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# **IT Management of Chinese Firms: Quantitative Analysis by Using Survey Data**

**Xiaoyang FENG**

Tianjin University

**MOTOHASHI Kazuyuki**

RIETI



Research Institute of Economy, Trade & Industry, IAA

The Research Institute of Economy, Trade and Industry

<http://www.rieti.go.jp/en/>

**IT Management of Chinese Firms:  
Quantitative Analysis by Using Survey Data<sup>1</sup>**

Xiaoyang Feng<sup>2</sup> and Kazuyuki Motohashi<sup>3</sup>

**Abstract**

This paper presents quantitative analysis of IT use, management, and organization at Chinese firms, based on the “International Comparative Survey of Firms’ IT Strategies” conducted by the Research Institute of Economy, Trade and Industry (RIETI). The results of analysis show that Chinese firms have achieved remarkable progress with regards to the ability of IT to support business and strategies, and they have a clear comprehension of information resources and realize the importance of IT in some degree.

However, we cannot find significant impact of IT use on firm profitability. This may be due to the fact that application of IT in Chinese firms is still in transition from the IT support stage of development, and further efforts for improving IT management are needed. In terms of IT organization, the share of firms with a chief information officer (CIO) is quite large, but most of the CIOs are only IT department managers. The status of CIOs in Chinese firms is low, and their power to influence managerial decisions at the company-wide level is still weak.

**Keywords:**

Chinese firms, IT systems, firms’ performance, IT strategy, CIO, outsourcing

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<sup>2</sup> Graduate Student, Tianjin University,, Graduate School of Management, Information System Management Department

<sup>3</sup> Professor, the University of Tokyo, Graduate School of Engineering, Department of Technology Management for Innovation and Faculty Fellow, Research Institute of Economy, Trade and Industry (RIETI), corresponding author, e-mail: [motohashi@tmi.t.u-tokyo.ac.jp](mailto:motohashi@tmi.t.u-tokyo.ac.jp)

## **1. Introduction**

China is the country to make the most noticeable economic growth over the last decade and has made remarkable accomplishments in the process of constructing its economy and society. According to the catch-up theory, China has a preponderance of direct profit from high-tech production and the experience of developed countries so that it has been able to accelerate economic growth and shorten the distance between itself and those countries (Meng and Lee 2007). Regarding high technology, information technology must be the most significant resource and first driving force for development of the world economy in this digital era.

For firms, information technology not only brings favorable and unconventional opportunities, but also creates many more challenges. To some extent, IT has led to reorganization of firms, transformation of business, improvement of supply chains, and so on. And increasingly more experiences show that IT has had a positive influence on firm performance, productivity, competition, and employment.

Increasing numbers of Chinese firms have realized the importance of applying IT to improve performance in order to keep up with this trend and avoid being defeated in the international competition. Particularly in recent years, a large portion of Chinese firms have invested heavily and adopted various IT systems into management. Against this backdrop, it is necessary to measure Chinese firms' ability to use information resources, which includes comprehension of information resources, awareness of IT strategy, deployment of software and hardware facilities, and the support ability of IT to business.

Japan's Research Institute of Economy, Trade and Industry (RIETI) recently completed an "International Comparative Survey of Firms' IT strategies." This survey covered the level of IT system deployment (e.g., IT investment per sale and the coverage of IT system use by types of business), the relation between IT and management strategies, and internal and external IT management organization (chief information officers' duties, IT outsourcing, etc.). Motohashi (2007) provided a comparative analysis of Japanese, U.S., and Korean firms on IT and management, based on the firm level data from this survey. This paper focuses on the Chinese data to see how Chinese firms deploy and manage their IT systems.

The next section of this paper introduces the detailed contents of the survey. The third section analyzes the use of IT by Chinese firms and its impact on profitability. This section is followed by one for describing IT management and organization. IT organization includes both the internal IT management structure, such as the role of the chief information officer (CIO), and the external one, focusing on issues relevant to IT outsourcing. The final section summarizes the conclusions of the paper and provides future directions for research.

## **2. Data Description**

The "International Comparative Survey of Firms' IT strategies" covered firms in

Japan, the U.S., China, and Korea, aimed at revealing these countries' firms' IT strategies and how they utilize IT. Because the level of IT use in firms depends on various factors, which include the type of industry and business activity, asset and staff size, target and capability of management, etc, it is difficult to directly measure the ability of their IT use. Therefore, in this survey, we tried to measure the fitness between individual firm strategies and firms' IT management styles.

This survey focuses mainly on four topics: "Deployment of IT systems," "The relation between IT and management strategies," "Internal IT organization," and "Outsourcing of IT systems." Deployment of IT systems includes the level of deployment classified by the type of business and how enterprise resource planning (ERP) and supply chain management (SCM) are implemented. The relation between IT and management strategies includes 12 items that a firm perceives as important for its managerial strategies and the contribution of IT systems to achieve these management goals is investigated. Internal IT organization includes questions related to the role of the CIO and the important duties of that role. Outsourcing of IT systems surveys topics such as the relationship with the outsourcing partner firm and the type of business that is outsourced (see RIETI [2007] for details).

Data were collected via face-to-face interviews and compiled by the Center for Applied Statistics at Renmin University of China. Because the survey mainly focused on the questions of strategy management and the decision-making process, most respondents (over 80%) to the survey were managers or executives who take charge of firms' decision-making and IT strategies. The survey for Chinese firms was conducted from May 27 to June 17, 2007 and amassed 179 valid questionnaires.

The firms participating in the survey were from various industries that can be divided into five classifications: manufacturing, financial sector (banks, securities firms, insurance), distribution (retail, wholesale), ICT service sector (communications, information industry), and others. Table 1 is the sample size according to industry classification. The survey also classified firm scale according to the number of employees, which is given in Table 2. Firms' organization form is another consideration. Firms are divided into four categories: independent firm, parent firm of domestic group, subsidiary of domestic group, and subsidiary of foreign-owned enterprise group (Table 3). First, the share of the ICT service sector (software, internet services, etc.) is relatively large in this sample. The other sector, including research and development (R&D) and professional services companies, also has a larger number of firms. It should be noted that the sample is skewed toward high-tech firms, which deploy relatively advanced IT systems as compared to typical Chinese firms. Second, the sample covers not only large firms but also small firms with less than 50 employees. Finally, there is a large share of foreign-owned companies, which are presumably better at IT management than domestic firms.

