]. Especially in the context of China, the organizational cultures between China and Western countries are very different, plus foreign ERP packages took up more than 90 per cent market share in China (Source: IDC 1998), thus in this study it is necessary to investigate the impact of Chinese organizational culture on ERP implementation.

As for the measurement of ERP implementation success, two measures are identified as indicators of the dependent variable. From Delone & McLean (1992) information system success model that identifies six dimensions or categories of information systems success including system quality, information quality, use, user satisfaction, individual impact, and organizational impact, user satisfaction is selected as one of the two measures. According to Delone & McLean, when the use of information system is mandatory or required, the previous measures of system quality, information quality, and use become

less useful. That means whether the quality of the system itself and of the information outputs are satisfying or not, and whether you want to use the system or not, there is no choice for the user. Users must accept and use the information system. User satisfaction is used to measure the interaction of users with the information system. Ginzberg (1981) adopted user satisfaction to measure information system implementation success. Powers & Dickson (1973) used user satisfaction to measure MIS project success. Individual impact and organizational impact are two measures used to indicate the contribution of information systems on users and organizational performance, which are difficult to reach a conclusion regardless to some papers listed in Delone and McLean's paper. However, the influence of non-controllable variables prevented their reaching a conclusion [3]. Apparently it is difficult to assess the contribution of information systems to performance in a real world situation: a large portion of the costs and benefits will be qualitative or intangible [3]. Meanwhile, the assessment of the value of unstructured or ad hoc decision-making may be nearly impossible and organizations typically will not record these costs and benefits [2].

Another measure is adapted from Oliver White's *ABCD* Classification, which can be used to assess ERP implementation success from the angle of integration between modules. Among the adopters of ERP systems, some company users achieved material requirements planning (MRP) level, others may use ERP systems as inventory control only, and still others may have achieved manufacturing resources planning (MRP II) level. Very few have achieved the level of integrated ERP level. This study puts emphasis on ERP implementation success, which level ERP implementation achieves has been used as an important indicator of ERP implementation success [20], [27].

3. Research Methodology

This study used a mail survey combining with Internet to examine the hypothesized factors and research framework and the questionnaire is adapted from prior literature. Data were collected from those firms that have implemented ERP systems within recent two years from northern, eastern, and southern China in that these three districts are the most developed economic areas in China (n = 138), which were identified from two sources: clients of an ERP consulting firm and its history log of past telemarketing. Only one survey questionnaire was sent to an ERP organization user. The respondents may include the master scheduler, production and inventory manager, material handling clerk and manager, and production manager.

To ensure that a comprehensive list of items is included in the questionnaire, the works of previous researchers are reviewed. Moreover, the instruments of previous researchers are proved to be valid and reliable. The items used to construct the constructs were adapted from prior research, with appropriate modifications to make them specifically relevant to ERP systems. Individuals were asked to indicate the extent of agreement or disagreement with the questionnaire items concerning ERP systems on a five-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire is made in English originally and then translated into Chinese to conduct the survey. To ensure the consistency of the questionnaire between English version and Chinese version, one research-mate was asked to back-translate the Chinese version questionnaire to English version. By comparing the back-translated English version with the original English version questionnaire, most items share the same meaning. For those discrepant items, further refinement was conducted and second round back-translation was conducted to make the final Chinese version questionnaires consistent with the original English version.

4. Research Framework

ERP systems implementation is a long-term program, not a short-term project that is finished just after system installation. Once organizations have purchased ERP packages from external vendors, a project team including external contractors' consultants and internal will be setup. In China's ERP market, most ERP projects use consultants and project managers from external consulting firms or ERP vendors.

Based on the ERP literature, the researcher classified the hypothesized factors into five categories with: (1) organizational environments, including top management support, re-engineering business process, effective project management, and company-wide commitment; (2) people characteristics, including education & training, and user involvement both at system requirements definition and ERP project implementation; (3) technical problems, including suitability of software & hardware and data accuracy; (4) ERP vendor commitment, including vendor support; and (5) cultural impact including organizational cultures.

