



ERP adoption in Chinese small enterprise: an exploratory case study

ERP in Chinese small enterprise

489

Yulong Li

*Gabelli School of Business,
Roger Williams University, Bristol, Rhode Island, USA*

Received February 2010
Revised September 2010
Accepted October 2010

Abstract

Purpose – The purpose of this paper is to examine a Chinese small enterprise's failed attempt to adopt enterprise resource planning (ERP) and to identify the critical success factors for these type of projects.

Design/methodology/approach – Information was collected through multiple site visits and semi-structured interviews with key staff of the ERP project, as well as examination of relevant company documentations.

Findings – The study identified nine critical success factors and discussed how these factors affected ERP adoption in a small farming feed manufacturing company.

Originality/value – Considering very few ERP project failures are recorded in the literature and the majority of existing ERP research in China was in the context of large state-owned or foreign-invested companies, this paper represents an early effort to explore the reasons why ERP adoption failed in the case study company. It provides valuable lessons to Chinese small enterprises on some of the common pitfalls they may encounter when pursuing ERP.

Keywords Manufacturing resource planning, Small enterprises, Critical success factors, China

Paper type Case study

1. Introduction

Enterprise resource planning (ERP) is a multi-module application software system that helps organizations to streamline their business processes. It revolutionizes organizational transaction structure by replacing a firm's many stand-alone applications with a united system that facilitates enterprise-wide integration. Numerous studies have consistently credited ERP for its ability to improve business decision-making capabilities and organizational performance. The most prominent benefits of ERP include better cost structure, faster customer response rate, higher information visibility, and improved process flow (Nikookar *et al.*, 2010; Romero *et al.*, 2010; Gattiker and Goodhue, 2005; Nicolaou, 2004). ERP has been regarded as a key part of organizational information infrastructure for modern businesses. In recent years, it becomes a world-wide sensation for companies to invest in ERP projects. Gattiker and Goodhue (2005) and Wang *et al.* (2006) believed that the trend to adopt ERP was expected to continue for years to come.

The past three decades have witnessed China's stunning metamorphosis from a primitive agriculture-dominated society into an industrialized economy (Gao and Yu, 2010). To meet the increasingly turbulent and diverse market expectations and to continuously improve productivity, many Chinese firms have been moving quickly to reengineer business processes by utilizing modern information technology (Ma and Dissel, 2008). A report by the consulting firm Analysys International (2007) indicated



that China was experiencing booming growth on ERP adoption. The ERP market size in China had achieved ¥6.93 billion in 2008, and was expected maintain an average annual growth rate of 6.8 percent to the year 2013 (Leader Forum, 2010).

Inspired by many of the world's most technologically advanced and best managed companies when serving as their original equipment manufacturer suppliers, large state-owned companies and foreign-invested or joint-ventured (with Western firms) enterprises were the earliest batch of ERP adopters in China (Martinsons, 2004). It is thus not surprising that the existing limited numbers of studies in the literature on the ERP in China are exclusively covering these large state-owned organizations and ones with considerable Western background (Su and Yang, 2010; Srivastava and Gips, 2009; Huang *et al.*, 2007; Wang *et al.*, 2006; Wu *et al.*, 2008; Woo, 2007; Ma and Dissel, 2008; Martinsons, 2004).

Small enterprises in China have been growing exponentially over the last three decades as the country emerges to become the "the world's factory" (Muhammad, 2008). This is partly because of the readily available raw materials and an abundance of suitable labor (Tang, 2007) and partly in response to external opportunities such as the exporting demands brought about by China's accession to the World Trade Organization (Cunningham and Rowley, 2008), the government policies since 1979 that encourage the establishment of township-village enterprises (Shi *et al.*, 2008), and the recent astonishing development in the domestic market due to the rapid increase of Chinese consumers' spending power (Qi and Prime, 2009). Small enterprises have been described as the "backbone of China's future economic growth" (Wang and Yao, 2002). Reports indicated that small and medium enterprises contributed around 60 percent of the gross industrial output value of China (Cunningham and Rowley, 2008), and represented 99 percent of all corporations registered in China (Chen, 2006). Witnessing the proven benefits that ERP brings to the early adopters, and encouraged by the central government's 863 program for national manufacturing system renovation (*Baidu Encyclopedia*, 2010) more and more Chinese small enterprises have become interested in adopting ERP. Several domestic software vendors such as KingDee and UFIDA have grown to be specialized in small-scale ERP packages. Meanwhile, these Chinese small enterprises are facing some unique challenges on adopting ERP.

The lack of prestige to compete with state-owned and foreign-background companies for manpower and resources (Cunningham and Rowley, 2008), left behind technical infrastructure (Han and Altman, 2009), discriminatory financial policy and government regulations (Wu, 2006), and the managerial structures heavily influenced by traditional Chinese social value system (Chen, 2008) have put additional pressure on Chinese small enterprises and thus have limited their ability to implement ERP. Considering the lack of research that is focused on the context of Chinese small enterprises and their uniqueness that makes existing ERP literature not fully applicable, we believe it is both practically and theoretically important to investigate the special hurdles and challenges of Chinese small enterprises when adopting ERP. Representing one of the earliest efforts in this direction, the current study will first survey the literature to identify some commonly recognized critical success factors for ERP adoption. Then we will base on the identified factors to examine the experience of a small farming feed manufacturer in Northwest China about how it had failed the ERP project. It is hoped that the results could provide some initial guidance to the perspective companies on where to focus attention and resources in planning an ERP project.

2. Critical success factors for ERP adoption process

ERP projects have notoriously high failure rate. Research found that more than two-third of these projects resulted in complete failure (Kwahk and Ahn, 2010; Chang *et al.*, 2008; Ho *et al.*, 2004). Other authors observed that 90 percent of ERP adoption ran behind schedule (Scott and Vessey, 2002) and/or over budget (Adam and O'Doherty, 2000). The consequence of failed ERP projects can be devastating (Razmi *et al.*, 2009), including bankruptcy (Chang *et al.*, 2008).