Table 1: Sample size by industry classification

<b>Classification</b>	<b>Freq.</b>	<b>Percent</b>
Manufacturing	44	<b>(24.6%)</b>
Finance	10	<b>(5.6%)</b>
Distribution	35	<b>(14.0%)</b>
ICT services	37	<b>(20.7%)</b>
Others	63	<b>(35.2%)</b>
<b>Total</b>	<b>179</b>	

Table 2: Sample size by staff scale

<b>Employees</b>	<b>Freq.</b>	<b>Percent</b>
Less than 50	17	<b>(9.5%)</b>
50 - 99	28	<b>(15.6%)</b>
100 - 499	55	<b>(30.7%)</b>
500 - 999	18	<b>(10.1%)</b>
1000 - 4,999	37	<b>(20.7%)</b>
More than 5,000	24	<b>(13.4%)</b>
<b>Total</b>	<b>179</b>	

Table 3: Sample size by organization form

<b>Attribute</b>	<b>Freq.</b>	<b>Percent</b>
Independent firm	75	<b>(41.9%)</b>
Parent company of domestic firm group	30	<b>(16.8%)</b>
Subsidiary company of domestic firm group	43	<b>(24.0%)</b>
Subsidiary company of foreign-owned firm	31	<b>(17.3%)</b>
<b>Total</b>	<b>179</b>	

### 3. IT Use of Chinese Firms

Table 4 shows the distribution of firms by IT intensity (share of IT expenditure to sales). It is found that 26% Chinese sample firms' ratios of IT expenditure to sales reach 5%, and about 27% firms are less than 1%. The average ratio of IT to sales for China is 4.1%.<sup>4</sup> Figure 1 shows the comparison of the ratio by industry classifications. In this figure, comparable numbers of Korean, Japanese, and US firms are also displayed. It is typical that ICT service firms show the highest IT intensity figures, more than 6%, and the finance sector follows. This can be explained by the fact that banks are required to equip themselves with advanced and security-guaranteeing IT facilities in order to provide secure, convenient, and fast services to their customers. However, in contrast, the ratio of IT expenditure to sales is, on average, not very high

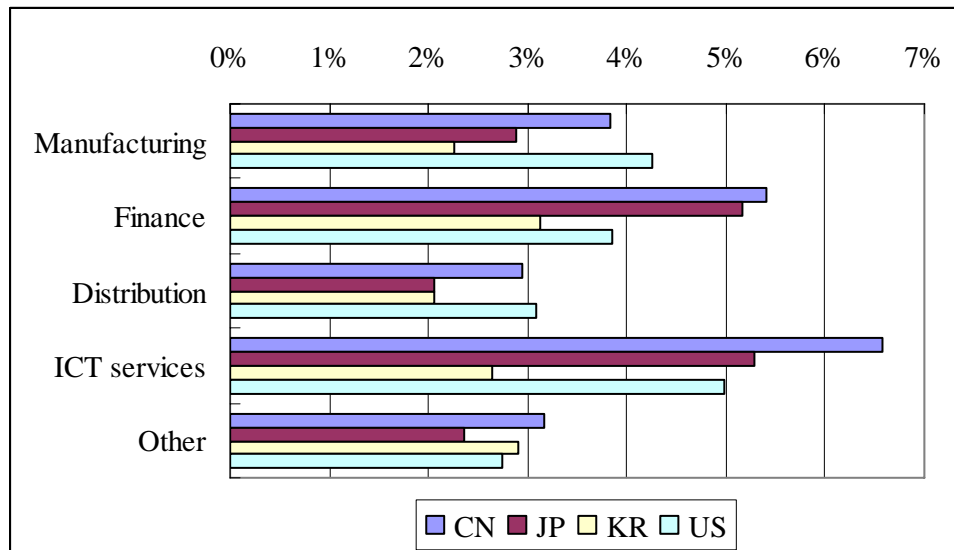
<sup>4</sup> The survey questioned the IT investment ratio qualitatively as 1. less than 1%, 2. between 1%-3%, ... The average was computed using 0.5% for less than 1%, 1.5% for between 1%-3%, 4% for between 3%-5%, 7.5% for between 5%-10%, and 10% for above 10%. The country ranking for each industry does not change even if we use 15% for above 10%.

among the other firms (2%-3%). Quite surprisingly, the IT intensity of Chinese firms is generally the highest among the four countries. However, it should be noted that the sample framework is different. For the survey in Chinese firms, the sample was selected by the Center for Applied Statistics at Renmin University of China, while the surveys for the other three countries were distributed to randomly sampled, listed companies (Motohashi 2007). Since firms with more advanced IT systems are more interested in responding to this kind of survey, a response bias toward higher IT intensity may exist among the Chinese samples. However, it is interesting that IT investment in Chinese firms is not lagging behind that in Korean, Japanese, and US firms.

