Association for Information Systems
AIS Electronic Library (AISeL)

PACIS 2005 Proceedings

Pacific Asia Conference on Information Systems (PACIS)

December 2005

A Survey of the State and Impact of CIOs in China

Meiyun Zuo
Information, Renmin University of China, Beijing

Ji-Ye Mao
Information, Renmin University of China, Beijing

Follow this and additional works at: http://aisel.aisnet.org/pacis2005

A Survey of the State and Impact of CIOs in China

Meiyun Zuo
School of Information, Renmin University
of China, Beijing, 100872
zuomeiyun@263.net

Ji-Ye Mao
School of Business, Renmin University of
China, Beijing, 100872
jiyemao@yahoo.com

Abstract

This survey investigates the state and impact of CIOs in China. Results show that most CIOs were in fact operating at the departmental director level, coming from an IT-related background. The main impact of CIO felt by CEOs was improved support for decision-making and organizational efficiency. Whereas CEOs' assessment of CIO performance was mostly positive, a major portion of CEOs had an ambivalent feeling and some even gave a failing mark to their CIO. It appears there is still a long way to go for enterprises in China to perfect their CIO mechanism for effective IT strategic management.

Keywords: CIO survey, Information Management, CIO state, Impact of CIOs

1. Introduction

The development and adoption of management information systems (MIS) in China have evolved in a unique macro- and micro-environment, along a different path than in the West. Till recent years, the economy has been dominated by state owned large and medium sized enterprises. The road to modernization of MIS has been shaped by both Western influences that came along with the reform and open-door policy, increasing presence of multinational enterprises and direct foreign investment, and still omnipotent government initiatives.

For example, the Ministry of Information Industries and the State Economy and Trade Commission jointly issued "Guidelines for Boosting Applications of Business Information Systems" in 2002, calling upon Chinese enterprises and those state-owned key enterprises in particular "to actively respond to the economic globalization and the challenges arising from China's accession to the WTO, and to give adequate recognition to the importance and urgency of information systems applications, and greatly promote the systems development." Such initiatives combined with financial incentives have created a major impact on the IT adoption in Chinese enterprises. However, the effective development and management of IS applications are also hindered by many problems including the lack of IT budget and training, and more importantly the predominantly qualitative decision-making style in management.

It was under this circumstance that many Chinese organizations have created their CIO position following the trend observed in multinationals and management literature. Typically with understanding of both IT and business knowledge, CIOs are charged with the primary responsibility of designing the overall IS strategy and overseeing its implementation. They must exercise influence and create impact successfully to attain the objectives attached to the CIO position (Enns et al., 2003). An increasing amount of Chinese enterprises have realized the important role played by CIOs in aligning IT with business strategy. In an effort to promote the CIO mechanism for effective IS management, the "Information Systems Development Plan for the Tenth Five-Year (2001-2005) Development of Beijing" specified that "the CIO mechanism should be widely adopted by enterprises and not-for-profit organizations. During the tenth five-year development period, the percentage of enterprises and not-for-profit organizations that have created the CIO position should exceed 50%."

It is, therefore, of interest to find out empirically the state of CIOs in China in day-to-day operation, and their effectiveness in bringing about desired IS applications. In the unique business environment in China, it would be useful to investigate the profiles of CIOs, their professional background, main challenges that they come across. More importantly, it is important to ask, what impact has CIOs created on their organizations? Is the senior management satisfied with their CIO's performance. These are the research questions of this empirical study.

2. Prior Studies

Since its emergence in the 80's of the past century, the CIO notion has gained acceptance in practice, and attracted much academic interest. Among the more prominent prior studies are Synnott [1, 2], Earl [3], and Feeny [4]. A key issue of research is the role and responsibilities of CIO. An early advocate, Synnott [5] proposed that the CIO had three types of roles, namely a businessman, manager, and technologist. Earl [3] stated that CIOs should undertake eight roles. Gottschalk [5] suggested that CIOs' roles include a public speaker, monitor, communicator, entrepreneur, and resource allocator. His research showed that CIOs considered the entrepreneurial role most important, and its importance would grow with the increasing end-user computing, IS management maturity, administrative effectiveness, the number of employees reporting to the CIO, and the number of IT personnel along with their educational level. Interestingly, he pointed out that CIOs might play different roles in various national contexts, and it should be adjusted according to the national or even business situation.