It's difficult to define ERP success. ERP success is a nebulous and highly subjective concept. Until now there is not a concerted definition of ERP success and there are some attempts to define success in the ERP literature. In his classical books, Oliver White (1981) proposed a classification system named *ABCD* for MRP II user companies. Markus et al (2000) defined ERP success from several angles, including: (1) Success viewed in technical terms; (2) Success viewed in economic, financial or strategic business terms; (3) Success viewed in terms of the smooth running of

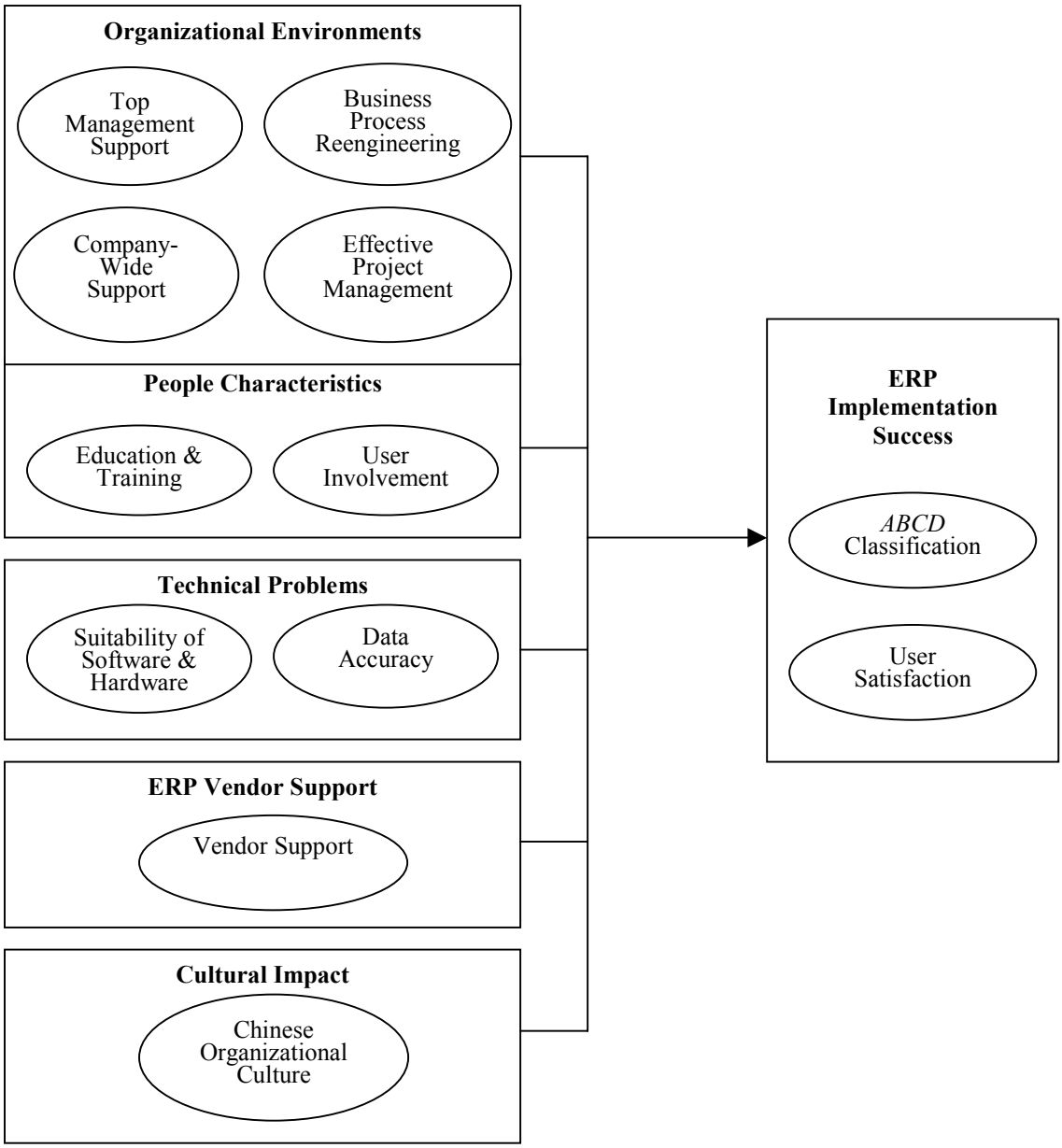

Figure 2. Conceptual research model of ERP implementation success in China

business operations; (4) Success as viewed by the ERP-adopting organization's managers and employees; and (5) Success as viewed by the ERP-adopting organization's customers, suppliers, and investors. Among Markus's dimensions of success, it's difficult to use quantitative analysis to measure success from angles of economic benefits and the adopter's customers, suppliers, and investors.

