

# 한국 정보기술관리자들의 기술요구사항에 대한 연구

## Skill Requirements for Information Technology Managers in South Korea

이 충 권 (Choong Kwon Lee) 남조지아대학교 정보기술학과 조교수  
유 상 진 (Sangjin Yoo) 계명대학교 경영정보학과 교수  
Han Reichgelt 남조지아대학교 정보기술학과 교수

### 요 약

정보기술관리자는 정보기술자원을 조직화하는 것 뿐만 아니라 정보시스템을 실행시키는데 있어서 매우 중요한 역할을 한다. 정보기술관리자가 되려는 사람은 업무를 수행하는데 필요한 기술이 무엇인지를 정확하게 이해해야 한다. 본 연구는 한국의 온라인 구인광고들을 분석함으로써 정보기술관리자에게 요구되는 기능들이 무엇인지를 밝히고자 한다.

*키워드 : 기술, 정보기술관리자, 목록분석*

## I. Introduction

IT is not merely supporting organizations in their day-to-day businesses but is also used as a weapon to acquire and maintain sustained competitive advantages. Today's organizations rely heavily on IT in managing organizational information and knowledge and keeping them up-to-date with internal and external partners. It is not surprising to see a number of authors (e.g., Kanter, 2001; Davis, Siau, and Dhenuvakonda, 2003) assert that, in order to successfully use IT, organizations must align their business and IT strategies.

One of the most critical determinants of the success or failure of an IT-related business proj-

ect is the capabilities of the people who design, implement, and maintain the project to support the organization (Jiang, Klein, and Margulis, 1998). Specifically, the role of IT managers is critical in streamlining business and achieving IT-enabled competitive advantage in an organization.

Given the importance of the IT manager for the success of an organization, it becomes crucial that one understand the skills necessary for success in such positions. This knowledge is potentially relevant to individuals interested in moving into such positions, but also for educational institutions that want to design programs to prepare individuals for such positions, as the reasons to believe that programs that are designed with spe-

cific outcomes in mind are in some ways superior to those that are not are many (see e.g., Reichgelt, Price, and Zhang, 2002; Clarke and Reichgelt, 2003; Yen, Chen, Lee, and Koh, 2003). This paper tries to answer the question of which skills organizations require from their IT managers through the collection and analysis of job ads posted on South Korean Websites.

## II. Literature review

An IT manager is an IT professional responsible for managing an organization's overall IT infrastructure, including databases, computer networks, computing support, and hardware and software. In addition to these technical duties, IT managers supervise the other members of the IS staff, including programmers and systems analysts. Given the increasing importance that IT plays in modern organizations, it is not surprising that the IT manager has become a more important position in many organizations, and the question of which skills are required for IT managers has therefore gained some prominence as well. Researchers have studied the IT manager from many different angles, including functional responsibilities (Gibson, 1973), motivation (Couger, Zawacki, and Oppermann, 1979), and training and development (Delaney, 1985).

Several methods for investigating the research question regarding the skills of IT professionals have emerged. First, one can use survey results reported by professional organizations such as the Association for Information Technology Professionals (AITP), the Association for Computing Machinery (ACM), and the Association for Information Systems (AIS). Second, one can conduct empirical studies of actual IT managers,

either through observation of their actual day-to-day duties or through interviews with IT managers. Third, job advertisements may be used as a window to see what skills organizations report they are need in IT managers.

One example of the second approach is a research conducted by Ives and Olson (1981), who examined the nature of the IT manager's job through the observation of six IT managers. The results of their study indicated that the IT manager is clearly more of a manager than a technician and spends most of his/her time in contact with technical specialists rather than IT users. Another empirical study was conducted by Stokes (1991), who reported that IT managers consider managerial skills as a critical success factor for their career. Many other empirical studies have revealed that, for IT managers, behavioral skills such as leadership and communication (Morris and Bartczak, 2000; Hardin, Joshi, and Li, 2002) are more critical than technical ones.

