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Key IS Management Issues: a China Perspective *

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ABSTRACT

Based on data collected from 286 Chinese companies, this paper analyses the key issues in information system management in Mainland China. By ranking the individual issues and comparing them with the results of an earlier study, our findings reveal that while the top three critical issues remain the same, there are distinguishable changes that took place in the past few years. We also present results of further analyses regarding different sectors of companies. The study could be helpful for understanding the situations and challenges in information systems management in China.

Keywords: Information System Management, Key issues, Chinese companies

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I. INTRODUCTION

The last two decades have witnessed tremendous advances in Information Technology (IT), which have deeply changed the way companies carry on their businesses. As Information Systems (IS) departments of today's organizations face many challenges in a fast changing environment, it is important to elicit the critical concerns for IS management, which could be helpful in various respects to both academia and practitioners (Niederman et al. (1991)).

According to a recent review, key issues in IS management are generally defined as the set of main challenges facing IS managers over the next 3 to 5 years, which deserve most resources, time, and attention by IS management (Gottschalk (2000)). Since early 1980s, studies on key IS issues have been conducted in various nations and regions, including Hong Kong and Taiwan. However, in Mainland China, studies in this area are still preliminary. One of our previous efforts examined the critical factors affecting IS management in Chinese enterprises (Shi et al. (2000)). Although this effort produced some tentative findings with regard to key IS issues, it is still in need of further extension, largely due to its limitations in scope and survey. Furthermore, new trends are expected to emerge in the years since our last survey, for Mainland China is currently experiencing an extraordinarily fast changing era.

On the other hand, as the economy of Mainland China keeps growing rapidly in a cultural and social context greatly different from those of western countries, IT penetration brings both opportunities and challenges to China. Therefore, it is considered worthwhile to inspect the key IS issues in the light of newly collected data from Chinese organizations and find out whether and how these issues may reflect the unique characteristics of China.

Thus, we conducted another survey study to further develop our earlier work, aimed at identifying certain important concerns of IS managers in Mainland China and discovering the changes over the past few years, as well as comparing them with those of other regions.

II. RELATED STUDIES

In early 1980s, the first studies that surveyed IS executives and managers in order to identify the key issues in IS management appeared in the Society for information management (SIM) of the US (Ball and Harris (1982), Dickson et al. (1984)). Initially, a set of candidate key issues was proposed by a group of experts from SIM and later evaluated by 417 members of the society. The result of the analysis indicated that the most important IS issues for US organizations at that time were MIS long-range planning and integration, gauging MIS effectiveness, and impact of communications on MIS (Ball and Harris (1982)). Later on, this method of gathering and reporting IS issues has been replicated periodically in the US (Brancheau et al. (1996), Brancheau and Wetherbe (1987), Deans et al. (1991), Niederman et al. (1991)). Top

issues were found to be changing evidently over time in these surveys and considered to reflect the evolutional characteristics of IS management in US organizations.

Since early 1990s, key IS issues studies were extended to other countries and regions of the world, including Canada (Haynea and Pollard (2000)), India (Palvia and Palvia (1992)), Central America (Mata and Fuerst (1997)), Thailand (Pimchangthong et al. (2003)), Slovenia (Dekleva and Zupancic (1996)), Hong Kong (Burn et al. (1993), Moores (1996)), and Taiwan (Chou and Jou (1999), Yang (1996)). From an industrial perspective, Computer Sciences Corporation (CSC) has kept surveying critical IS issues in enterprises all over the world annually since 1987, as well as providing incremental longitudinal analyses. By 2001, these surveys had been conducted 14 times, through which rich historical data accumulated and some trends in IS management were revealed (CSC (2002)). The results of these efforts are summarized in Table 1, which displays the top three key issues in each study.