Table 4: IT expenditure to sales

IT expenditure to sales	Freq.	Percent
Less than 1%	48	(26.8%)
1%-3%	45	(25.1%)
3%-5%	40	(22.4%)
5%-10%	30	(16.8%)
More than 10%	16	(8.9%)
<b>Total</b>	<b>179</b>	

Figure 1: IT/Sales ratio by industry

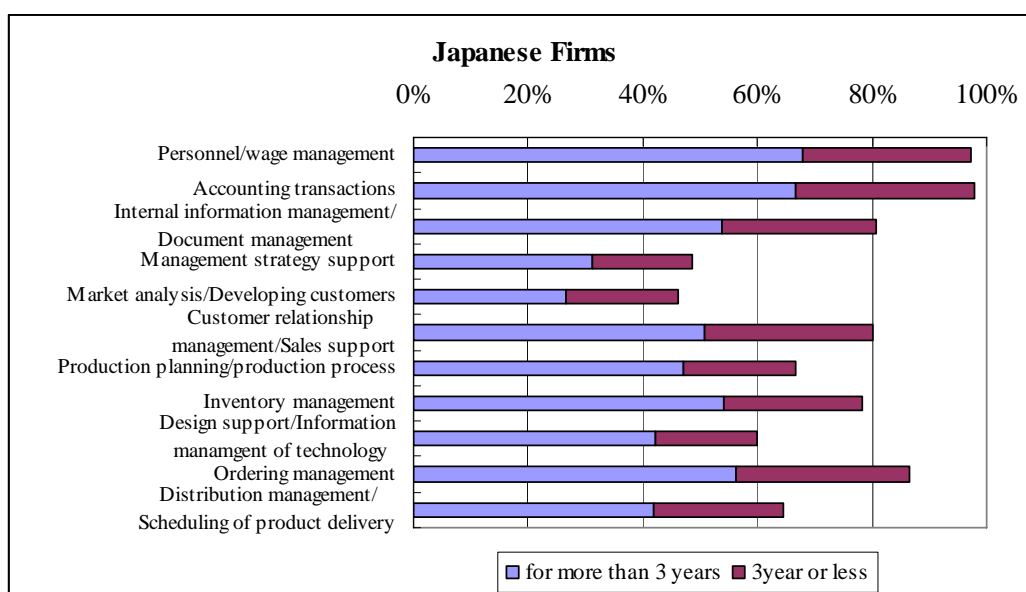
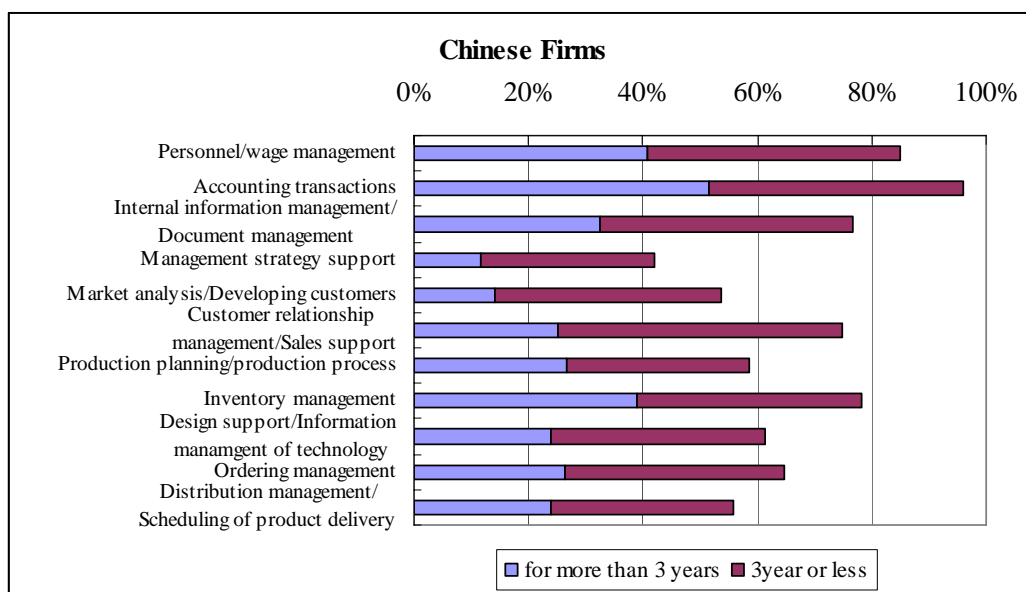


On the whole, IT investment is accomplished by means of adopting IT systems, which are the keystone for firms to conduct IT management. The level of IT systems reflects the ability and degree of implementing information systems. The survey, “Deployment of IT systems” investigated deployment based on different types of business field, including that of ERP and SCM systems.

Figure 2 is the deployment proportion of these 11 types of systems, displaying that most of the Chinese firms (96%) have possessed accounting and financial systems and

about 80% of these firms have deployed personnel and wage systems, inventory management systems, and internal information and document systems. However, less than 50% of firms have deployed systems that could support management strategy and market analysis/developing customers. Figure 2 also presents the same figures for Japanese firms. The IT deployment ratios of Chinese firms are lower than those of Japanese ones with the exception of management strategy support systems. In addition, we can see that for more than three years the portion of the IT deployment group is very low (from just 20% to 40%). That is to say, only in these recent three years the deployment ratio has been increasing on quite a large scale. This result is consistent with the statement in the last section that Chinese firms have been spending relatively large sums of money on IT systems in recent years.

Figure 2: Shares of IT system deployment by type of application (China and Japan)



Three-quarters of the sampled Chinese firms have deployed ERP systems. The

survey also performed a complementary measurement regarding how firms integrate ERP software and their respective businesses. The result shows that about half of firms have adopted tailor-made ERP systems in order to adapt ERP to their businesses; whereas a minority of firms tend to adopt prepackaged ERP and aim at optimizing the business process. The rest of the firms are more likely to adjust both.

With respect to SCM systems, the deployment ratio in sample firms is limited (36%), especially in the manufacturing industry. Only in the distribution sector (retail and wholesale) has the proportion reached 60%, which is due to the great importance of supply chain for these firms. Of firms owning both ERP and SCM systems, most could establish a kind of data linkage between the two systems.

As seen in Table 3, the sample of this survey is comprised nearly 20% of firms that are subsidiaries of foreign-owned firms. Naturally, their IT application level should be advanced. So it is meaningful to separate them from the other Chinese domestic firms and to consider their differences. Here, we will apply a descriptive regression model to conduct the comparison. The model could be described as:

$$VAR = a + b_1 \textit{Foreign\_dummy} + b_2 \textit{Industry\_dummy} + b_3 \textit{Scale\_dummy} + e \quad (1)$$

In this regression equation, the independent variable---*Foreign\_dummy* (binary variable) describes whether the firms are foreign-owned or not, setting Chinese domestic data as the zero category. *Industry\_dummy* and *Scale\_dummy* are used to control the impact of firms' industries (five classifications on Table 1) and scales (six classifications on Table 2). The dependent variable is the binary choice on whether firms have owned IT systems. Then we conduct a Probit regression, with the results given in Table 5.