Since the 9/11 tragedy, CIO responsibilities have evolved, to be more action-oriented, including several new responsibilities such as risk analysis, disaster recovery planning, employee protection, public relations, and scenario planning [6]. A primary responsibility has emerged to maintain the business operations and security. Furthermore, due to rapid business strategic reform, proliferation of IT and e-Commerce, and technological complexity, CIOs thought their internal IT department would need to be radically restructured. IT management would be increasingly virtual and global, and move closer to the strategic center of their organization. As a result, CIOs must demonstrate in-depth business knowledge, effective influence and negotiation capabilities, and give attention to standardization of infrastructure, metrics and value-adding functions [7].

To attain the responsibilities discussed earlier, CIOs must be able to exercise influence. Enns et al. investigated CIOs' technical background and seven types of influencing behavior including rational persuasion, consultation, ingratiation, personal appeals, exchange, coalition tactics, and pressure, along with the relationships among these behaviors [9]. An interesting conclusion of was that more technical knowledge would not help successfully influence other senior management, i.e., CIOs' technical background had no relation with their influencing behaviors [8]. It was found that rational persuasion, personal appeals, and coalition tactics had positive effects on outcomes, whereas other behaviors had negative impacts [9]. These results are useful reference for CIOs trying to get IS applications implemented. Of course, effective communication and understanding between the CEO and CIO is a crucial factor for the successful operation of IT in an organization [10].

In light of the widespread doubt regarding the productivity of IT spending, Hirschheim et al. suggested that to rectify this impression the IT department should work closely with functional areas, and share benefits of successful implementation [11]. By and large, the importance of CIO in organizations and the rapid role change of CIO have gained wide recognition [12]. Previously believed to be technocrats, CIOs are now administrators tentative to business management, playing a key role in corporate strategy development [13].

In recent years, scholars in China have started initial research of CIOs. For example, Huo suggested that CIO play four types of roles, including the leader of the information function, expert of IT strategic planning, manager of strategic information resources, and advocate of e-Commerce [14]. Li [15] discussed essential CIO qualities and aptitudes, whereas Zuo investigated the fundamental knowledge structure of CIOS, and organized it into nine modules of CIO knowledge [16]. The knowledge modules include IT, information management, information systems, process management, project management, operations management/public management (for CIOs in the public sectors), information strategy, and change management and information culture.

In addition to academic research, several industry surveys have been carried out. For example, the CIO Magazine has conducted three to investigate the state of U.S. CIOs [17, 18, 19]. These surveys were done online, to readers of the magazine. The main elements of the surveys included the CIO titles, experience, salaries, challenges faced, and opinions on IT value. In particular, CIO Magazine in 2004 surveyed not only CIOs but also 40 CEOs, and conducted follow-up research on CIO success factors [20]. The Chinese media have done some surveys of CIOs in China [21, 22, 23]，in an effort to identify concerns and challenges faced by IT executives in China. However, a major limitation of these industry surveys without academic participation is that the questionnaire might be arbitrary lacking generalizability.

3. Research Method

3.1 Objectives

This research aims to investigate the state of CIOs and their impact. We wanted to study both the CIOs' perspectives, and CEOs' views such as their evaluation of their CIO's performance and organizational impact. It is among the first in its kind investigating both CIO and CEO views, and the first academic study in China with regard to CIO state and impact.

3.2 Questionnaire Design and Sampling

The questionnaire was entitled "Survey of the state and impact of CIOs in China," and there are two versions. One of them was for CIOs, focusing on their state, such as the official title, work experience/background, and major challenges faced by them. The other one was for CEOs, emphasizing the influence and the effects of CIOs. This one aimed at an assessment of CIOs' work by the CEOs, including the directions of improvement for CIOs.

At the beginning of each questionnaire, we provided a definition of the respective profile of the intended respondents. A CEO would be the principal decision-maker in an organization as an independent legal entity, typically holding the title of President, General Manager, or Director of a government agency. A CIO would be the person responsible for the overall IT strategy and implementation in an independent legal entity, although the official title might not necessarily be CIO. Note, neither the English term Chief Information Officer (along with its English acronym) nor the verbatim Chinese translation is widely used in China, although such a role in organization is common.

A preliminary questionnaire was designed based on existing studies and questionnaires, and the research objectives of this study. It was then given to four experienced MIS researchers for comments and review for two rounds. Next, a pilot-test was conducted with three CIOs invited by the Beijing Center for Advancing Information Systems via telephone interview. Based on the feedback, the questionnaire was revised and consolidated. The data collection started in July 2003 and ended in October 2003, over a three-month period of time.