Considerable research endeavors have been taken by a number of authors and identified dozens of critical success factors in the literature (Table I). Synthesized from 14 different studies, the two separate lists compiled by Shanks *et al.* (2000) and Nah *et al.* (2003) provided comprehensive coverage of the internal aspects of ERP implementation. Zhang *et al.* (2003) simplified such list by categorized the factors into three general dimensions: organizational environments, people characteristics, and technical problems. They added an additional vendor support dimension to emphasize the role of ERP software suppliers and a culture impact factor to recognize the unique challenges of adopting ERP in the Chinese context. Lin *et al.* (2006) took a narrower perspective to focus on the specific organizational actions to adopt ERP project. Although worded differently, their factors were similar to the ones in the previous lists. Woo (2007) did a case study based on one single company in China, thus only discussed a sub-set of six factors. Build upon DeLone and McLean's (1992) famous IS success model, Chung *et al.* (2008, 2009) specifically studied the technical factors aiming to improve individual user's perceived usefulness to ERP.

Although the lists from different studies overlap with each other considerably, there appears to have no general consensus as to which set of factors is absolutely essential to the success of every ERP projects (Chung *et al.*, 2009). Individual companies must consider the exact combination of success factors based on their specific organizational circumstances. The current study will recognize nine critical success factors that are most relevant to the company being studied and regard them as benchmark indicators to evaluate the company's ERP adoption experience. Considering resources constrain is such a major challenge that Chinese small organizations are facing (Qi and Prime, 2009), we added "resources availability" as a new critical success factor, even though it was not clearly identified elsewhere in the literature. Table II listed the nine factors and their operational definitions.

3. Methodology

Exploratory case study method is used for the current study. Benbasat *et al.* (1987) suggest that case study is an appropriate research method when exploring new areas and issues where little theory is available or areas where research and theory are at their earliest stages. Our data collection involved multiple site visits to the company and semi-structured interviews to some of the key staff of the project, including the company's general manager, the ERP project coordinator, an IT specialist in the ERP project task force, and an end-user in the shipping department. Concerning any potential bias from a limited group of respondents, this paper does not seek to approve or disapprove any prior theory on ERP adoption but to document the actual experiences of those involved in managing, implementing, and using ERP in the company.

Table I.
Review of critical success
factors for ERP adoption

	Shanks <i>et al.</i> (2000)	Nah <i>et al.</i> (2003)	Woo (2007)	Lin <i>et al.</i> (2006)	Zhang <i>et al.</i> (2003)	Chung <i>et al.</i> (2008, 2009)	Current study
<i>Organizational environment</i>	Top MGMT support	Top MGMT support	Top MGMT support	Top MGMT support	Top MGMT support	Top MGMT support	Top MGMT support
<i>Technical issues</i>		Monitoring evaluation of performance			Culture impact		Culture impact
Data accuracy		Appropriate business and IT legacy systems		Data accuracy	Data accuracy		Resources availability
		Software development testing and troubleshooting	Appropriate modules	Suitability of software and hardware	Suitability of software and hardware	Software selection	Tech readiness
<i>People issues</i>		Teamwork and composition	Project team	Department support	Company-wide support	Internal support	System design and configuration
Balanced project team	Presence of champion	Project champion	Communication			Reporting capability	
		Communication			User involvement	Info system area participation	
Best people full time			Education and training		Education and training		Employee training
Education and training							
<i>Adoption process MGMT</i>							
Minimum customization		BPR with minimum customization		System customization	BPR		
Clear goals		Business plan and vision		Overall strategy			Project MGMT
Project MGMT		Project MGMT	Project MGMT	Project MGMT	Project MGMT		Project MGMT
Change management		Change management and culture	Process change				Change MGMT
<i>External support</i>							
External expertise			External consulting assistance	External consulting assistance	Vender support	Consultant support	Vender support

Dimensions	Organizational environment	Technical issues	People issues	Adoption process management	External support
Factors	<p>Top MGMT support</p> <p>Culture impact</p> <p>Resources availability</p> <p>Technical readiness</p> <p>System design and configuration</p> <p>Employee training</p> <p>Project MGMT</p> <p>Change MGMT</p> <p>Vender support</p>	<p>The organizational capability to absorb an ERP system in terms of compatibility with existing legacy system and employee technical qualifications to utilize the new system</p> <p>The process of defining and implementing architecture, modules, and interfaces of the ERP system</p> <p>The process to identify and address operational disruptions due to the transition to the new ERP system</p> <p>The process to bring about the successful completion of the ERP project</p> <p>The technical support provided by the supplier during and after the sale of ERP software to address the system application problems from users</p>	<p>The effects and consequences of the shared beliefs and commonly accepted behaviors of the hosting country or community to the project</p> <p>The availability of financial resources to fund the ERP project</p> <p>The organizational capability to absorb an ERP system in terms of compatibility with existing legacy system and employee technical qualifications to utilize the new system</p> <p>The process of defining and implementing architecture, modules, and interfaces of the ERP system</p> <p>The organizational efforts to cultivate positive attitudes to the project and to teach employees how to use the ERP system</p> <p>The process to identify and address operational disruptions due to the transition to the new ERP system</p> <p>The process to bring about the successful completion of the ERP project</p> <p>The technical support provided by the supplier during and after the sale of ERP software to address the system application problems from users</p>	<p>The effects and consequences of the shared beliefs and commonly accepted behaviors of the hosting country or community to the project</p> <p>The availability of financial resources to fund the ERP project</p> <p>The organizational capability to absorb an ERP system in terms of compatibility with existing legacy system and employee technical qualifications to utilize the new system</p> <p>The process of defining and implementing architecture, modules, and interfaces of the ERP system</p> <p>The organizational efforts to cultivate positive attitudes to the project and to teach employees how to use the ERP system</p> <p>The process to identify and address operational disruptions due to the transition to the new ERP system</p> <p>The process to bring about the successful completion of the ERP project</p> <p>The technical support provided by the supplier during and after the sale of ERP software to address the system application problems from users</p>	<p>The effects and consequences of the shared beliefs and commonly accepted behaviors of the hosting country or community to the project</p> <p>The availability of financial resources to fund the ERP project</p> <p>The organizational capability to absorb an ERP system in terms of compatibility with existing legacy system and employee technical qualifications to utilize the new system</p> <p>The process of defining and implementing architecture, modules, and interfaces of the ERP system</p> <p>The organizational efforts to cultivate positive attitudes to the project and to teach employees how to use the ERP system</p> <p>The process to identify and address operational disruptions due to the transition to the new ERP system</p> <p>The process to bring about the successful completion of the ERP project</p> <p>The technical support provided by the supplier during and after the sale of ERP software to address the system application problems from users</p>