TABLE 1
Summary of key issues studies around the world

Country/Region	Study	Top three key issues
USA	(Deans et al. (1991))	Educating senior personnel Data security Integration of technologies
India	(Palvia and Palvia (1992))	Understanding/awareness of MIS contribution Human resources/personnel for MIS Quality of input data
Hong Kong	(Burn et al. (1993))	Retaining, recruiting and training personnel IS Planning Aligning IS and Organization

Country/Region	Study	Top three key issues
USA	(Brancheau et al. (1996))	Building a Responsive IT infrastructure Facilitating and Managing Business Process Redesign Developing and Managing Distributed Systems
Slovenia	(Dekleva and Zupancic (1996))	Inadequate appreciation of IS by executives and other users and their lack of involvement in IS development Education of IS professionals Lack of IS Strategic planning
Hong Kong	(Moores (1996))	Quality of software development Use of data resources IS strategic planning
Taiwan	(Yang (1996))	Top management support Improving communication with end-users Goal alignment
Costarica	(Mata and Fuerst (1997))	Using IS for competitive advantage IS Strategic planning Software development
Guatemala	(Mata and Fuerst (1997))	Using IS for competitive advantage Information security and control Disaster recovery
Taiwan	(Chou and Jou (1999))	Developing elective communications with end users Developing elective communications with senior manager Satisfying users' needs

Country/Region	Study	Top three key issues
Canada	(Haynea and Pollard (2000))	Building a responsive IT infrastructure
		Improving IS project management practices
		Planning and managing communication networks
World wide	(CSC (2002))	Optimizing Enterprise-wide IS Services
		Optimizing Organizational Effectiveness
		Organizing and Utilizing Data
Thailand	(Pimchangthong et al. (2003))	Building IT infrastructure
		IS strategic
		IS human resource

Some other researchers compared and contrasted the findings of such surveys in various nations or regions, seeking to identify and explain regional similarities and differences. In 1991 and 1997, Watson et al. reviewed the key IS issues studies twice and stated that the ranks of the issues would much likely be influenced by four dominating factors, namely economic structure, national culture, political/legal environment, and technological status (Watson et al. (1997), Watson and Brancheau (1991)).

III. RESEARCH METHOD AND DATA COLLECTION

Our survey was conducted in 2002 and 2003. In our questionnaire, we asked IT managers to rate 12 candidate issues (see Table 2) in a four-point scale. These candidate issues were adapted from our previous work (Shi et al. (2000)), in which they were derived from two rounds of Delphi surveys, and adjusted by 1 more round of Delphi survey among Chinese scholars. It may be regarded as a limitation that we only focused on these 12 issues and did not take into consideration other widely addressed issues such as those of the US SIM study (Watson et al. (1997)). However, as one of our major targets was set to discover the changes that have taken place in Chinese companies over the past several years, we felt that it might be better to reuse most of the variables of the study of 1999 (Shi et al. (2000)) while complementing them with newly proposed issues, so that longitudinal comparisons could be more

feasible.

In addition to express mailing our questionnaires to 2000 randomly selected Chinese companies the addresses of which were provided by AMT Group, an IT consulting firm based in Shanghai, and the National Bureau of Statistics of China, we contacted more than 100 companies by e-mail, phone, and interviews, which helped to increase the responding rate and quality. Later, we also surveyed the IT managers attending an education program in our school. From the surveying, we have in total received 286 answers usable for data analysis.

TABLE 2
Candidate issue list

No.	Issue
01	Status and power of persons in charge of IS departments in enterprises
02	Organizational mechanisms with which enterprises manage the IS department
03	Internal managerial and organizational level of IS departments
04	Investments in the IS department
05	Support of and acquaintance with IT of high-level managers
06	Support of middle-level manager
07	Ability to utilize computers of the staff other than those of the IS department
08	Technology competence of staff in IS departments
09	Applications of advanced IT in enterprises
10	Staff training on IT
11	Consistency of IT policy
12	Evaluating the effectiveness of IS correctly

To test the reliability of our questionnaire, Cronbach's α was calculated. The resulting α was 0.802. Reliabilities over 0.70 are general considered to be acceptable and those over 0.80 are considered good. Correspondingly, the reliability of our questionnaire was considered satisfactory. ANOVA analysis was used to measure the validity of the instrument. The results showed that with a signification level of 0.01, the 12 issues could be differentiated. Therefore, it was considered valid to rank the issues with their average scores.