This study was conducted in conjunction with the China Computer Users magazine, with support from the Beijing Center for Advancing Information Systems and the Society for Information Economics of China. The magazine is widely circulated, and well respected by its reader community, which consists of managers and executives with responsibilities for managing their organization's IT. The magazine kindly allowed the researchers access to their subscriber database.

A sample of 1400 executive subscribers was randomly selected from the database. Two hundred and seventy-two usable questionnaires were received, among which 100 were from CEOs and 172 from CIOs. There were 19 organizations with responses from both the CIO and CEO, which means the responses were from 253 unique organizations. Among them were 48 government and not-for-profit organizations, and 205 enterprises. The remaining part of this paper discusses results from the 205 businesses, and the CIO and CEO data were analyzed and reported separately.

3.3 Sample Characteristics

By the Chinese standard and also according to the official classification criteria of the national Statistic Bureau of China, 70% of the businesses were of large and medium size, and a major portion of them were still in rapid development. Most of them had an annual revenue above 50 millions of RMBs (1 US$ is equivalent to 8.27 RMBs). Follow-up telephone interviews revealed that large and medium size enterprises tended to be more concerned about the role of information systems, with a stronger motivation to adopt modern management philosophy and tools to deal with the increasingly fierce competition on the market. Bigger sizes also tended to be associated with more complexity and sophistication in management, which could be the reason that larger enterprises were more sensitive to the role of CIO in IT management. This is reflected in the fact that they were more co-operative with our study. The industry distribution of the 253 organizations is shown below in Table 1.

Table 1. Sample Distribution by Industry

Industry Sector	CEO		CIO		Combined	
	No. of Orgs	%	No. of Orgs	%	No. of Orgs	%
Communication and information, computing services and software	42	42%	17	11%	59	23 %
Manufacturing	21	21 %	30	19%	51	20%
Public administration & social orgs	3	3%	45	29%	48	18%
Financial services	5	5%	14	9%	19	7%
Scientific research, technical services, & geographic exploration	2	2%	16	10%	18	7%
Construction	10	10%	6	3%	16	6%
Health, social insurance and welfare.	2	2%	11	7%	13	5%
Others	15	15%	14	9%	29	11%
Total	100	100%	153	100%	253	100%

Note 1：Industry sector specification was based on the official Chinese government statistics.

Note 2：The "%" columns of the table show the proportion of CIOs and CEOs within the industry sector.

Note 3：If both the CEO and CIO of the same organization responded, the response of the CEO is kept in the statistics so that each observation is unique in the table.

Geographically, the enterprises in the sample came from 29 provinces. Generally speaking, the geographical distribution is not uniform across the provinces, as more observations were obtained from the more developed and affluent regions, whereas relatively fewer from the more remote and poorer regions. Beijing in particular has the highest number of enterprises from a single city, accounting for 29% of the sample. However, the industry sector distribution is relatively uniform across the regions, i.e., no region had observations clustered in any particular industries.

Table 2 shows the existence of the CIO position in the 253 organizations in the sample. It turns out that 59 of them (23%) had no CIO or equivalent position. Not surprisingly, the construction industry had the highest rate (56%) of CIO absence. However, it was unexpected that communications and IT industries had the second highest rate. To understand the reason, follow-up telephone interviews were made to several randomly selected high-tech companies, and the common response was that everyone was heavy users of IS and the organizational significance of IS was well understood, but IT operation itself was not considered critical to their organizational mission thus there was no need to create a CIO. After taking away the 45 in the public sectors, the number of businesses with CIO is 149 out of the 194 organizations surveyed.

Table 2：Sample Distribution according to the Existence of the CIO position

Industry Sector	No. of org.	Org. without CIO	% of org. without CIO
Communications and information, computing services and software	59	22	37%
Manufacturing	51	13	26%
Public administration & social orgs	48	3	6%
Financial services	19	3	16%
Scientific research, technical services, & geographic exploration	18	2	11%
Construction	16	9	56%
Health, social insurance and welfare.	13	2	15%
Others	29	5	17%
Total	253	59	23%

Interestingly, most of the organizations in the public administration and social organizations (mostly government agencies and non-profit organizations) have created the CIO position. This is an indicator of the awareness of government IT applications and e-Government in various levels of government and nonprofit organizations.