Table II. Operational definitions of selected critical success factors for ERP adoption

4. Background of the case study company

Founded in 1995, the company under study is a subsidiary of a leading feed producer in China. The parent company (group) has 38 branch subsidiaries with 3,690 employees, covering 13 Chinese provinces, and achieves an average annual sales over ¥3 billion. Each subsidiary company is either wholly owned by the group or joint ventured with local partners and strategically located to serve different geographic regions of the country. Major managerial decisions are set to be made centrally by the group's founder and president himself. The product line includes farming feed for pig, chicken, and fish, and subdivided into varieties for these animals at different age groups. All products are based on secret formulas centrally developed and maintained at the headquarter R&D laboratories. However, each subsidiary does have high level of autonomy to slightly modify the formulas to reflect local animal nutrition needs, and plan for its own production level, pricing structure, and local market promotion and advertisement campaign, etc. Although audited monthly by the group headquarters, accounting is done independently at subsidiary level. The target subsidiary (HZ) of this study is located in Northwestern province of Shaanxi, with 77 employees and annual sales of about ¥68 million (\$10.04 million) in 2009.

5. ERP implementation at HZ

ERP adoption in HZ was the result of a top-down initiative from the group headquarters. It originated from a plant tour by the president to another company in a different industry in mid-2003. He was so fascinated with the potential performance benefits that an ERP project task force within the group's IT department was soon established to supervise the overall adoption processes. Following a group wide multi-year master plan, an independent K/3 ERP package by KingDee was installed in each subsidiary company. Aiming to minimize disruption by introducing changes gradually and to reduce initial project cost by incorporating a legacy sales management system into the new platform, the task force took a multi-phase strategy to adopt ERP in HZ. The initial phase included two modules: supply chain management and financial management. Out of the ten sub-modules designed for supply chain management, only four (production, inventory, procurement, and quality management) were put into place. An existing separate sales management system by a different vendor was kept as the make-shift third module to deal with sales and other customer-related transactions. Other functional modules such as human resources management, logistics management, and budget planning were said to be installed at later phases in the future. But no definite timeline had been set to even the task force itself.

The adoption process at HZ started in July 2006 when the general manager was briefed in a series of meetings at the headquarters with counterparts from other subsidiaries. The accounting director was then appointed as the local ERP project coordinator and was sent to a standard one-week intensive training program held at the headquarters. The task force project team came to HZ in August 2006 for hardware and software installation. A massive training campaign aimed to educate every one of its employees regarding the new system started in January 2007. Nine sessions were conducted at after-work hours by the accounting director himself using standard training materials distributed by the task force. In February 2007, the system was fully launched to replace the old book-keeping procedures. The project team then left for the installation at another subsidiary, and the accounting director/ERP project coordinator was held solely responsible for answering questions and solving the system utilization-related problems.

There were more problems with the system than HZ management had initially expected. The accounting department at headquarters was not satisfied with the time it took to retrieve some of the HZ's operational data from the system. The end-users at HZ complained about the frequent down time and the complexity of the system. There were actually more data entry errors than the pre-ERP era. Employee productivity had dropped significantly. The receiving department, in particular, had to routinely require its employees to stay overtime (without extra pay) to process similar amount of workload. The HZ management also had issues on the various reports generated by the system; citing them to be confusing, hard to understand, and of little help for decision making. Eventually, the resistance became so severe that several key employees had resigned from HZ.

There was a group-wide policy that the general managers are evaluated each quarter strictly on the basis of financial performance, and ranked with other subsidiaries. Falling into bottom three would be warned formally at the group council meeting. Although not clearly attributable to the system change, HZ's second-quarter profit margin had dropped 12 percent compared with the same period last year. The general manager was furious with the disruptions and afraid of further decline in the following quarter. He managed to convince the chief operating officer of the group to have the system discarded in October 2007 and switched back to the original inventory and accounting procedures only eight months of ERP implementation.

To fully uncover the primary reasons of this failed ERP project, we base on the nine critical success factors identified previously to discuss some of the major pitfalls that HZ had encountered.

5.1 Cultural impact

Hofstede (2001) pioneered the research on recognizing national culture in business environment. The works of Davison (2002) and Martinsons (2004) confirmed the impact of culture on IT adoption and implementation. While Avison and Malaurent (2007) noted that the difference in culture between Western businesses that had developed ERP and Chinese businesses was a major contributor to the failures in ERP adoption. Some fragments of the highly traditional national culture of China could get embedded in Chinese business culture and be carried over to the decision-making behaviors regarding ERP adoption (Srivastava and Gips, 2009). Compared with large state-owned enterprises and foreign-invested companies in China, small enterprises are often family based, less formal in organization structure and policy, thus are subjected to greater influences by traditional Chinese culture (Han and Altman, 2009).

Confucianism is a set of religion-like pragmatic rules and beliefs that have guided the Chinese social behaviors since 500 BC. One of the key principles is that "the stability of the society is based on unequal relationships" (Hofstede, 2001). It is believed that the society could function only when each member took its proper role. How people interact with others is based on the relative level of social status: ones with lower social status are expected to always respect and obey (unquestionably) the orders and principles of the ones with higher status (Zhu *et al.*, 2005). Chinese small enterprises predominantly rely on an "entrepreneurial mode of decision making", where the bosses act as paternal figures to make all business decisions based on "personal knowledge and intuition", rather than "objective criteria or formal quantitative methods" (Martinsons and Westwood, 1997). Thus, the decision support capability of ERP system could not be fully

taken advantage of in HZ. Local managers would rather believe in their personal judgment without really referring to the data generated by the ERP system when making important business decisions. They had the fear that ERP would deprive them of the privilege associated with information ownership and lead to status equalization with the lower status employees.