In our study, the companies were categorized into 6 major sectors,

namely headquarters of business groups, IT and electronic, traditional manufacturers, commerce and trade, service, and agriculture. The distribution of our sample is shown in Table 3. Manufacturing companies accounted for a large portion in our sample. This is consistent with the percentage of manufacturing companies among all Chinese companies, which is 44% (NBS (2003)).

TABLE 3
Sample distribution

Sector	Number	Percentage
Head quarters of business groups	30	10.49%
IT and electronic	14	4.90%
Traditional manufacturers	117	40.91%
Commerce and trade	48	16.78%
Service	59	20.63%
Agriculture	15	5.24%
Others	3	1.05%
Total	286	100.00%

IV. RESULTS AND DISCUSSIONS

The basic result of our study is shown in
Table 4, in which the key issues are ranked in the light of their mean scores. Comparing the ranking with the results of the study of 1999 (Shi et al. (2000)), several changes can be roughly distinguished. While the top three issues remain unchanged, status and power of senior IT managers is no longer regarded as important as before. In this section, we will discuss each key issue and seek their driving factors in the dimensions of economic structure, national culture, political/legal environment, and technological status, as indicated by Watson et al. (1997). We will also present further analyses of different sectors of companies.

TABLE 4
Key issues in IS management in China

No.	Issues	Mean	Standard Deviation	Rank	Rank of 1999
05	Support of and acquaintance with IT of high-level managers	3.316	0.633	1	1
08	Technology competence of staff in IS departments	3.042	0.727	2	2
03	Internal managerial and organizational level of IS departments	2.878	0.773	3	3
06	Support of middle-level manager	2.840	0.669	4	6
10	Staff training on IT	2.833	0.689	5	7
11	Consistency of IT policy	2.743	0.788	6	NR
04	Investments in the IS department	2.736	0.708	7	4
12	Evaluating the effectiveness of IS correctly	2.688	0.611	8	NR
09	Applications of advanced IT in enterprises	2.681	0.648	9	9
02	Organizational mechanisms with which enterprises manage the IS department	2.625	0.714	10	8
01	Status and power of persons in charge of IS departments in enterprises	2.528	0.721	11	5
07	Ability to utilize computers of the staff other than those of the IS department	2.403	0.718	12	10

NR: Not ranked.

A. *Issue Discussions and Comparison with the Study of 1999*

Support of and acquaintance with IT of high-level managers is still the most important issue. This differs from the results of other regions and has not been changed over years. The reason for such a phenomenon may lie in two aspects. First, as Mainland China is transforming from a central-planned economy to an open-market economy, many Chinese companies still adopt a highly centralized decision-making mechanism. With such a management style, top executives usually play a critical role when an innovation penetrates the organizations. An early study has also revealed that chief executives' knowledge of computers and involvement in IT/IS applications often led to more successful computer use in small manufacturing firms where decision making power is usually relatively more centralized (DeLone (1988)). Second, many top executives of Chinese companies, especially those of state-owned companies, are not sufficiently acquainted with IT and therefore unable to provide strong support for IT/IS applications. It is reasonable to expect that this situation would change when the new generation of senior managers grows up in China. However, in the next 3 to 5 years, the top executive issue will possibly keep holding the top 1 position in the key issues list of Mainland China.

The second most import issue is technology competence of staff in IS departments, also the same with the study of 1999. As has been mentioned, IT/IS applications in China started relatively late compared with the practice in developed countries, which then resulted in a lack of the experience, know-how, and skillful staff in various degrees for Chinese companies. Although in recent years, IT human resources have accumulated rapidly in China, the demand for competent IT staff keeps growing as well. Again, this situation is not expected to change thoroughly in the coming few years.

Internal managerial and organizational level of IS departments still holds the third position. This issue may significantly affect the basic functions of IS departments, including software development, data integration, and building a responsive IT Infrastructure, upon which businesses could keep their steps with the market. Generally, Chinese companies are still weak in IS department management and ought to strive to improve their efficiency.