4. Data Analysis

Our data analysis is based on descriptive statistics about the state and impact of CIOs . Among the 149 businesses with the CIO position, 74% of the respondents (both CIOs and CEOs) reported that the CIO was operating at the departmental director level, and the remaining 26% considered he or she at vice-president level. Interestingly, the CEO and CIO respondents had vastly different perceptions. As shown in Table 3 below, 56% of the CEOs in our sample considered their CIO of vice-present level, whereas only 15% of the CIOs thought themselves were at the VP level.

This sharp contrast shows that in most enterprises CEOs have gradually recognized the importance of having a high-ranking executive responsible for IS. However, in day-to-day operations, this recognition and intention were not fully materialized. This caused CIOs

giving themselves a lower ranking on the corporate ladder. Perhaps it could also be said that the CEOs have a higher expectations for the CIOs, but the expectation was not filled for some practical reasons. There are a couple of other potential reasons for this. First, the CEOs who agreed to fill our questionnaire might be more mindful of the importance of the IS function, which contributed to the creation of the CIO position at the VP level. Second, it was also possible that, although CIO was envisioned at a higher level, in practice the CIOs were not given the full power thus they believed they were functioning as a departmental director.

Table 3. Organizational Ranking of CIOs (CEO vs. CIO Perceptions)

	Considered CIO at department level	Considered CIO at VP level	Total
All respondents	74%	26%	100%
CEO respondents	44%	56%	100%
CIO respondents	85%	15%	100%

Our questionnaire also had an item inquiring about CIOs' professional experience prior to taking on the CIO position. It turns out 73% of the CIOs had a background in IT or IT related fields. Only 13% of them were from other business areas in their company. The remaining 14% accounts for other or unspecified backgrounds. If our finding is representative of the industry, i.e., most CIOs have a technical background, it suggests that CIOs indeed need to pay more attention to business processes and organizational issues.

As to IT investment decision-making, 77% of the CIO respondents reported that they were given the authority to make decisions for IT investment below one million RMBs. This number is rather significant given that the size of common IT investments and projects are usually small in China. For most businesses, decisions about larger IT projects are made at the top level. This finding confirms the influence of CIOs on IT budget and planning.

Table 4. IT Investment Budget Approvable by CIOs

Less than 1 million RMBs	77%
1 – 5 million RMBs	16%
5 – 10 million RMBs	3%
Over 10 million RMBs	3%
	100%

It is a common belief that the CIO had the most difficult role in the organization [6], with responsibilities ranging from running the IT factory that must continue to adapting, enabling or facilitating all major changes in business processes. We asked our CIO respondents to identify the main challenges that they faced at work. Results are shown in Table 5 below. The most common complaints were all related to resources. In particular, "problematic coordination with business and functional units" was not among the top three challenges faced by CIOs. This finding might be interpreted as that IT applications were at a more developed stage than before, and without resource shortage IT applications would be able to serve the identified needs of business units.

Assessing CEOs' perception of their CIO is a key feature of our study. The most frequently mentioned areas for improvement were "knowledge and experience in managing the business" and "coordination with other functional areas." These two were mentioned by close to half of the responding CEOs. Generally speaking，CEOs' main complaints seemed to cluster around CIOs' business experience and integration with the rest of organization. This is

not surprising, as mentioned earlier, most of the CIOs in our sample had an IT or IT-related background. Business know-how and coordination were their main weaknesses. It is also easy to understand the importance of "integration into organization culture," as most of the CIO roles require cross-functional coordination, and communication has become a major part of CIOs' work [6].

Table 5. Major Challenges Faced by CIOs

Insufficient IT Budget	60%
Lack of decision power	49%
Shortage of IT personnel	48%
Unfavorable corporate strategies or environment	31%
Problematic coordination with business and functional units	27%
Lack of understanding by others in the organization	15%
Difficulty with following the technological progress	12%
Unstable markets	11%
Poor relationship with the CEO	9%
Others	6%

Table 6. CIO's Areas for Improvement as Perceived by the CEOs

Knowledge and experience in managing the business	49%
Coordination with other functional areas	40%
Integration into organization culture	29%
Technical competency	22%
Loyalty to organizational	18%
Personal aptitude and ethics	13%

Since there was much discussion about the CIO position being a career terminator and the high failure rate of IT projects, we were interested in finding out the reasons that were likely to cause CIOs to quit their job. Therefore, we asked the CIOs to answer a hypothetical question – If they were to quit their job, what would be the main reasons. Results are summarized in Table 7. The two most frequently cited reasons were "unpleasant corporate environment" and "presence of more challenging work in other companies." This result seems to suggest that CIOs cared a great deal about their organizational environment and prefer challenging work to realize their potential and growth opportunities.