A number of researchers have used job ads to identify the skill requirements and trends of IT professionals. Cullen (2000) investigated job ads for library information professionals in Ireland. By analyzing job ads in newspapers, Arnett and Litecky (1994) identified skills that are most in demand. Job ads have also been used to observe the trends of IT skills over time (Todd, McKeen, and Gallupe, 1995; Gallivan, Truex, and Kvasny, 2004). Lee (2003) was one of the first to use jobs ads posted on the Internet and investigated Fortune 500 corporate websites to determine the skill sets required for IT managers. By providing a virtual market for the supply and demand of human resources, the Internet has made a fundamental, innovative impact on corporate recruiting. Cappelli (2001) il-

illustrates strategic ways of using the Internet for recruiting employees. Karr (2000) reports that the poor design of corporate websites led a significant number of students to reject them as potential employers. Hiring organizations are moving from posting their jobs in newspapers to posting them on the Internet. Daily newspapers were estimated to earn between one and two billion dollars less in each year 1999 and 2000 from their job ads (Grotticelli, 2001) with this business moving to new competitors, such as Monster.com or Hotjobs.com (Anstead, 1999; Litecky and Arnett, 2001). Online job boards are now regarded as a main medium for both college students and professionals to find new employers.

Two types of analysis can be performed on job adverts. One is fairly simple and involves counting the number of skills listed in relevant job ads. Such an analysis allows one to determine whether the IT manager's position has become more complicated. Based on the IT managers' job ads posted on the off-line newspapers, Todd et al. (1995) reported that the average number of skills mentioned in an ad has increased from five in 1970 to seven in 1990. Studies on Internet job boards revealed that the average number of skills in an ad had soared to 19.1 in 2003 (Lee, 2003).

One can, of course, speculate whether this dra-

matic increase in the number of skills required that Lee (2003) reported was due to the fact that the position of IT manager had become significantly more complex since 1990. The emergence of the Internet argues that this may indeed be the case. On the other hand, it may simply be the case that online job boards allow employers to use an unlimited space for each ad, while the offline newspapers charge advertising fees depending on the number of words in the ad. In other words, the greater length of online ads may simply be a function of the fact that it is cheaper to specify the job requirements more precisely in this environment than in an off-line environment, rather than being reflective of increased complexity of the position.

A second way of analyzing job ads involves not merely counting the number of skills specified in the ad, but also attempting to classify the types of skill. A number of authors (e. g., Nunamaker, Couger, and Davis, 1982; Todd et al., 1995; Lee, 2005) have developed classification schemes. In a study of job ads posted on corporate web sites for Fortune 500 companies, Lee (2003) refined the classification by Todd and his colleagues (1995) to reflect the increasing importance of the Internet. <Table 1> juxtaposes the various classification schemes.

<Table 1> Categories of IT Skill Requirements

Category 1 (Dichotomous Approach)	Category 2 (Nunamaker, et al., 1982)	Category 3 (Todd, et al., 1995)	Category 4 (Lee, 2003)
Technical Skills	Computers	Technical	Architecture/Network Hardware Software
	Models	Systems	Problem Solving
	Systems		Development
	Organizations	Business	Business
Behavioral Skills	People, Society		Management
		Social	

〈Table 2〉 Number of Ads by Website

Website	Number of Ads	Percentage
incruit.co.kr	112	26.6%
scout.co.kr	106	25.2%
jobkorea.co.kr	105	24.9%
recruit.co.kr	98	23.3%
Total	421	100.0%

〈Table 3〉 Number of Job Ads by Industries

Industry	Number of Ads	Percentage
Information, Finance, Insurance, Professional	236	56.0%
Manufacturing	85	20.2%
Wholesale, Retail, Transportation / Warehousing	37	8.8%
Education, Health Care and Social Assistance	24	5.7%
Mining, Utility, Construction	21	5.0%
Arts, Accommodation & Food Services	18	4.3%
Total	421	100.0%

One of the limitations of the previous work reviewed in this section is that it has, by and large, been limited to U.S. organizations. Apart from an inherent interest in determining to what extent U.S. organizational practices are followed in other countries, the increasing globalization of the market for IT employers also makes it important to look at practices elsewhere. U.S. firms are increasingly forced to look abroad for IT employees. Moreover, it is not unlikely that at least some of the students currently enrolled in U.S. universities, or IT professionals currently employed by U.S. firms, may, at some stage, find employment with firms abroad. It is for this reason that this study looked at what Korean firms were looking for in IT managers.

### III. Data Collection

Job ads, based on job title, were collected from four commercial job websites in South Korea as shown in <Table 2>. Job ads that contained the title 'IT manager,' 'IT director,' or 'IT supervisor' and that were permanent, rather than contract-based, were collected for the analysis. Ads with job titles such as 'IT project manager' and 'IT development manager' were excluded as these were more likely to be temporary. Overall, 421 job ads were collected from 421 different companies. <Table 3> shows the industry classifications of the firms in the sample.