In this study, two measures of ERP success are used: The first measure is using a set of statements that best describe the organization's ERP implementation. Four descriptive statements are provided, which are adapted from Oliver White's *ABCD* classification. A Class *A* user company is one that uses MRP in a closed-loop mode so well that they never use shortage lists. This type of company has MRP as a master plan integrated into marketing, manufacturing, finance, and engineering, and management uses it as a master game plan. A Class *B* company has a very good production and inventory control system, but it differs from the Class *A* company in that the system does not extend to the entire company. MRP is used primarily as an inventory control system for order launching in a Class *C* company. A Class *D* company uses MRP primarily as a data processing system that has little impact on operations. The second measure is subjective user satisfaction toward the ERP system, adapted from Doll and Torkzadeh's (1988) measures, indicating the extent to which the ERP system has met the respondent's expectations.

The ten independent variables are assumed as factors affecting ERP systems implementation success, which is indicated by *ABCD* classification and user's subjective satisfaction. Since ERP evolved from MRP II and MRP II came into being centered on MRP,

therefore, we can conclude that MRP, MRP II, and ERP have the same independent variables. The hypothesized research framework refers to Figure 2 and the details of the factors are illustrated in the following section.

4.1. Top Management Support

Many studies have stressed the importance of top management support as a necessary ingredient in successful ERP implementation [4], [11], [21], [22]. Since ERP is a highly integrated information system, its design, implementation, and operation require the complete cooperation of line and staff members from all segments of the business. Top management support can play a useful role in setting disputes and in providing clear signals to any doubts.

Top management must create an environment for implementing an ERP system and obtained results and must be seen as a participant in the implementation. Top management support in ERP implementation has two main facets: (1) providing leadership; and (2) providing the necessary resources. To implement an ERP system smoothly and successfully, companies require a steering committee to participate team meetings and monitor the implementation efforts, spend time with people and provide clear directions of the project. Willingness to provide the necessary resources is another indicator of top management commitment to the ERP project. The implementation could be seriously handicapped if some of the critical resources (e.g., people, funds and equipment) are not available. Thus, we get the following hypothesis:

H_1: Top management support has a positive impact on ERP implementation success.

4.2. Re-engineering Business Process

Business process re-engineering (BPR) is defined by Hammer and Champy (2001) as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed".

Implementing an ERP system involves re-engineering the existing business processes to the best business process standard [6], [10], [21]. One of the principal reasons why ERP and other large technologically sophisticated systems fail is that organizations simply underestimate the extent to which they have to change and re-engineering the existing business processes in order to accommodate their purchase. ERP systems are built on best practices that are followed in the industry. All the processes in a company must conform to the ERP model.

Dimensions concerning business process reengineering are: (1) Company's willingness to reengineering; (2) Company's readiness for change; (3) Company's capability of reengineering; and (4) Communication. Prior studies claimed that the more willing an organization is to change, the more successful the implementation [24]. Moosbruker & Loftin (1998) and Motwani et al (2002) suggested that the organization should be prepared and ready for fundamental change to ensure the success of BPR. There should exist the trust between top management and the staff within the company, which would facilitate the change process. Grover et al (1995) and Zairi et al (1995) stressed that the company should be capable of conducting reengineering in that the process entails much time, capital, and the sustainability of leadership. While communication is another determinant factor affecting successful BPR implementation in that BPR is a radical redesign of the company's current culture, structure, and process. If people within the company were not given enough information about the purposes of BPR, they would feel uncertainty about their jobs, which can impede the progress of reengineering. Management should answer every employee question and held company-wide meetings to make the strategy understood by every people [9], [24]. The following hypothesis on BPR is developed:

H_2: Business process reengineering has a positive impact on ERP implementation success.

4.3. Effective Project Management

According to Dennis Lock (1996), "project management has evolved in order to plan, coordinate and control the complex and diverse activities of modern industrial and commercial projects."

ERP systems implementation is a set of complex activities, involving all business functions and often requiring between one and two years of effort, thus companies should have an effective project management strategy to control the implementation process, avoiding overrun of budget and ensuring the implementation within schedule. There are five major parts of project management: (1) having a formal implementation plan, (2) a realistic time frame, (3) having periodic project status meetings, (4) having an effective project leader who is also a champion, and (5) having project team members who are stakeholders. The formal project implementation plan defines project activities, commits personnel to those activities, and promotes organizational support by organizing the implementation process [5].

Having a realistic time frame is very important. If the target completion time schedule were unrealistically short, the pressure to rush through would result in the implementation being carried out in a haphazard manner. On the other hand, if the implementation delayed for too long, people would tend to lose faith and/or patience, which also will result in low morale and resistance. Conducting periodic project status meetings in which each team member reports progress and problems is an invaluable means for evaluating the progress of the ERP implementation. Selecting the right project leader

is also important for the project implementation success. Thus, we get the following hypothesis:

H_3: Effective project management has a positive impact on ERP implementation success.