The fourth key issue is support of middle-level managers. It is worth noting that the position of this issue rises compared to 1999. This change may reflect the development of IT/IS applications in China from the user perspective. At the early stage of IT/IS applications, information systems mostly affect low-level employees and most resistance would come from those levels. As the application is gradually deepened, it becomes possible for companies to build flatter and more flexible organizational structures, in which the interests of mid-level managers would be most possibly affected. Consequently, whether mid-level managers support or decline the implementation and development of new IT/IS applications becomes more critical to IS success.

Staff training on IT also rose for two places and ranked fifth in the key issues chart. In the past four years, the extension and complexity of IT/IS applications have changed a lot. In late 1990s, IT/IS applications in Mainland

China was mainly focused on data processing, website building, document sharing, and other tasks that require relatively low knowledge and low user inter-dependency (Fichman (1992)). Nevertheless, around 2003, IT/IS applications in Mainland China had reached a new stage. Large-scale information systems such as ERP were broadly implemented. More and more IT skills become necessary for ordinary employees and training has become more significant. Meanwhile, although the education system in China has produced much more IT professionals than before, IT training for other personnel remains on a relatively low level, which demands particular attention.

As a newly proposed issue, consistency of organizational policies regarding IS management ranks sixth. This issue did not appear in other studies and seems to be unique in Chinese companies. We feel that it can also be accounted for by the management styles in China. As mentioned previously, the governance and management in Chinese companies still highly rely on behaviors and preferences of top executives, rather than regulations and standard mechanisms. Accordingly, it is possible that when the top executives change, the successors may not adhere to the existing IS policies and the process of IT/IS application development could be harmed.

The seventh key issue, investments in the IT/IS department, has been widely discussed since the 1970s (Guo et al. (2003)). Unsurprisingly, the importance of this issue has dropped down during the past years, because IT has gained more attention in these years and more sufficient resources have been allocated to IS departments.

Another newly proposed issue, evaluating the effectiveness of IS correctly, ranks the eighth in our research. Partly due to the existence of "Productivity Paradox" (Brynjolfsson (1993)), evaluating the productivity and effectiveness of IT/IS application is by no means an easy task. It could be even harder for state-owned Chinese companies to accurately estimate the outcomes of IT/IS application, since in these companies some decisions on IT/IS investments are made upon mandatory instructions instead of economic analyses. We feel that the importance of this issue may rise significantly in the near future when strategic IS management becomes more essential to businesses.

A technological issue, applications of advanced IT in enterprises, stays unchanged at the ninth place. In most Chinese organizations, utilizing advanced information technologies is regarded as an issue that needs to be considered constantly, but not among the most important ones. After a period of IT practice, it has been widely accepted that possessing new or advanced technologies is not equivalent to having successful IS management.

The tenth key issue in IS management of China is the coordination mechanism for IS departments. This issue may significantly influence the alignment of IS plans with business plans, which has long been considered as one of the top key issues in the most studies in other regions of the world (Gottschalk (2000), Watson et al. (1997)). However, in China, this issue failed to show the strongest importance in either of our two studies. This observation

can again be attributed to the particular management style of Chinese companies, namely highly relying on the individual personalities and behaviors of top executives instead of solid mechanisms. Another plausible reason to account for the low importance of this issue is that IT has not yet become a strategic resource for many Chinese companies, so the impact of IS plans on business plans is not as significant as that in the developed countries.

The next key issue in our findings is related to the power of senior IS managers, which could be the most remarkable change observed from the comparison with the study of 1999. In that year, this issue ranked the fifth, while in the present research, it drops to the eleventh. In other words, it is no longer a top urgent mission to endow senior IS managers with a proper position and sufficient power. Based on our interviews and observations, this has already been done in many Chinese companies, where the top persons in charge of IS departments are now CIO or vice-presidents.

The last issue in our study is the user's ability to utilize computers and other information technologies. As in 1999, this issue is regarded to be of consideration but not important or urgent.