Another unique dimension of Chinese culture that characterizes the business environment of Chinese small enterprises is the personalism (or Guanxi)-based inter-firm and inter-department relationships (Han and Altman, 2009). Stemmed from high power distance, Chinese business communications emphasize horizontal coordination (Hofstede, 2001), social networks (Tung and Worm, 2001), harmonious partnerships, personal trust, commitment, favor, and reciprocity (Shin *et al.*, 2007). Organizational members in Chinese small enterprises prefer face-to-face communications (Martinsons and Westwood, 1997), rather than through the mediation of ERP systems (Zhu *et al.*, 2005). This is because of the high context of communication, where interactions tend to be “suggestive rather than articulate”, with few “explicit, consistent or enforceable communication rules” (Martinsons and Westwood, 1997). It is therefore nearly impossible to codify the business communications in Chinese small enterprises with ERP system, and transmit the transaction information effectively through technologies (Martinsons and Westwood, 1997).

These cultural impacts can be offset by the complex managerial hierarchies and the systematic organizational rules and policies in larger size state-owned and foreign-invested companies in China, small enterprises are not as fortunate due to their less formal organizational structure. Our observations revealed that the weekly routine executive meetings were still the primary inter-department communication channel at HZ. The general manager also confirmed in the interview that considerable portion of business issues with external partner were actually resolved in dinner parties outside the office. Such personalism-based business environment diminishes the value of communication efficiency bring about by ERP. As a result, HZ managers had complained seeing little performance improvement from ERP.

5.2 Resources availability

Although ERP projects are deemed expensive by almost any attempting company (Kwahk and Ahn, 2010; Chang *et al.*, 2008), Chinese small enterprises are under greater pressure of resources scarcity. “Resources poverty”, especially with respect to financial resources, has long put Chinese small enterprises at a disadvantaged position over other companies in the country. This is partly because of the tight governmental regulatory policies toward the private sector. Small enterprises often have “limited access to formal financial markets” (Wang and Yao, 2002; Shin *et al.*, 2007). Traditionally being frugal, they typically lay out a smaller budget for their IT projects, even when it is at the price of sacrificing system performance (Avison and Malaurent, 2007). A typical application by SAP or Oracle usually costs more than ¥5 million, while domestic ERP vendors only charge for as little as ¥700,000 (Liang *et al.*, 2004). It is not surprising these small Chinese enterprises would choose lesser known vendors simply because of the price differences. Actually, budget constraint was cited by the task force specialist as one of the major considerations for HZ to choose KingDee and to opt out the professional consulting services for the adoption project.

Another approach HZ had used to further reduce adoption cost was to install a crippled ERP package with limited number of modules and to retain the legacy sales

management system. The new system was troubled by compatibility problems and demonstrated little integration. HZ employees quickly lost interest to the new system and withdraw their initial support.

5.3 Technological readiness

Chinese small enterprises have been frequently reported as lack appropriate “technology capability” for adopting advanced IT system like ERP (Zhang *et al.*, 2008). Shi *et al.* (2008) found that most Chinese small enterprises are currently confronted with difficulties such as obsolete equipment and technology, untrained and inexperienced laborers. The technology infrastructures at HZ were apparently not ready for ERP. HZ’s operational data were designed to be accessible in real time by the group headquarters. However, communication failures had been frequent due to limited band width and interface conflicts with the server’s firewall.

Employee technology qualification was another concern. Most of the HZ end-users outside the accounting departments were not even graduated from high school. They have no computer-related skills other than limited online chatting or web browsing experiences. The system’s standard multi-layer sub-menu interface was complained as “too complicated”. One operator could not catch up with data-entry while busy weighing the shipments on delivery trucks. She simply typed in some approximate numbers hours after that particular shipment at the end of her shift. Inaccurate input from similar practices jeopardized the data integrity of the system, thus substantially reduced the benefits of ERP.

5.4 Top management support

Support from top management has been stressed as an essential ingredient for ERP adoption, particularly when the outcomes are dynamic and uncertain (Zhang *et al.*, 2003; Woo, 2007). Liang *et al.* (2007) found that the coercive pressure from top management can provide leadership role in sending out clear signals to any doubts and settling potential disputes, while the institutional pressure helps to secure necessary organizational resources to the project.

Unfortunately, the top management at HZ did not give enough commitment the project deserved. Considered as an IT project with little strategic implications, the project had difficulty in gaining sponsorship from members of senior management. The president was the only major advocate for the project at top executive level. But he had been too busy and often distracted by other commitments to provide the task force with consistent support. It had been structurally impossible for the project task force to receive the collaboration from other departments at the headquarters. Newly hired from a different industry, the task force manager, the highest level manager overseeing ERP project at the entire group, was an IT engineer with no previous executive level managerial experience. It is a common situation in Chinese companies, where isolated task force managers had no authority or political power to facilitate business process changes required for proper ERP implementation (Xue *et al.*, 2005; Woo, 2007). There were multiple times that schedules were altered and key employees or ear-marked resources were taken away from the project by other divisional managers before consulting with the task force. Locally at the subsidiary level, the general manager had not been very cooperative, as well. Worrying too much about the disruptions the project has caused to the daily operation (and the financial consequences to him),

the general manager only allowed the minimum numbers of training sessions to the employees and arranged all of them at after-work hours without pay.

5.5 Project management

Considering ERP is designed for rule-based and mature operations (Brown and He, 2007), to adopt ERP under the personal and implicit agreement-based governance system in Chinese culture undoubtedly requires careful strategic analysis and meticulous project planning (Xue *et al.*, 2005). Chinese small enterprises, still experiencing growing pains from the recent astronomical development, were far behind from other companies in experiences on managing business process reengineering and large-scale technological innovation projects.