The subsidiaries of foreign-owned firm are found to have a significantly higher deployment ratio than Chinese domestic firms in the areas of strategy support systems, customer relationship support systems, production process control systems, ordering management, and distribution schedule systems. In fact, considering the result in Figure 2, the deployment ratio of all sample firms in these areas is not high at all, mainly ranging from 40% to 60%. Therefore, except for the proportion of foreign-owned firms, there is only a small portion of Chinese domestic firms actually having adopted the IT systems stated above. As for ERP systems, SCM systems, and systems dealing with daily business like "accounting transactions" and "personnel/wage management," domestic firms and foreign-owned firms seem to have similar prevalence.



Table 5: Comparison of domestic firms and foreign-owned firms

	<b>Deployment of IT systems</b>	<b>Coef.</b>	<b>z</b>
1	Personnel/wage management	0.37	0.83
2	Accounting transactions	-0.17	-0.27
3	Internal information/document management	0.42	1.30
4	Management strategy support	0.60	2.15(*)
5	Market analysis/Developing customers	0.14	0.51
6	Customer relationship/Sales support	0.80	2.33(*)
7	Production planning/production process	1.35	3.27(*)
8	Inventory management	0.65	1.44
9	Design support/ management of technology	0.35	1.21
10	Ordering management	0.94	2.65(*)
11	Distribution/Scheduling of product delivery	0.93	2.84(*)
12	Adoption of ERP system	0.45	1.33
13	Adoption of SCM system	0.49	1.76

Note: (\*) Significance level: 5%

In this section, the relationship between IT use and firm performance is analyzed. In the survey for Chinese companies, some qualitative questions about firm profitability and sales growth performance are included. The following table shows the distribution of firms by profit-to-sales ratio and ROA (profit-to-asset ratio) from our survey. The profitability of firms in this sample is found to be generally good as we can see that the profit-to-sales ratio of more than 30% of firms is above 20%.

Generally speaking, IT systems applied by firms can be divided into two types: “mission-critical systems,” or systems that increase efficiency of daily business operations such as management of ordering and systems for the back office divisions, and “informational systems” such as managerial strategy support, market analysis/developing new customers, and design support/information management of technology, which support dealing with ad-hoc analysis for value creation out of day-to-day operational information (Davenport 2000).

From the analysis above, we can find that IT systems in the Chinese firms are concentrating more on mission-critical systems, which are used in the back office divisions and could help firms increase the efficiency of their routine business operations. In contrast, Chinese firms have a lower deployment ratio in the areas of informational systems, which focus on the strategy level and can strengthen the competitiveness of the firms. In this aspect, subsidiaries of foreign-owned firms have a relatively higher ratio of deployment than Chinese domestic firms. This unbalance is due to the fact that informational systems often require higher management levels and changes in management thought and patterns for the sake of performing complicated analysis and sharing deep-seated information resources.

Table 6: Distribution of firms by profitability category

	Profit-to-sales		ROA	
	Freq.	Percent	Freq.	Percent
below 0%	6	(3.4%)	7	<b>(3.9%)</b>
0% ~ 2%	11	(6.2%)	22	<b>(12.3%)</b>
2% ~ 5%	21	(11.7%)	32	<b>(17.9%)</b>
5% ~ 10%	40	(22.3%)	40	<b>(22.3%)</b>
10% ~ 20%	46	(25.7%)	42	<b>(23.5%)</b>
above 20%	55	(30.7%)	36	<b>(20.1%)</b>
<b>Total</b>	<b>179</b>		<b>179</b>	

Using this profitability information as a dependent variable, we have estimated the regression model as follows.

$$profit = \alpha + \beta_1 IT\_before + \beta_2 IT\_after + \gamma_1 dummyIND + \gamma_2 dummySIZE + \varepsilon \quad (2)$$

Here, “profit” is either of two kinds of profitability variables as dependent variables, which is regressed by “IT\_before” as a dummy of IT system use for more than 3 years, “IT\_after” as a dummy of that for 3 years or less, industry dummies, and firm-size dummies. An ordered logit model is used for estimation because the profitability variable is a categorical one. The results are presented in Table 7.

Table 7: Regression results on IT use and profitability

	Profit to Sales Ratio				ROA			
	more than 3 years		3 years or less		more than 3 years		3 years or less	
Personnel/wage management	<b>-0.07</b>	(0.18)	<b>0.23</b>	(0.57)	<b>-0.29</b>	(0.68)	<b>-0.35</b>	(0.84)
Accounting transactions	<b>-0.32</b>	(0.46)	<b>-0.27</b>	(0.38)	<b>-0.46</b>	(0.64)	<b>-0.60</b>	(0.82)
Internal information management/ Document management	<b>-0.06</b>	(0.15)	<b>-0.34</b>	(0.94)	<b>-0.06</b>	(0.15)	<b>-0.40</b>	(1.10)
Management strategy support	<b>0.20</b>	(0.47)	<b>0.09</b>	(0.28)	<b>-0.08</b>	(0.19)	<b>-0.07</b>	(0.23)
Market analysis/ Developing customers	<b>0.39</b>	(0.96)	<b>0.15</b>	(0.48)	<b>-0.35</b>	(0.89)	<b>-0.08</b>	(0.25)
Customer relationship management/Sales support	<b>-0.05</b>	(0.12)	<b>0.31</b>	(0.90)	<b>0.11</b>	(0.30)	<b>0.62</b>	(1.80)
Production planning/production process	<b>0.48</b>	(1.39)	<b>-0.11</b>	(0.34)	<b>-0.05</b>	(0.14)	<b>-0.22</b>	(0.65)
Inventory management	<b>-0.22</b>	(0.57)	<b>-0.22</b>	(0.55)	<b>-0.50</b>	(1.32)	<b>-0.56</b>	(1.40)
Design support/Information management of technology	<b>0.45</b>	(1.23)	<b>-0.13</b>	(0.41)	<b>0.18</b>	(0.49)	<b>-0.33</b>	(1.00)
Ordering management	<b>0.43</b>	(1.22)	<b>-0.10</b>	(0.31)	<b>0.04</b>	(0.10)	<b>-0.42</b>	(1.29)
Distribution management/ Scheduling of product delivery	<b>0.26</b>	(0.75)	<b>0.00</b>	(0.01)	<b>-0.19</b>	(0.53)	<b>-0.28</b>	(0.86)