The impact of CIOs to their organization was assessed from the perspective of the CEOs. The 41 CEOs who had a CIO in their organization reported that the greatest benefits of having a CIO was better information support to decision-making and more valuable information about the business operations (Table 8). Among the CEO respondents, 56% of them believed their CIO was instrumental for providing needed information for decision-making and business operations. It is also worth noting that 36% of the CEOs believed that their CIO had improved the efficiency of enterprises.

Table 7. CIO's Reasons for Jumping Boat

Unpleasant corporate environment	40%
Presence of more challenging work in other companies	35%
Career growth opportunities	28%
Better compensation elsewhere	14%
Poor relationship with the CEO or other executives	10%
Others	3%

Table 8. Organizational Impact of CIOs

IS department provided needed information for decision-making and business operations	56%
Helped improve organizational efficiency	36%
Helped reduce costs	4%
Not much impact	4%
	100%

Merely one out of 41 CEOs (4%) reported that the CIO helped cutting costs, and another one reported not much impact at all. One possible reason for this could be that IT projects and major IS initiatives take a long time to deliver the expected benefits. There were two other possible answers to the question about CIO impact, "made efficiency lower" and "increased costs," but none was chosen by any CEO.

CEOs' evaluation of CIOs was mostly positive in general (as shown in Table 9). Forty-eight percent of the CEOs praised the work of their CIO. However, at the same time, 20% of the CEOs could not give a definite assessment of their CIO. This could be due to an honest difficulty with assessing the real impact of CIO, or a polite but negative evaluation. Furthermore, 32% of the CEOs were not satisfied with the performance of their CIO. Therefore, CIOs impact seemed vary to a large extent, and it is hard to generalize the impact of CIOs across organizations and industries. This inconclusive result could be partly due to our single-item measure, and that the assessment CIO performance might need a more elaborate instrument. Nevertheless, our study reveals that the effectiveness of CIO was not overwhelmingly positive in the eyes of CEOs. There is still a long way to go for the CIOs to learn and improve, before their CEOs' expectation is met.

Table 9. CEO's Assessment of CIO Performance

Generally satisfied	48%
Not very satisfied	32%
Not sure	20%
Total	100%

5. Conclusions

As the first large scale survey of CIO state and impact in China, this study has identified several interesting findings. Most CIOs have ranked themselves at the departmental director level. If this was based on how the CIO duties were implemented, it certainly was not

consistent with the purpose and title of CIO. Nor was it consistent with CEOs' expectation and intention. Most CIOs had a background in IT or IT-related work, which might have contributed to their self-evaluated lower ranking and effectiveness. This is further evidence of some CIOs' inability to bring about strategic applications of IT, to show cross-functional leadership, and to manage consolidation of IT to satisfy business requirements.

It is also interesting to note that CIOs have attributed their lack of power and effectiveness to external factors such as "insufficient IT Budget," "lack of decision power," "shortage of IT personnel," and "unfavorable corporate strategies or environment." In contrast, CEOs believed that CIOs should strengthen their "knowledge and experience in managing the business" and improve their "coordination with other functional areas," which point to CIOs' own qualities and aptitudes. The somewhat contradictory beliefs could lead to CIO turnovers, causing them to cite "unpleasant corporate environment" and the presence of "more challenging work in other companies" as the main reasons for potential jumping boat.

By and large, the most significant effect of the creation of the CIO position was better support for decision-making and organizational efficiency. Close to half of the CEOs' assessment of their CIO was mostly favorable, although a major percentage of CEOs had ambivalent or negative feelings toward their CIOs' effectiveness.

This empirical research has several limitations that could hurt the quality and contribution of this work. First of all, all observations were taken from the same pool, a database of executive readers of the China Computer Users magazine. Most of the organizations in the database are large and medium sized, and they tend to have a higher-than-average level of IT applications. Therefore, there could be some systematic bias in the sampling method, and it could be safe to infer that CIO state and impact in most enterprises in China might be worse than what is reported in this paper.