Our observations found there was surprisingly no vision or mission statement installed for this project at HZ. Both the local management and employees regarded the project as just another technology initiative rather than strategic business process reengineering. The project coordinator/accounting director of HZ further commented that the headquarters were “just simply following a popular trend in the industry”, without truly understood “what process improvements ERP could bring to HZ” and “how the new system would affect the local operations”. The task force prescribed identical adoption plans from the headquarters for all subsidiaries without considering individual subsidiary differences nor communicating sufficiently with the local managers. It resulted in an unrealistic adopting plan with no identifiable project milestones and a workforce that did not have the “big picture” view of the project and its goals. Cross-functional cooperation did not exist, as many managers put the needs of their department above the needs of the enterprise.

5.6 Change management

Organizations often have to change the way they do business in order to successfully implement an ERP system (Su and Yang, 2010). Such change can easily overwhelm a small enterprise since it involves both redesigning business processes and reshaping people’s attitudes and behaviors in a short period of time. Dunn *et al.* (2005) argued that if change management is not handled well, ERP projects are apt to fail. One of the biggest hurdles Chinese small enterprises are facing when pushing forward an organizational change project is the national culture that places great value on the past and stability (Woo, 2007). Having immersed in a copycat economy for long (Schrage, 2004), these Chinese small enterprises have developed an organizational mentality that is reluctant to innovate and thus have accumulated little experience in managing large-scale organizational change. Consequently, managers often could not recognize the need to redesign key processes to fit the ERP system (Woo, 2007) or know how to implement the required changes.

The task force developed a uniform ERP architecture for all subsidiaries at the headquarters without even coming to HZ to analyze its shop floor operations. They had failed to take such opportunity to restructure the organization and optimize the business process but simply automate the existing one. During implementation, the task force had been overly cautious in introducing the new system. Although keeping the legacy sales management systems and installing a crippled system with limited modules could minimize the disruption to normal operations, they had underestimated the effects of poor system performance. Seeing a more complex system producing no obvious productivity improvements, users were more likely to resist the changes ERP

had brought about. Many of the HZ employees regarded ERP as a pure accounting package thus irrelevant to them even after going through the training sessions. When the users fail to see the benefits and are against the changes, a system would have slim chance of success.

5.7 Employee training

Chinese small enterprises, including HZ, have traditionally placed employee training at a low priority. Owing to the country's oversupply of labor, businesses have historically been hiring and maintaining only those employees with skills that can be of immediate use to the company and have largely ignored providing employees with career development opportunities (Au *et al.*, 2008). Training was often regarded as an expense that should be reduced or eliminated at all cost. General managers from all subsidiaries were supposed to be trained in a full-day seminar at the headquarters. However, the participation was not made mandatory. HZ's general manager missed half of it. The interview to him revealed that he had little understanding to the ERP concepts and referred the new system as more or less a "spy mechanism" that the group headquarters could use to "watch him from the back".

At the local level, the ERP project coordinator was responsible for the training programs. However, as an accountant himself, the coordinator had no prior experience with any type of information systems. All of his knowledge about ERP was from a one-week seminar he had received several months ago. The entire body of the employee was trained together in nine lecture-style sessions (2 hours each), the minimum number of hours required by the headquarters. The resistance was high. One employee commented that he felt "tired" and "frustrated" at having to stay after work without pay for those sessions. The training guidebook was also criticized as "poorly complied", and "filled with jargons". It was particularly challenging for the low-level employees, most of whom had technology phobia because of limited education (without high-school diploma). The employees who need to directly operate on the new system such as those in accounting and procurement departments complained the training was too general and too fast, because they only received one additional tutoring hour to actually work on computers. While the other managers felt the training sessions has focused too much on operational details since they set in the same nine sessions with the operational employees. Many of them thus failed to recognize the strategic ramifications of the new system to their own work and reluctant to use the system to assist their managerial decision making.

It is obvious that training should be handled more effectively. At the general manager's level, he should have never been allowed to be absent from the seminar. Without the true understanding to the benefits, as well as challenges ERP would bring, it was nearly impossible for him to support the project whole heartedly. At the general training level, it should at least be customized for different employee groups. Above all, under no circumstances training should be done during employees' spare time.

5.8 System design and configuration

The essence of ERP is to facilitate inter-departmental communication and coordination by establishing a common database (Laudon and Laudon, 2000). With a database only including incomplete and fragmented information from two modules installed, the system in HZ could not adequately explore the usually hidden inter-transaction relationships. Hence, it became impossible to establish any meaningful cross-functional integration.

Moreover, the system at HZ could be regarded as theoretically incomplete due to its coverage on internal functions only and the absence of mechanism to allow integration externally with suppliers and customers. The benefits of the system were more on operational automation. It had made no impact on even short-term decision support, not mentioning system planning at strategic level.

The configuration had been criticized for its poor usability, as well. At the structural level, the system did not implement local data warehousing. All data storage was set to be handled centrally at servers located at the group headquarters. After running for some time, data volume could increase tremendously and to a point where data communication became considerably slower and inefficient. The problem was accentuated considering the limited connection bandwidth between the headquarters and HZ.

At the end-user level, the system failed to consider process optimization for each tasks. The literature identified data and business process standardization of as a critical enabler for ERP systems (Gattiker and Goodhue, 2005). Ideally, organizations should modify and standardize its internal processes first and then design the ERP system accordingly. However, the system designers had largely ignored the procedures to analyze and optimize the current business processes at HZ. For example, in order to record the actual quantity of incoming materials, the system required the scale operator to input the weight of the empty truck when he/she was weighing a full-loaded truck. But in reality, the operator would not know the empty truck weight until the truck had finished unloading and returned to the scale. Another example was in inventory management module, some of the same items were indexed several times and given multiple stock-keeping unit numbers simply because they were called differently in different departments. These problems could have been fixed easily if the task force had studied the work processes more thoroughly. Rushing into misconfigured system had caused tremendous utilization problems to the end-users.