**note: t-statistics in ( ).**

The regression results show that the use of IT does not significantly contribute to the profitability of Chinese firms. Due to the data limitations, such as the categorical profitability variable and small samples, these results should be interpreted with care. However, it can be concluded that the impact of IT use on performance is not so strong for Chinese firms, while the IT diffusion rate in China is as high as in

developed countries such as Japan and the US. As we have seen before, Chinese companies have just started investing in IT, so they may merely be in a process of profiting from it.

There is another phenomenon that deserves attention: the survey indicated nearly 75% of Chinese firms have adopted ERP systems. Taking into account the relatively lower management level in Chinese firms, this is quite a high ratio. In recent years, the term ERP is extremely popular in Chinese manufacturing firms and many software companies are developing and promoting it. However, quite a few firms blindly adopted ERP systems, so they struggle with integrating these systems into their businesses effectively (Liu 2005). In this aspect, Chinese firms tend to adjust ERP systems to their businesses. Nevertheless, as prepackaged software, ERP requires customers to adjust their business processes to match the software upon deployment of the system. This alteration is not just confined to technology, but more concentrated on the improvement of management thought and methods. In summary, in the area of IT systems deployment, Chinese firms are still transitioning from the IT support stage to the IT realization stage.

#### **4. IT Management and Organization**

This section reports the results on management strategies and the contribution of IT. The survey first questioned whether or not an IT strategy exists (medium- to long-term, around 3 years, IT systems investment planning), and its relation with management strategies. According to the survey, 80% of the sample firms have established IT strategies and most of them are mapped out in the recent three years examined. Of these firms, more than half have placed IT strategies in a clear position to match their management strategies, and 37% of firms express that an IT strategy is not clearly stated but the two strategies still share a consistent goal and policy. Only 9% of firms report that there is no or a weak relationship between the two strategies. These numbers are quite high as compared to the ones of Japanese and US firms.

The survey also covers questions about relative importance of 12 types of management strategy and the contribution of IT to each of strategy. The degrees of importance and contribution are evaluated on a five-point scale in which extraordinary importance (and contribution) is 5, whereas no importance (and no contribution) at all is 1. Since individual firms' responses to these subjective evaluations would cause biases, the average response score for the 12 questions was subtracted from the scores of each item in order to measure the distance from the average score.