4.4. Company-Wide Commitment

Since ERP systems are enterprise-wide information systems that integrate information and information-based processes within and across all functional areas in an organization, it's imperative to get support from all functional segments of the organization [11]. Every person and department is responsible/accountable for the overall system and key users from different departments are ensured to commit to the project implementation without being called back to their prior functional job position frequently.

Three aspects of company-wide support are considered: (1) Functional department heads are champions of the ERP project; (2) They provide necessary resources to support their subordinates; (3) Other people outside the team support the project. Thus, we get the following hypothesis:

H_4: Company-wide support has a positive impact on ERP implementation success.

4.5. Education and Training

Education and training refers to the process of providing management and employees with the logic and overall concepts of ERP system [5]. Thus, people can have a better understanding of how their jobs are related to other functional areas within the company. The user is the people who produce results and should be held accountable for making the system perform to expectations.

The main reason for education and training is to increase the expertise and knowledge level of the people within the company. Three aspects concerning the contents of training are: (1) logic and concepts of ERP; (2) Features of the ERP system software; and (3) hands-on training. Concept training shows the people why the ERP system is implemented and why changes to the ERP system are necessary, while functional training (hands-on training) helps overcome the fear for computer systems since managerial people would fear that they are computer illiterate and they would lose power if manpower is reduced due to computerization, and the education can help overcome such fear. Thus, we get the following hypothesis:

H_5: Education and training has a positive impact on ERP implementation success.

4.6. User Involvement

User involvement refers to participation in the system development and implementation processes by representatives of the target user groups. System implementation represents a threat to users' perceptions of control over their work and a period of transition during which users must cope with differences between old and new work systems. User involvement is effective because it restores or enhances perceived control through participating the whole project plan. There are two areas for user involvement when the company decides to implement an ERP system: (1) user involvement in the stage of definition of the company's ERP system needs, and (2) user participates the implementation of ERP systems.

Often companies do not recognize the impact of choosing the right internal employees with the right skill set. Internal resources of a company should not only be experts in the company's processes but also be aware of the knowledge of information systems application in the industry. Involving users in the stage of defining organizational information system needs can decrease their resistance to the potential ERP systems, since by which users have feelings that they are the people who choose and make the decision. The hypothesis is as follows:

H_6: Involving user has a positive impact on ERP implementation success.

4.7. Suitability of Software and Hardware

Due to the lack of professional expertise and experience on developing ERP systems in-house, many companies prefer to buy off-the-shelf systems to shorten the ERP implementation cycle. ERP packages provide generic off-the-shelf business and software solutions to customers. More or less they can't fully meet the company's needs, especially when the business processes of the company are unique. Thus, to increase the chance of success, management must choose software that most closely fits its requirements. ERP vendors use different hardware platforms, databases, and operation systems and certain ERP packages are only compatible with some companies' databases and operation systems. Thus, companies should conduct requirements analysis first to make sure what problems need to be solved and select the ERP systems that most fit their requirements. The hardware then is selected according to the specific ERP systems' requirements. Three aspects should be cared when selecting software and hardware: (1) compatibility of software/hardware and company's needs; (2) Ease of customization. We get the following hypothesis:

H_7: Suitability of software and hardware has a positive impact on ERP implementation success.

4.8. Data Accuracy

Since ERP system modules are intricately linked to one another, inaccurate data input into one module will adversely affect the functioning of other modules. If you lie to the ERP systems, then the ERP systems will lie to you and you will get inaccurate or misleading results. Thus, data accuracy is a major determinant of ERP success [5], [18]. Thus, the

following hypothesis is developed:

H_8: Data accuracy has a positive impact on ERP implementation success.

4.9. Vendor Support

Most China's companies purchase ERP packages from foreign ERP vendors (IDC 1998) and ERP represent the best-practice processes that is different from China's organizational business process, thus, it's important to get the vendor support.

Three dimensions of vendor support are classified: (1) Service response time of the software vendor; (2) Qualified consultants with knowledgeability in both enterprises' business processes and information technology including vendors' ERP systems; and (3) Participation of vendor in ERP implementation. It's important for the vendor's staffs to be knowledgeability in both business processes and ERP system functions. Also, the consultants should possess good interpersonal skills and be able to work with people. Software vendors should be carefully selected since they play a crucial part in shaping the ultimate outcome of the implementation. We get the following hypothesis:

H_9: Vendor support has a positive impact on ERP implementation success.