Two types of analyses were conducted on the job ads. First, the number of skills listed were

<Table 4> Classification Scheme Used to Classify Job Ad Skills

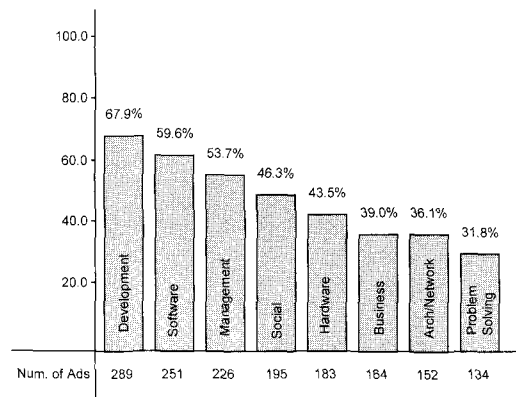
Technical Skills	Business Skills	System Skills
Software	Management	Development
Programming Language General Knowledge of S/W Packages Database OS / Platforms CASE	Project Management Planning General Management Leadership Organization Monitor & Control Training	Implementation Design Programming Analysis Knowledge of Methodologies General Knowledge of Development Operations/Maintenance Knowledge of General Technology Integration Documentation Quality Assurance
Hardware	Social	
General Knowledge of H/W Server Devices/Printers/Storage Desktop/PC	Foreign Language (English) Communication Interpersonal Independent/Self-Motivated	
Architecture/Network	Business	Problem solving
Networking & N/W Devices Internet General IT Architecture Network Security Client/Server LAN/WAN Mainframe	General Knowledge of Business Electronic Business Industry Specific Enterprise-wide Function Specific	Technical Expertise Creative/Innovative analytical/critical/logical Customer Oriented General Problem Solving Adaptive/Flexible Modeling

counted, and second, the skills were classified based on the following classification scheme.

of ads that referred to each skill category at least once in the ad.

#### IV. Results

Although job posting websites in South Korea also allowed almost unlimited space for the advertisers, the first analysis counting the number of skills listed in those ads shows that the ads in the sample list an average of 6.3 different skills. Note that this is considerably lower than the average obtained from even the offline newspaper ads in 1990. The authors return to this finding in the discussion section of this paper. <Figure 1> shows the number



<Figure 1> Percentage of ads that referred to each category at least once

〈Table 4〉 Number of ads for skills requirement

Technical skill			Business skill			System skill		
Skills requirement	# of Ads	% of Ads	Skills requirement	# of Ads	% of Ads	Skills requirement	# of Ads	% of Ads
Software	251	59.6%	Management	226	53.7%	Development	289	67.9%
Programming Language	137	32.5%	Project Management	120	28.5%	Implementation	151	35.9%
General Knowledge of S/W	94	22.3%	Planning	87	20.7%	Design	117	27.8%
Packages	89	21.1%	General Management	68	16.2%	Programming	94	22.3%
Database	74	17.6%	Leadership	68	16.2%	Analysis	65	15.4%
OS / Platforms	62	14.7%	Organization	38	9.0%	Knowledge of Methodologies	54	12.8%
CASE	8	1.9%	Monitor & Control Training	11	2.6%	General Knowledge of Development	50	11.9%
Hardware	183	43.5%	Social	195	46.3%	Operations/Maintenance	50	11.9%
General Knowledge of H/W	82	19.5%	Foreign Language (English)	114	27.1%	Knowledge of General Technology	43	10.2%
Server	39	9.3%	Communication	100	23.8%	Integration	24	5.7%
Devices/Printers/Storage	12	2.9%	Interpersonal	69	16.4%	Documentation	17	4.0%
Desktop/PC	4	1.0%	Independent/Self-Motivated	8	1.9%	Quality Assurance	6	1.4%
Architecture/Network	152	36.1%	Business	164	39.0%	Problem solving	134	31.8%
Networking & N/W Devices	60	14.3%	General Knowledge of Business	99		Technical Expertise	54	12.8%
Internet	53	12.6%	Electronic Business	47	23.5%	Creative/Innovative	32	7.6%
General IT Architecture	37	8.8%	Industry Specific	45	11.2%	analytical/critical/logical	21	5.0%
Network Security	25	5.9%	Enterprise-wide	25	10.7%	Customer Oriented	20	4.8%
Client/Server	10	2.4%	Function Specific	21	5.9%	General Problem Solving	20	4.8%
LAN/WAN	7	1.7%			5.0%	Adaptive/Flexible	10	2.4%
Mainframe	3	0.7%				Modeling	5	1.2%

No category was mentioned in more than 70 percent of ads. Three categories that were mentioned in more than half the ads collected were software (59.6%), management (53.7%), and development (67.9%). Note that, in contrast to IT managers in the United States, IT managers in South Korea are required to possess development and software skills over management skills.