5.9 Vendor support

The domestic vendors have taken an advantage of the “cost at priority” mentality of Chinese small enterprises by offering simplified ERP packages at a fraction of cost (Brown and He, 2007). A system by Chinese domestic vendors on average only costs one-fifth of one by internationally renowned suppliers (Liang *et al.*, 2004). However, these vendors often do not provide adequate level of technical support to their customers. This is partially because of the vendors’ recent astonishing growth at the domestic market. For example, KingDee’s total sales had increased from less than ¥150 million in 1998 when its K/D3 ERP software was introduced to ¥870 million in 2008. In their haste to gain market share, these vendors experience considerable shortage on qualified software support personnel, practically those with both business process analysis background and IT qualifications. The ERP Project Coordinator at HZ commented that the service responses from KingDee were slow and the staff was purely technical. These software engineers had little understanding to the business implications of transactions in the system. Thus, they could only address some of the most basic operation-related issues. Such weakness places more pressure on the in-house ERP project task force, which unfortunately lacked the manpower and expertise to handle complex enquires.

6. Conclusions

Although there are numerous studies on ERP implementation, a major problem with the existing ERP case studies is that very few failures are recorded in the literature;

perhaps because few companies wish to publicize their failures. Thus, the reasons why adoption fails were not fully explored in the literature. This is particularly true for Chinese small companies. Current knowledge available on the ERP in China as a whole still remains limited, let alone concerning Chinese small enterprises. By reviewing the pitfalls of HZ's adoption processes, the current study prompts the prospective companies with a number of warnings.

First, Chinese small enterprises must be aware of the inherited challenges and be genuine to their intention to pursue ERP. ERP is not a one-cure-fits-all solution for all organizational problems. The identified nine critical success factors can serve as a starting point for prospective firms to evaluate their organizational readiness, both operationally and financially. Although companies in China were believed to be subjected to similar challenges and problems experienced by Western businesses in the literature (Woo, 2007), Chinese small enterprises are facing additional difficulties such as national culture, non-engaging top management, and very limited resources available for the project. They are also affected more substantially due to the significantly lower level of these factors and the interaction effects when putting all factors together. For example, it is a mission impossible to train a cohort of individuals who has absolutely no prior knowledge about computer to use a complicated ERP system within a hostile organizational environment in relatively short period of time, especially when there is sever monetary constraint, powerless project manager, and little vendor support. Based on the current situation in many of the Chinese small enterprises, there may still be a long way to go for them to be able to adopt ERP system successfully and fully take advantage of all the potential benefits ERP can provide. The reality is that some of these companies, from the top management all the way to the bottom level employees, do not really understand or even care to learn the essence of ERP philosophy, but more to use ERP as a propaganda tool to sugarcoat their dated operational processes for public relationship reason. It may not be appropriate for these companies to attempt ERP at the current moment. They might better start with automating transactions and other smaller scale business process reengineering project to accumulate experience.

Second, for those Chinese small enterprises which are truly interested in adopting ERP, they must be willing to engage in substantial organizational restructuring. Senior management must be committed with their involvement and publicly identify the project as a top priority. They must recognize that adopting ERP is more to introduce a new managerial philosophy than a technological project that simply installs a computer system. It means that the existing organizational structure and policies that everybody has been so comfortable with may have to be replaced fundamentally. For example, the general manager at HZ should be evaluated and motivated differently. The organizational policy to compensate him strictly based on HZ's quarterly financial performance and to rank all general managers with warning to the bottom three should be removed. Managing by fear and intimidation is not sustainable (Bryant, 2010).

Third, Chinese small enterprises should be practical and candid in establishing adoption agendas and assessing their project management capabilities. Owing to limited experiences and autocratic management style, the presidents in many Chinese small enterprises are often the solo decision makers to initiate an ERP project. Without thorough analysis, he or she can be easily carried away, ignore some of the major challenges, and develop an over-optimized adoption agenda. Rushing into an ERP project such as to design ERP architecture before even analyzing the business process

is a frequent mistake for ERP adoption (Panorama Consulting Group, 2010). To save cost, resource thirsty Chinese small enterprises usually found it appealing to self-direct everything. Introducing a complex system like ERP requires considerable experiences and knowledge which is very likely beyond the reach of a small enterprise. They are thus advised to consider seeking professional assistance from external consulting companies, whose established protocols may help the attempting small enterprises to ease the transition (Plaza and Rohlf, 2008).

Fourth, Chinese small enterprises should be cautious in balancing the efforts to introduce the new system and to maintain the normal operations. Small companies are often not as well endowed as their larger counterparts to withstand the disruptions caused by a substantial organizational change. The executives must consider the impact of the ERP adoption project when managing issues such as allocating resources, organizing training programs, and designing employee evaluation and compensation. Too much stress on the new system can dilute the limited resources and put the company at financial risk; while emphasizing the existing operations excessively may magnify the disruptions and drag the project for too long. Additionally, the management must be ready to accommodate the learning curve effects of the new system. It can be slow for the new system to display positive performance results. Based on the scale of change ERP has brought to the system, some organizations may even find disruptions outweigh the performance gain initially (Plaza and Rohlf, 2008). Affected employees and managers should be patient and not to oppose the new systems too soon.

To find an effective approach for ERP adoption is a generic problem facing all organizations, it is however a more acute one for Chinese small enterprises due to these companies' rapidly growing interest to ERP, the unique challenges they are facing, as well as the small margin of error they can afford. Although the current study has the limitations of using subjective interviews and qualitative analysis based on one single company, it does provide some initial understanding to the critical success factors for this type of ERP projects. We have also demonstrated that the Chinese small enterprises are different in many ways, and caution must be taken when comparing their ERP adoption experiences and that of others in the literature. Future research can be directed to study the ramifications of these differences. More specifically, empirical studies are needed to verify whether the critical success factors we have identified are applicable to other Chinese small enterprises, in general.