4.10. Chinese Organizational Culture

Organizational culture was defined by Schein (1992) as "a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems".

In China's ERP market, foreign ERP vendors (mostly are European and American vendors) took up more than 90 per cent market share (Source: IDC 1998). The difference of cultures between Western countries where ERP systems are developed and China where these ERP systems are implemented makes culture an important determinant of implementation success. Kumar and Bjorn-Anderson (1990) have concluded that information system design methodologies have built-in value biases reflecting the value priorities of the culture in which they are developed.

Densley (1999) revealed that adapting the implementation to the prevailing cultural style was one important cause of project implementation failures. A company who implements an ERP system has to change its business processes to the ERP best-practice processes. The change both impacts on the customer's organizational culture (i.e. the ways that things are done in the organization) and is constrained by it [17]. Thus, China's companies and western ERP vendors should adapt ERP packages to fit China organization's culture to ensure ERP implementation success.

Since organizational culture is embedded in national culture, two aspects related with organizational culture are identified to be associated with ERP implementation success: (1) Clash level of the culture embedded in the ERP package with the customer's organizational culture; (2) Level of collectivism in the organizational culture. Krumbholz and Maiden (2001) claimed that the clash between the culture embedded in the ERP package and current organizational culture affects the ERP implementation success. Western organizations are dependent on information to make decision. While in China, management does not rely on information much even though information systems have been implemented. They will rely more on extrapolations from experience, and intuition. The main decisions are generally made by top management, which would reduce the need to exchange information between managers. Thus, the less inclination of management to rely on systematic information from ERP system output will distress related stakeholders who could be negatively affected by their leaders' behavior. This may be one of the major reasons explaining why more failures to ERP success in China produced than Western counterparts. Harrison et al (2000) stressed that collectivism is the characteristic of Chinese organizational culture, which put more emphasis on in-group relationship built over a long time. The in-group relationship generally forms through a long time frame and it's stable and difficult for outsiders' access. Thus, cooperation across different functional areas entailed by ERP systems is less likely to be achieved in China's organizations. However, Western countries put more emphasis on individualism and ERP system solutions represent a perfect integration/cooperation within and across different functional areas in an organization. Thus, the higher level of the collectivism one organization has, the more difficult to obtain cooperation, which will negatively affect ERP implementation. Thus, we get the following hypothesis:

H_{10}: Chinese organizational culture has a negative impact on ERP implementation success.

5. Data Analysis

For the pilot study, 47 useful responses are returned and the response rate is 34 percent. SPSS and PLS-Graph were used to conduct the data analysis. Table 1, and Table 2 describe the characteristics of the ERP company users. 6 respondents are subsidiaries of foreign-owned companies (12.8%), which indicate validity of the construct of Chinese organizational culture. ERP users are mainly in industries of electric & electronic products, mechanical equipments, and transport equipments, which take up 68.1% of the total respondents. People who completed the questionnaires are mainly from departments of manufacturing, materials management, IT, procurement, and accounting (78.7%).

From Table 3, 25 respondents (53.2%) indicate overall satisfaction with ERP implementation in their companies and 14 respondents indicate average attitude toward ERP implementation. While from Table 4, only 11 companies achieve a level of Class *A* (23.4%), about 68.1% of the respondents uses one of ERP system modules or inventory control system. Four ERP installations are thoroughly failed indicated by being classified as Class *D*. However, without realization of fully integration of functional departments, ERP can't be said a success. Thus, from the angle of White's *ABCD* classification, the success rate of ERP is only 23.4%, which is close to the literature. If considering both *ABCD* classification and user satisfaction, only one respondent answered both Class *A* and strongly satisfied with the ERP system implementation (2%). Nine respondents answered both Class *B*s and strongly satisfied with the ERP implementation (19.1%). And seven respondents answered both Class *B*s and satisfaction with the ERP implementation (14.9%). There is no reply with a mix of Class *A* and strongly satisfied with ERP implementation.

From Table 5, we can conclude that only hypotheses of H_2 and H_{10} have some discrepancies with the proposed hypotheses. At first, Business Process Reengineering shows a significant positive impact (R=0.738) on *ABCD* Classification, but combined with a negative impact (R=-0.665) on User Satisfaction. Chinese Organizational Culture has a negative impact (R=-0.675) on *ABCD* Classification and a positive impact (R=0.702) on User Satisfaction. All other path coefficients are compatible with the proposed hypotheses.