Figure3: Management strategy and IT contribution

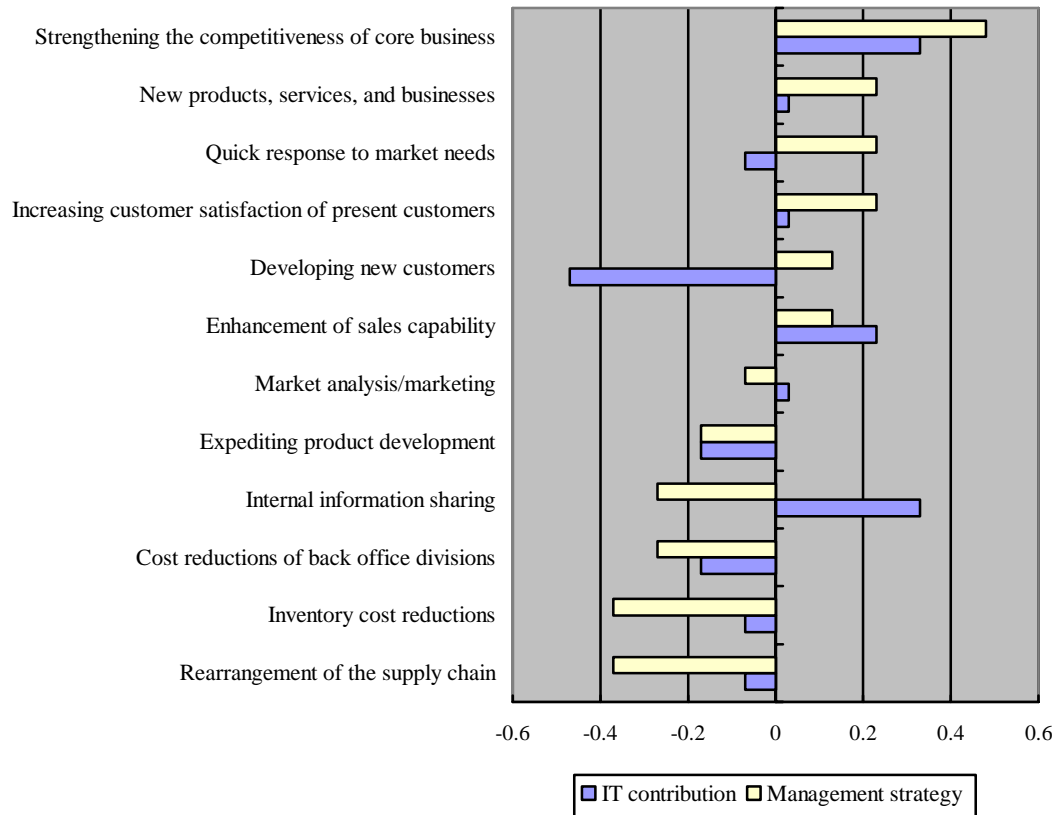


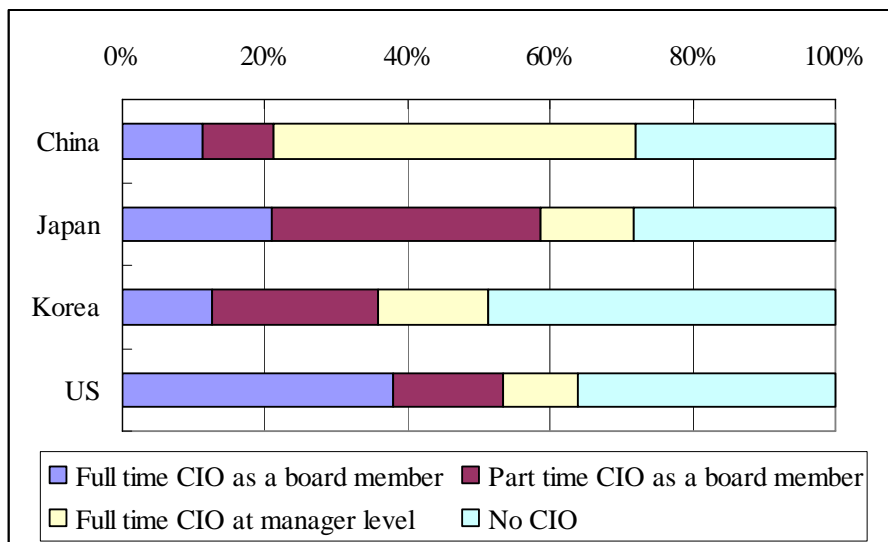
Figure 3 shows the results of the comparison of the 12 types of firm management strategies and degree of IT contribution to these goals. Generally, Chinese firms place “Strengthening the competitiveness of core businesses” as the most important strategy, and concurrently, have obtained the most benefit from the adoption of IT. Strategies related to customer satisfaction and developing new markets are rated highly in management strategy, while IT contribution to these strategies is relatively low. In contrast, a significant contribution made by IT can be found in promoting the sharing of information, yet this item seems to be attached less importance by firms. It also can be concluded that Chinese firms rather infrequently regard cost reduction and supply chain control as important strategies. Correspondingly, IT also does not significantly contribute to cost-cutting.

Combined with the analysis in the last section, most of the Chinese firms have adopted mission-critical systems that help reduce the cost and increase the efficiency of routine business operations. However, these systems seem relatively less important for catering to the strategies of firms. To the contrary, Chinese firms have invested less in information systems that could contribute to the successful implementation of important strategies, such as those related to business process, market, customers, and competition strengthening. This also reflects that the level of IT application in Chinese firms is still in the development stage.

Firm management strategies always involve a myriad of aspects regarding essential, long-term, and integration problems. In the meantime, motivation to make new IT investments cannot immediately lead to actual action and the IT systems deployed cannot immediately make a great contribution to firms. Therefore, firms require a long time to start from their strategies and combine their process traits to make full use of IT resources.

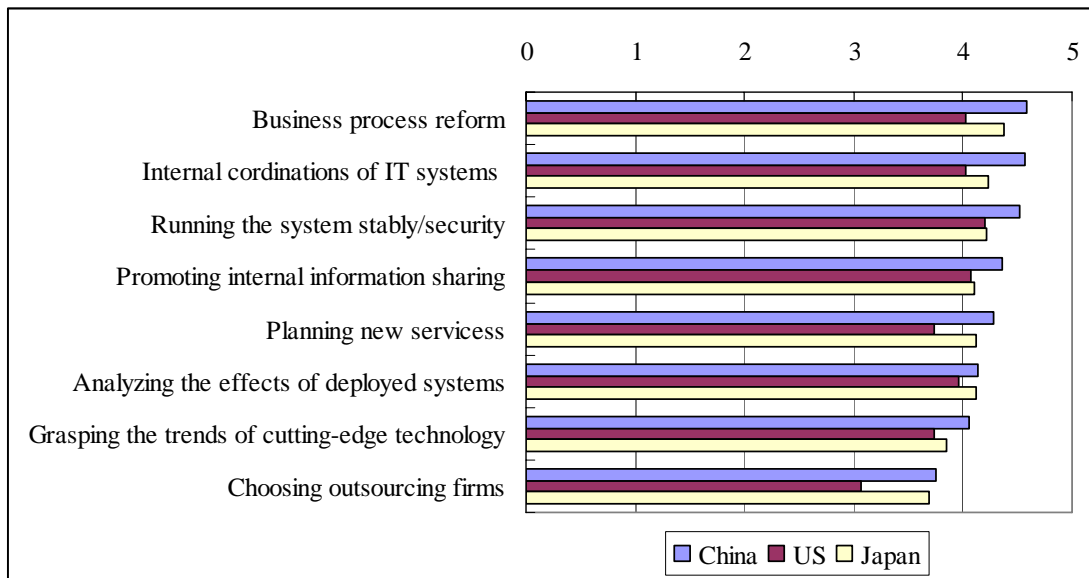
Firms' internal IT organization can influence the IT performance, and this organization reflects the firms' attitudes toward IT. As the most significant factor in IT organization, the chief information officer (CIO) usually attracts more attention from the outside. The appearance of CIOs can be traced back to the 1980s in U.S. firms, owing to the emergence of the information economy. However, the position of CIO was introduced into China only in the past decade (Yang and Chen 2005). The survey was designed to investigate on and elucidate the general situation of CIOs in Chinese firms. The results show that 73% of the Chinese firms have someone in the position of CIO, but 51% out of 73% firms have the CIO only at the manager level. The share of CIOs at the board-member level is quite low compared to Japan, Korea, and the US (Figure 4). In China, the position of CIO is not highly rated inside companies, suggesting that top-level commitment to IT strategy is relatively weak.