References

- Adam, F. and O'Doherty, P. (2000), "Lessons from enterprise resources planning implementations in Ireland: towards smaller and shorter ERP projects", *Journal of Information Technology*, Vol. 15 No. 4, pp. 305-16.
- Analysys International (2007), *China ERP Market Quarterly Tracker Q1*, Analysys International Inc., Beijing.
- Au, A.K., Altman, Y. and Roussel, J. (2008), "Employee training needs and perceived value of training in the Pearl River Delta of China: a human capital development approach", *Journal of European Industrial Training*, Vol. 32 No. 1, pp. 19-31.
- Avison, D. and Malaurent, J. (2007), "Impact of cultural differences: a case study of ERP introduction in China", *International Journal of Technology and Information Management*, Vol. 27, pp. 368-74.

- Baidu Encyclopedia* (2010), "863 Program" (in Chinese), available at: <http://baike.baidu.com/view/1713.htm> (accessed 31 August 2010).
- Benbasat, I., Goldstein, D.K. and Mead, M. (1987), "The case research strategy in studies of information systems", *MIS Quarterly*, Vol. 11 No. 3, pp. 369-86.
- Brown, D.H. and He, S. (2007), "Patterns of ERP adoption and implementation in China and some implications", *Electronic Markets*, Vol. 17 No. 2, pp. 133-41.
- Bryant, J.H. (2010), "Leading with love in a fear-based world", *Leader to Leader*, Vol. 56, pp. 32-8.
- Chang, M.-K., Cheung, W., Cheng, C.-H. and Yeung, J.H.Y. (2008), "Understanding ERP system adoption from the user's perspective", *International Journal of Production Economics*, Vol. 113 No. 2, pp. 928-42.
- Chen, J. (2006), "Development of Chinese small and medium-sized enterprises", *Journal of Small Business and Enterprise Development*, Vol. 13 No. 2, pp. 140-7.
- Chen, N. (2008), "Decoding the SME predicament", *Beijing Review*, Vol. 51 No. 33, p. 35.
- Chung, B.Y., Skibniewski, M.J. and Kwak, Y.H. (2009), "Developing ERP systems success model for the construction industry", *Journal of Construction Engineering and Management*, Vol. 135 No. 3, pp. 207-16.
- Chung, B.Y., Skibniewski, M.J., Lucas, H.C. Jr and Kwak, Y.H. (2008), "Analyzing enterprise resources planning systems implementation success factors in the engineering-construction industry", *Journal of Computing in Civil Engineering*, Vol. 22 No. 6, pp. 373-82.
- Cunningham, L.X. and Rowley, C. (2008), "The development of Chinese small and medium enterprises and human resources management: a review", *Asia Pacific Journal of Human Resources*, Vol. 46 No. 3, pp. 353-79.
- Davison, R.M. (2002), "Cultural complications of ERP", *Communications of the ACM*, Vol. 45, pp. 109-11.
- DeLone, W.H. and McLean, E.R. (1992), "Information systems success: the quest for the dependent variable", *Entrepreneurship Theory Practice*, Vol. 3 No. 1, pp. 60-95.
- Dunn, C.L., Cherrington, J.O. and Hollander, A.S. (2005), *Enterprise Information Systems: A Pattern-based Approach*, 3rd ed., McGraw-Hill, New York, NY.
- Gao, P. and Yu, J. (2010), "Emerging markets: has China caught up in IT?", *Communications of the ACM*, Vol. 53 No. 8, pp. 30-2.
- Gattiker, T.F. and Goodhue, D.L. (2005), "What happens after ERP implementation: understanding the impact of inter-dependence and differentiation on plant-level outcomes", *MIS Quarterly*, Vol. 29 No. 3, pp. 559-85.
- Han, Y. and Altman, Y. (2009), "Supervisor and subordinate Guanxi: a grounded investigation in the People's Republic of China", *Journal of Business Ethics*, Vol. 88, pp. 91-104.
- Ho, C.F., Wu, W.H. and Tai, Y.M. (2004), "Strategies for the adaptation of ERP systems", *Industrial Management & Data Systems*, Vol. 104 No. 3, pp. 234-51.
- Hofstede, G. (2001), *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations*, 2nd ed., Sage, London.
- Huang, S.Y., Lin, C.W., Wong, S.L. and Tsai, M.C. (2007), "The impact of ERP implementation on business performance – an integrated investigation model", *International Journal of Manufacturing Technology and Management*, Vol. 12 No. 4, pp. 342-59.
- Kwahk, K.-Y. and Ahn, H. (2010), "Moderating effects of localization differences on ERP use: a socio-technical systems perspective", *Computer in Human Behavior*, Vol. 26, pp. 186-98.