6. Discussion

Most of the hypotheses are supported by the returned empirical data. Top Management Support, Business Process Reengineering, Effective Project Management, Education & Training, Suitability of Software & Hardware, and Data Accuracy have more significant impact on *ABCD* Classification with 0.698 or above than other independent variables. Business Process Reengineering has a biggest positive impact on *ABCD* Classification, which indicates the necessity of BPR in the ERP implementation in China. However, BPR has a negative impact (R=-0.665) on User Satisfaction. One central reason for the negative impact lies in people resistance to technological change due to fear of loss of discretion and prestige; fear of new standards and control measures; economic fears concerning the loss of job security, pay increments and bonuses; and the fear of learning something new, etc. Chinese Organizational Culture has a significant negative impact (R=-0.675) on *ABCD* Classification, which support the proposed hypothesis. However, Chinese Organizational Culture also has a positive impact on User Satisfaction. The tentative explanation maybe due to the user's willingness to use more systematic and formal plan procedures as well as more cooperation is needed in routine work.

One of the research biases is the small sample size, which limits the reliability and validity of generalizing the research results to the company population. This problem could be solved in the next phase survey, in which a larger sample size will be targeted at.

Another bias lies in the sample selection methods. In this research, only one questionnaire was sent to each company, thus the person who answered the questionnaire may not be representative of all users within the company.

7. Conclusion

This study aims to improve understanding of critical factors affecting ERP implementation success in China. A scale is developed to test the proposed model, two independent variables of business process reengineering and organizational culture that are assumed to be extremely important factors in ERP implementation in China are examined and supported by empirical data.

However, due to the small sample size in the survey, there are some limitations in the generalization of the research results to a larger population. Meanwhile, ERP implementation is not a short-term project lasting only two or three months, but a long-term program which may last for one or several years. Factors affecting ERP implementation are complex and abundant, thus many researchers conduct case study only to find out some specific problems with ERP implementation. Undoubtedly, detailed case study is a powerful tool to solicit important issues disregarding to its disadvantage of generalization problems. Thus, combining detailed case study and a large survey would be an ideal method to researchers in the ERP field.

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9. Appendix.

Table 1. Company ownership

	Ownership Type	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Private enterprise	12	25.5	25.5	25.5
	State-owned enterprise	14	29.8	29.8	55.3
	Joint venture	15	31.9	31.9	87.2
	Foreign-owned subsidiary	6	12.8	12.8	100.0
	Total	47	100.0	100.0	

Table 2. Company by industry

	Industry Type	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Electric & electronic products	15	31.9	31.9	31.9
	Power and resources	2	4.3	4.3	36.2
	Steel	4	8.5	8.5	44.7
	Mechanical equipments	11	23.4	23.4	68.1
	Clock & watch	4	8.5	8.5	76.6
	Transport equipments	6	12.8	12.8	89.4
	Other industry	5	10.6	10.6	100.0
	Total	47	100.0	100.0	

Table 3. Overall Satisfaction

	Degree of Satisfaction	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	10.6	10.6	10.6
	Neither disagree nor agree	14	29.8	29.8	40.4
	Agree	25	53.2	53.2	93.6
	Strongly agree	3	6.4	6.4	100.0
	Total	47	100.0	100.0	

Table 4. Oliver White's ABCD Classification

	ABCD Classification	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Class *A*	11	23.4	23.4	23.4
	Class *B*	17	36.2	36.2	59.6
	Class *C*	15	31.9	31.9	91.5
	Class *D*	4	8.5	8.5	100.0
	Total	47	100.0	100.0	

Table 5. Path Coefficients

Independent Variables on ABCD Classification	Path Coefficients	Independent Variables on User Satisfaction	Path Coefficients
TMS→Class *ABCD*	.787	TMS→User Satisfaction	.806
BPR→Class *ABCD*	.738	BPR→User Satisfaction	-.665
EPM→Class *ABCD*	.801	EPM→User Satisfaction	.714
CWC→Class *ABCD*	.743	CWC→User Satisfaction	.795
ET→Class *ABCD*	.781	ET→User Satisfaction	.658
UI→Class *ABCD*	.792	UI→User Satisfaction	.757
SSH→Class *ABCD*	.698	SSH→User Satisfaction	.699
DA→Class *ABCD*	.712	DA→User Satisfaction	.724
VS→Class *ABCD*	.783	VS→User Satisfaction	.814
COC→Class *ABCD*	-.675	COC→User Satisfaction	.702