Figure 4: Share of firms with a CIO



With regard to evaluating the degree of importance of the CIO's various duties, the survey is also designed as a five-point scale to measure eight types of duty (Figure 5). Of these eight duties, quite a few Chinese firms regard "Business process reform," "Internal coordination of IT systems," and "Running the system stably/security" as the most important duties for a CIO, while "Choosing outsourcing firms" is not as important. This pattern is similar to that of Japanese firms. Compared to these two countries, "Running the system stably/security" is relatively important for US firms.

Figure 5: Importance of the CIO's duties (1: least important – 5: most important)



To survive, CIOs are required to possess four attributes: systems thinker, architect, reformer, and alliance manager (Earl 1996). These attributes correspond with different duties depending on the changing environment. Duties are the core concern for a CIO, the authority range of which basically lies in the degree of integration of information function in firms. For Chinese firms, a majority of IT systems are recently adopted and still in the adaptation stages; therefore, making sure systems run stably, reforming business process to realize IT strategy, and promoting inter-division coordination are listed as the primary duties of a CIO. Chinese firms have focused relatively less on information systems, which require a higher-level flow of internal information, and “internal information sharing” is not treated as an important management strategy; therefore, promoting internal information sharing is not a crucial duty for Chinese CIOs. The duty of “analyzing the effects of deployed systems” seems to not be important at all, which can be ascribed to the situation that many Chinese firms seldom consider the productivity and payoff when they deploy new IT projects.

According to the present, actual situation, the status and power held by Chinese CIOs is not very high. That is to say, although they are titled as executives or managers, they are not actually endowed with much authority to make decisions and are usually viewed as advanced technicians. In another report, 87% of a sample of CIOs merely reported possessing some power of suggestion on adopting new IT projects (Wang and Si 2004). Many intricate reasons underlie this unbalance. In the US, the emergence of CIOs is owing to firms’ needs to perform information management. Nevertheless, the drive force for posting CIOs in most of the Chinese firms comes from the outside, such as catering to the trends of the information society, instead of from internal needs. Moreover, a large portion of Chinese CIOs are IT division managers who tend to not be familiar with the business process. However, as the most important duty for a CIO, business process reform pertains more to the business division than to technology, so CIOs are easily plunged into a dilemma.

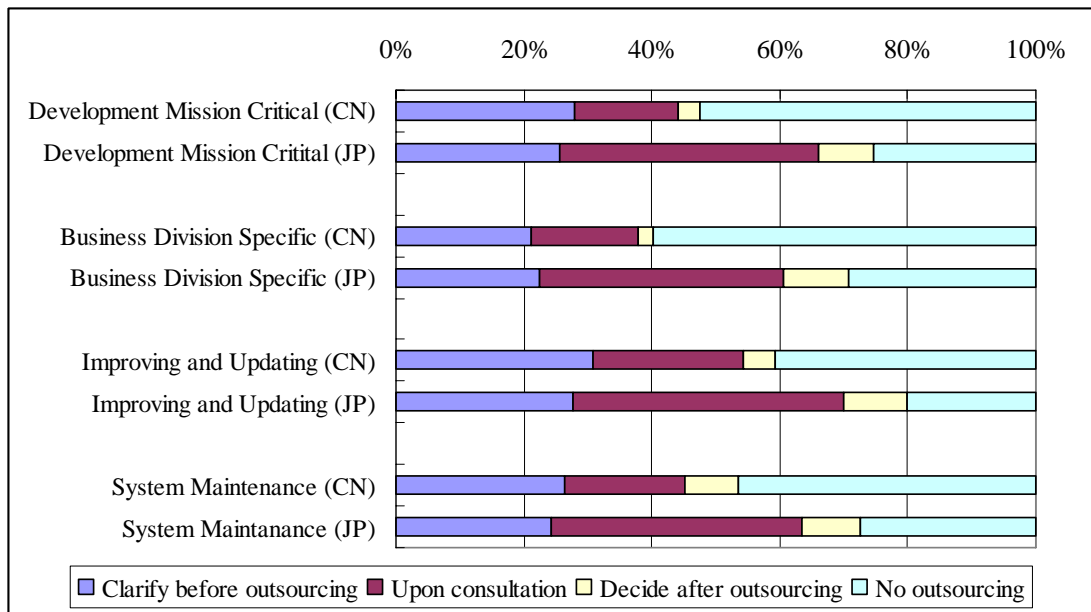
No matter the external or internal motivation, firms are confronting various information service needs, such as systems operation, information application planning, and user support. Firms should choose proper IT services according to their special needs. There are mainly five ways to obtain IT services: internal development, employing experts, outsourcing, strategic M&A, and alliances. At the present, outsourcing is the most common and important method for firms.

The development of IT outsourcing in China has experienced three periods: an embryonic stage (1993-1998), integration stage (1999-2001), and popularization stage (from 2001). At first, some multinational corporations, like IBM, GE, and Hitachi, began to push IT outsourcing. After a decade of development, nowadays, more Chinese government sections and banks, even small- and medium-sized firms are participating in outsourcing. In addition, the market scale of Chinese IT outsourcing services reached 1.43 billion U.S. dollars as of 2006, while it was just 630 million dollars in 2004 (CCID 2006). On the one hand, the number of firms that wish to outsource their business has been increasing dramatically; on the other hand, firms providing IT outsourcing services and the entire information industry in China are also booming. Moreover, the chief offshore clients of Chinese outsourcing service providers are Japanese and U.S. firms. This growth is leading to an increasing ratio of Chinese firms that have outsourced IT.

The survey investigated the relationship between firms and their outsourcing partners and the types of business that are outsourced. The results show that nearly three-quarters of the sample of Chinese firms have ever outsourced IT-related business. Among them, one-half of firms order the business after outsourcing activities are clarified, one-third of firms decide the outsourcing activities upon consultation with the outsourcing firms, and only one-sixth of firms clarify matters step-by-step after the outsourcing activities begin.