Secondly, as the first major effort to investigate CIO state and effectiveness in China, our questionnaire was catered to issues that were of interest and concern to Chinese executives, thus was less comparable to questionnaires used in western studies. As a result, it was not meaningful to compare the results. Furthermore, most questions were single item measures, thus measurement errors were difficult to assess. Data analysis was also based on descriptive statistics only, without any inferential statistical analysis. One of the key features of research design is the inclusion of both CIO and CEO perspectives, however, unfortunately there were too few businesses that gave two responses by both the CEO and CIO. Therefore, there was not enough statistical power to perform any serious statistical analysis. These limitations are certainly the starting point for our next project.

In summary, despite the limitations, this research has painted a reasonably cohesive picture about CIO state and impact in China. It has confirmed the positive contributions of CIOs to some extent, and identified potential areas for improvement. Therefore, this study could have practical values for CIOs and CEO to find ways to perfect the CIO mechanism to achieve their objectives. It might be safe to infer from the data that the key question is not whether businesses have given enough power and resources to CIOs, but whether CIOs are ready and able to support senior management in strategic management and IT applications. The expectation gaps between CIOs and CEOs are particularly worth noting, and both parties have much to do to narrow the gap.

References

[1] Synnott, W.R. & Gruber, W.H., *Information Resource Management – Opportunities and Strategies for the 1980s*, New York: John Wiley & Sons Inc., 1981.

[2] Synnott, W.R., *The Information Weapon: Winning Customers and Markets with Technology*, New York: John Wiley & Sons Inc., 1987.

[3] Earl, MJ., *The Chief Information Officer: An Analysis of Survival*, London: Center for Research in Information Management of London Business School, 1993.

[4] Fenny, D.F., Edwards, B.R, & Simpson, K.M., Understanding the CEO/CIO relationship, *MIS Quarterly*, 16, 435-448,December, 1992.

[5] Gottschalk, P., The Chief Information Officer：A study of managerial roles in Norway，in *Proceedings of the 35th Hawaii International Conference on System Sciences*, 2002.

[6] Leslie, D.B.，CIO on center stage: 9/11 changes everything，*Information Systems Management*, Vol. 19, No. 2, Spring 2002.

[7] Reich，B.H., Nelson，K.M., In their own words：CIO visions about the future of in-house IT organizations, *DATA BASE for Advance in Information Systems*, Vol. 34, No. 4, 28-44, Fall 2003.

[8] Enns，H.G., Huff，S.L., Golden, B.R., CIO influence behaviors: the impact of technical background，*Information & Management*, Vol. 40, No. 5, 467-485, 2003.

[9] Enns，H.G., Huff，S.L.，，Higgins，C.A., CIO lateral influence behaviors：Gaining peer's commitment to strategic information systems，*MIS Quarterly*, Vol.27, No.1，155-175, 2003.

[10] Johnson，A.M., Lederer，A.L. Two predictors of CEO/CIO convergence，in *Proceedings of the SIGMIS Conference*, Philadelphia, Pennsylvania, April 2003.

[11] Hirschheim，R., Porra，J., Parks，M.S.，The evolution of the corporate IT function and the role of the CIO at Texaco, *DATA BASE for Advance in Information Systems*, Vol. 34, No. 4, 8-27, Fall 2003.

[12] Tagliavini, M., Moro, J., Ravarini, A., Guimaraes，T., Important CIO features for successfully managing IS sub-functions，in Igbaria, M. (Ed), *Strategies for Managing IS/IT Personnel*, 64-91, 2003.

[13] Reinventing the CIO, Finance Custom Wire, Nov 15, 2004.

[14] Huo, G., *Enterprise Strategic Information Management* (in Chinese), Science Press, 2001.

[15] Li, D., Qualities that CIOs' must have (in Chinese), Computer Weekly, 2002, 9.

[16] Zuo, M., CIO knowledge structure research (in Chinese), *Bulletin of Renmin University of China*, 3, 120-125, 2004.

[17] The 2002 state of the CIO survey，*CIO Magazine*，Mar. 1, 2002.

[18] The State of the CIO 2003，*CIO Magazine*，Mar. 26, 2003.

[19] State of the CIO 2004，CIO Magazine，Sep. 30, 2004.

[20] State of the CIO 2004—The CEO View，*CIO Magazine*，Nov. 02, 2004.

[21] Year 2002 annual report of CIO survey (in Chinese)，*Internet Weekly*, 2003，2.

[22] CIO Survey，*Information Systems Engineering* (in Chinese), 2003，12.

[23] A survey of CIO compensation (in Chinese)，*Knowledge Economy*，2004，2.

Acknowledgements