- Laudon, K.C. and Laudon, J.P. (2000), *Management Information Systems: Organization and Technology in the Networked Enterprise*, Prentice-Hall, Upper Saddle River, NJ.
- Leader Forum (2010), "The analysis on the competition in Chinese ERP market" (in Chinese), available at: www.ileader.com.cn/html/2009/12/16/30243.htm (accessed 27 August 2010).
- Liang, H., Saraf, N., Hu, Q. and Xue, Y. (2007), "Assimilation of enterprise systems: the effects of institutional pressures and the mediating role of top management", *MIS Quarterly*, Vol. 31 No. 1, pp. 59-87.
- Liang, H., Xue, Y., Boulton, W.R. and Byrd, T.A. (2004), "Why Western vendors don't dominate China's ERP market", *Communications of the ACM*, Vol. 47 No. 7, pp. 69-72.
- Lin, W.T., Chen, S.C., Lin, M.Y. and Wu, H.H. (2006), "A study on performance of introducing ERP to semiconductor related industries in Taiwan", *International Journal of Manufacturing Technology*, Vol. 29, pp. 89-98.
- Ma, X. and Dissel, M. (2008), "Rapid renovation of operational capabilities by ERP implementation: lessons from four Chinese manufacturers", *International Journal of Manufacturing Technology and Management*, Vol. 14 Nos 3/4, pp. 431-47.
- Martinsons, M.G. (2004), "ERP in China: one package, two profiles", *Communications of the ACM*, Vol. 47, pp. 65-8.
- Martinsons, M.G. and Westwood, R.I. (1997), "Management information systems in the Chinese business culture: an explanatory theory", *Information & Management*, Vol. 32, pp. 215-28.
- Muhammad, S.S. (2008), "China, the world's factory: from a producer to a consumer economy", available at: www.americanchronicle.com/articles/view/60912 (accessed 27 August 2010).
- Nah, F.F.-H., Zuckweiler, K.M. and Lau, J.L.-S. (2003), "ERP implementation: chief information officers' perceptions of critical success factors", *International Journal of Human-Computer Interaction*, Vol. 16 No. 1, pp. 5-22.
- Nicolaou, A.I. (2004), "Firm performance effects in relation to the implementation and use of enterprise resources planning systems", *Journal of Information Systems*, Vol. 18 No. 2, pp. 79-105.
- Nikookar, G., Yahya Safavi, S., Hakim, A. and Homayoun, A. (2010), "Competitive advantage of enterprise resources planning vendors in Iran", *Information Systems*, Vol. 35 No. 3, pp. 271-7.
- Panorama Consulting Group (2010), *2010 ERP Report*, Panorama Consulting Group, Denver, CO, available at: www.sdexec.com/pdf/research/2010/4si_panorama_erp.pdf (accessed 26 August 2010).
- Plaza, M. and Rohlf, K. (2008), "Learning and performance in ERP implementation projects: analyzing and managing consulting costs", *International Journal of Production Economics*, Vol. 115 No. 1, pp. 72-85.
- Qi, L. and Prime, P.B. (2009), "Market reforms and consumption puzzles in China", *China Economics Review*, Vol. 20 No. 3, pp. 388-401.
- Razmi, J., Sangari, M.S. and Ghodsi, R. (2009), "Developing a practical framework for ERP readiness assessment using fuzzy analytic network process", *Advances in Engineering Software*, Vol. 40 No. 11, pp. 1168-78.
- Romero, J.A., Menon, N., Banker, R.D. and Anderson, M. (2010), "ERP: drilling for profit in the oil and gas industry", *Communications of the ACM*, Vol. 53 No. 7, pp. 118-21.
- Schrage, M. (2004), "Designed and made in China", *Technology Review*, Vol. 107 No. 3, p. 20.
- Scott, J.W. and Vessey, I. (2002), "Managing risks in enterprise systems implementations", *Communications of the ACM*, Vol. 45 No. 4, pp. 74-81.

- Shanks, G., Parr, A., Hu, B., Corbitt, B., Thanasankit, T. and Seddon, P. (2000), "Differences in critical success factors in ERP systems implementation in Australia and China: a cultural analysis", *Proceedings of the 8th European Conference on Information Systems, Vienna, Austria*.
- Shi, H., Peng, S.Z., Liu, Y. and Zhong, P. (2008), "Barriers to the implementation of cleaner production in Chinese SMEs: government, industry and expert stakeholders' perspectives", *Journal of Cleaner Production*, Vol. 167, pp. 842-52.
- Shin, S.K., Ishman, M. and Sanders, G.L. (2007), "An empirical investigation of socio-cultural factors of information sharing in China", *Information & Management*, Vol. 44, pp. 165-74.
- Srivastava, M. and Gips, B.J. (2009), "Chinese cultural implications for ERP implementation", *Journal of Technology Management & Innovation*, Vol. 4 No. 1, pp. 105-13.
- Su, Y.-F. and Yang, C. (2010), "A structural equation model for analyzing the impact of ERP on SCM", *Expert Systems with Applications*, Vol. 37 No. 1, pp. 456-69.
- Tang, Y. (2007), "Marketing and business performance of construction SMEs in China", *The Journal of Business & Industrial Marketing*, Vol. 22 No. 2, pp. 118-25.
- Tung, R.L. and Worm, V. (2001), "Network capitalism: the role of human resources in penetrating the China market", *International Journal of Human Resource Management*, Vol. 12, pp. 517-34.
- Wang, E.T.G., Klein, G. and Jiang, J.J. (2006), "ERP misfit: country of origin and organizational factors", *Journal of Management Information Systems*, Vol. 23 No. 1, pp. 263-92.
- Wang, Y. and Yao, Y. (2002), "Market reforms, technological capabilities and the performance of small enterprises in China", *Small Business Economics*, Vol. 18, pp. 195-209.
- Woo, H.S. (2007), "Critical success factors for implementing ERP: the case of a Chinese electronic manufacturer", *Journal of Manufacturing Technology*, Vol. 18 No. 4, pp. 431-42.
- Wu, J. (2006), "Status and promotion policies of the small medium size enterprises in China", paper presented at the Official Event Newsletter of the AABAC's Business CHINA 2006 Forum and Exhibition.
- Wu, L.C., Ong, C.S. and Hsu, Y.W. (2008), "Active ERP implementation management: a real option perspective", *Journal of Systems and Software*, Vol. 8, pp. 1039-50.
- Xue, Y., Liang, H., Boulton, W. and Snyder, C. (2005), "ERP implementation failures in China: case studies with implications for ERP vendors", *International Journal of Production Economics*, Vol. 97 No. 3, pp. 279-95.
- Zhang, L., Lee, M.K.O., Zhang, Z. and Banerjee, P. (2003), "Critical success factors of enterprise resources planning systems implementation success in China", *Proceedings of 36th Hawaii International Conference on System Sciences, Big Island, HI, USA*.
- Zhang, M., Sarker, S. and Sarker, S. (2008), "Unpacking the effect of IT capability on the performance of export-focused SMEs: a report from China", *Information Systems Journal*, Vol. 18, pp. 357-80.
- Zhu, Y., Bhat, R. and Nel, P. (2005), "Building business relationships: a preliminary study of business executives' views", *Cross Cultural Management*, Vol. 12, pp. 63-84.

Corresponding author

Yulong Li can be contacted at: yli@rwu.edu

To purchase reprints of this article please e-mail: reprints@emeraldinsight.com
Or visit our web site for further details: www.emeraldinsight.com/reprints

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.