Figure 6 shows the comparison of outsourcing means based on different business types. We can see that firms tend to improve and update their current systems by outsourcing. As far as the development of specific systems, fewer firms have outsourced this work compared to Japanese firms. A significant difference between the two countries can be found at in “division level business support system such as SCM.” Presumably, large numbers of Chinese firms are introducing prepackaged software in this field, while Japanese firms are likely to outsource development to IT vendors. However, Chinese firms clarified the outsourcing specifications at a relatively earlier stage, which can help firms to control the process of the outsourcing activities.

Figure 6: Outsourcing activities by type of IT system



Then, the survey presented eight statements regarding IT systems outsourcing and respondents were asked to judge whether these statements are consistent with their actual conditions (five-point scale). The survey results show that outsourcing providers are often advisors on IT technology trends. Moreover, in order to avoid becoming black-boxed, a large portion of Chinese firms have clarified the specifications and contracts of the outsourcing activities beforehand and seldom directly accept the proposals of the outsourcing firm.

Basically, firms base their decisions to outsource their business on the following reasons: lacking related professionals, reduction of cost, quality guarantee, and avoiding distracting resources and attention from the core business. For the Chinese firms, cost reduction is not the chief reason to outsource. Actually, outsourcing cannot cut costs dramatically on the whole. Some reports noted that only 16% of customers have cut costs remarkably via outsourcing and the amount of reduction is just 15% on average.

The Chinese IT services market is shown to be not well-rounded and about 50% of customers are not satisfied with the IT outsourcing outcomes presented. Most unsuccessful outsourcing projects also owe to overspending and content divergence although they clarified the order beforehand. This situation is caused by the particular characteristic of custom software in that it often requires meeting specific individual user needs during the outsourcing process. In fact, it is arduous to state specific items clearly in contracts in advance.

## 5. Conclusion

This paper presents quantitative analysis of IT use, management, and organization at Chinese firms, based on RIETI's "International Comparative Survey of Firms' IT



Strategies.” The analysis results show that Chinese firms have achieved remarkable progress with the ability of IT to support business and strategies, and these firms have a clear comprehension of information resources and to some degree realize the importance of IT.

However, we cannot find significant impact of IT use on firm profitability. This may be due to the fact that application of IT in Chinese firms is still in transition from the IT support stage of development, and further effort for improving IT management is needed. In terms of IT organization, the share of firms with a CIO is quite large, but most of the CIOs are only IT department managers. The status of CIOs in Chinese firms is low, and their power to influence managerial decisions at the company-wide level is still weak.

In terms of the type of IT system deployed, Chinese firms have relied heavily on mission-critical systems for the back office divisions, whereas the ratio of information systems deployment is relatively low. A large portion of firms have adopted ERP systems and tend to adjust them to the business, but quite a few firms blindly adopted ERP systems, so they struggle with effectively integrating these systems into their businesses. Subsidiaries of foreign-owned firms have a significantly higher IT deployment ratio than Chinese domestic firms in the areas of information systems.

Finally, we find there are many firms that have outsourced certain business and they usually tend to clarify the specifications and contracts of the outsourcing activities beforehand and choose advisors of IT technology trends as their outsourcing partner firms. Yet some of these firms also still face problems of overspending and content divergence.

In conclusion, in their short history of IT use, Chinese firms have made significant accomplishments in the application of information technology and have shown a certain awareness of IT strategy. However, Chinese firms are still in the development stage of better IT management. In the future, research will expand into the evaluation of IT performance, combined with productivity theory, quality, degree of customer satisfaction degree, etc. We especially hope to obtain more adequate data to describe the factors affecting firms’ management levels and uncover more phenomenon and regularity regarding information technology used at the firm level.

## References

- CCIDConsulting, [http://industry.ccidnet.com/art/1163/20040102/78817\\_1.html](http://industry.ccidnet.com/art/1163/20040102/78817_1.html) (in Chinese).
- Davenport, T. H. (2000), *Mission Critical: Realizing the Promise of Enterprise Systems*, Harvard Business School Press, 2000.
- DiRomauldo, A. and V. Gurbaxani (1998), “Strategic Intent for IT Outsourcing,” *MIT Sloan Management Review*, vol. 39, no. 4, summer 1998: pp. 67-80.

- Earl, M. J. (1996), "The Chief Information Officer: Past, Present, and Future," in Earl, M. J., ed., *Information Management: The Organizational Dimension*, Oxford University Press, 1996.
- Kanamori, T and K. Motohashi (2007), "Information Technology and Economic Growth: Comparison between Japan and Korea," RIETI Discussion Paper Series 07-E-009, March 2007.
- Liu, H. (2005), "Research on Current Situation of Enterprise Development and Implement in China," *Information Science*, vol. 23, no. 6, 2005: pp. 812-816. (in Chinese).
- Mansury, M. A. and J. H. Love (2007), "Innovation, productivity and growth in US business services: A firm-level analysis," *Technovation*, vol. 28, 2007: pp. 52-62
- Meng, Z. and S. T. Lee (2007), "The value of IT to firms in a developing country in the catch-up process: An empirical comparison of China and the United States," *Decision Support Systems*, vol. 43, no. 3, April 2007: pp. 737-745.
- Motohashi, K. (2007), "A Comparative Analysis of Japanese, U.S., and Korean Firms on IT and Management", RIETI Discussion Paper Series 07-E-047, July 2007.
- OECD (2006), *Information Technology Outlook 2006*, OECD, Paris.
- Yang, Y. and Y. Chen (2005), "CIO in China", *Railway Operation Technology*, vol. 11, no. 1, 2005: pp. 16-18 (in Chinese).
- Wang, S. and G. Si (2004), "Research on Current Status and Development of CIO in China," *Information Science*, vol. 22, no. 6, June 2004: pp. 757-764 (in Chinese).
- Wang, Y. (2005), "The present Situation of Japanese Informationization Construction and its Enlightenment for China," *Journal of Nanhua University*, vol. 6, no. 6, 2005 (in Chinese).
- Zhao, P. and S. Guo (2006), *Management of Business Information Strategy*, Tsinghua University Press, 2006 (in Chinese).