B. *Sector Analysis*

By far we have discussed the overall key IS issues in Chinese companies. However, it is nature to expect that companies in different business sectors may display different characteristics with regards to IS management, and the key issues would differ among such sectors. As has been illustrated, we categorized our sample into six sectors, which are headquarters of business groups, IT and electronic, traditional manufacturers, commerce and trade, service, and agriculture. The key issues in each sector are shown in Table 5. Inspections on the contrast of these sectors revealed some interesting phenomena that deserve further investigation.

First, it is worth noting and somehow unexpected that in the sector of IT and electronic manufacturers, managerial issues are deemed more important than technological ones. In our interviews with the managers of these companies, we found that the employees of the companies in this sector usually possess a higher level of technology skills and often hold a positive attitude to IT/IS applications. In such cases, the importance of technological issues would relatively decline. On the other hand, IT professionals often hold higher positions in these companies and their managerial ability is generally lower than that of professional managers. This has led to the higher recognition about managerial issues. Another characteristic of the IT and electronic sector is that the companies of this sector usually pay more attention to IT investment than the other sectors.

Second, managers from the service sector paid more attention to technological issues than managerial issues. There are two possible reasons for this observation. First, directed by the China government, the service sector has been developing rapidly in recent years to accommodate the

laid-off workers from state-owned companies and its demand for IT/IS applications has been expanding quickly as well. Second, the fast changing nature of the service sector also makes the companies more eager to absorb technological innovations.

Third, the sector of commerce and trade displays two characteristics:

1. the information flows in commerce and trade enterprises are characterized by continuity, frequency and interactions, thereby making it more desirable to use IT for automation and support;

and

2. companies in this sector are often more experienced and rational in IT management since they applied IT early than other sectors. Thus, use of advanced technologies is regarded highly critical, while managerial issues are not top priorities. This finding is also consistent with a recent study on the IT adoption in China (Guo and Chen (2005)).

Regarding the other sectors, different characteristics could also be distinguished from the ranks of the issues. Companies in the agriculture sector are paying much more attention to infrastructural issues such as staff training, user ability, and technology competence of IS staff. This observation could be possibly attributed to the low level of IT/IS application in this sector, because of the labor-intensive nature of Chinese agricultural production. Business groups put more emphasis on strategic issues such as IT investment, IS benefit evaluation, and status of senior IS managers. This is also consistent with the primary missions of business groups, which are usually resource allocation and strategic consolidation. Lastly, the ranking of issues in the sector of traditional manufacturers is roughly the same as the overall result, since this sector dominates the population of all Chinese companies.

V. CONCLUSIONS

In this paper we have investigated the key issues in the IS management in Mainland China based on data collected from 286 Chinese companies. By ranking the individual issues and comparing them with the results of an earlier study, our analysis has revealed that while top three critical issues remain the same, largely due to the centralized decision-making mechanism, mandatory management style, and less experience of IT/IS applications. We have also inspected the difference between business sectors and discussed some worth-noting observations. These findings are deemed helpful for understanding the situations and challenges of IS management in China.

Ongoing research is now centering on in-depth investigations for several focused industries in China with extended data and measures, as well as on comparative studies with other countries.

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TABLE 5
Key IS issues in different business sectors

Overall	Issues	Business Groups	IT and Electronic	Traditional Manufacturers	Commerce and Trade	Service	Agriculture
1	Support of and acquaintance with IT of high-level managers	1	1	1	1	1	3
2	Technology competence of staff in IT departments	2	7	2	2	2	4
3	Internal managerial and organizational level of IT departments	7	2	3	7	3	11
4	Support of middle-level manager	3	4	4	9	6	2
5	Staff training on IT	10	8	5	3	5	1
6	Consistency of IT policy	5	9	6	4	11	5
7	Investments in the IT department	4	3	8	8	4	10
8	Evaluating the effectiveness of IS correctly	6	10	9	5	7	7
9	Applications of advanced IT in enterprises	9	11	7	6	8	6
10	Organizational mechanisms with which enterprises manage the IT department	11	6	10	11	9	9
11	Status and power of persons in charge of IT departments in enterprises	8	5	12	10	10	12
12	Ability to utilize computers of the staff other than those of the IT department	12	12	11	12	12	8