## V. Discussion

The results of this analysis are remarkable in two ways, especially when compared to similar results for the U.S. job market. This research has already drawn attention to the fact

that Korean job ads list considerably fewer skills than U.S. ads. One can put forward different explanations for this result. For example, it may be the case that employers in South Korea do not think of their job ads as gate keepers to preventing unqualified applicants from applying for jobs. The relatively small size of the country could allow both job seekers and employers to meet face-to-face without expending much on travel. Alternatively, it may be that the IT manager position is much more narrowly defined in South Korea.

Some evidence for this second explanation is provided by the pattern of required skills. Unlike their U.S. counterparts, South Korean firms seem to require their IT managers to be more technical

and to place less emphasis on non-technical skills. Whereas U.S. firms seem to require management skills as much as development skills, closely followed by social skills, Korean firms place greater emphasis on development and software skills. A further breakdown of both shows that South Korean employers expect their IT managers to be involved in development activities, such as implementation (35.9%), design (27.8%), and programming (22.3%). In a similar vein, knowledge about software, such as programming languages (32.5%), general knowledge of software (22.3%), and packages (21.1%), also received much attention. Moreover, South Korean firms tend to require their IT managers to be software rather than hardware-oriented. The demand for general knowledge of software needs to be compared to the demand for general knowledge of hardware. While six of ten job ads referred to software (59.6%), about four of ten referred to hardware (43.5%). In the same vein, no skill in the categories of either architecture/network or hardware was required by more than 20 percent of the total job ads.

It is also noteworthy that only 39 percent of the South Korean ads mention business skills, whereas almost 89.4 percent of U.S. ads do, reinforcing the fact that South Korean firms place a much greater premium on technical rather than non-technical skills. There are, however, a number of caveats that one has to bear in mind when interpreting these results, primarily the fact that the U.S. job ads list a considerably larger number of skills than the South Korean job ads. If U.S. job ads were restricted to say six or seven skills, then it may be the case that management and business skills would be given less prominence. In other words, it may be the case that the non-

technical skills mentioned in U.S. job ads are desired, rather than required, skills. In future work, the authors hope to determine whether this is indeed the case.

## VI. Conclusions

The preliminary results of the research reported in this paper indicate that South Korean firms tend to look for personnel with strong technical skills, rather than business skills, when attempting to fill IT manager positions. This goes against the wisdom, at least in the U.S., where the trend has been toward filling such positions with people with management and business skills, although at least some anecdotal evidence suggests that successful IT managers in the U.S. also possess strong technical skills. In future work, the authors plan to make a more detailed comparison between U.S. and South Korean firms to try to relate their hiring practices and their organizational structures and cultures and to relate this to the uptake of IT both within firms and within the larger society. The authors hope that this research will ultimately lead to a better understanding of the skills that are required for an IT manager to be successful. This knowledge, in turn, can be used to arrive at a set of outcomes for any educational program aimed at preparing students for positions as IT managers, and hence provide an important input in the design of such educational programs.

## References

- Anstead, M., "Screen Saver", *Accountancy*, Vol. 124, No. 1275, 1999, p.32.
- Arnett, K. P. and C. R. Litecky, "Career Path

- Development for The Most Wanted Skills in the MIS Job Market”, *Journal of Systems Management*, Vol. 45, No. 2, 1994, pp.6-10.
- Cappelli, P., “Making the Most of On-line Recruiting”, *Harvard Business Review*, Vol. 79, No. 3, 2001, pp.139-146.
- Clarke, F. and H. Reichgelt, “The Importance of Explicitly Stating Educational Objectives in Computer Science Curricula”, *SIGCSE Bulletin Inroads*, Vol. 35, No. 4, 2003, pp.47-50.
- Couger, J. D., R. A. Zawacki, and E. B. Oppermann, “Motivation Levels of MIS Managers Versus Those of Their Employees”, *MIS Quarterly*, Vol. 3, No. 3, 1979, pp.47-56.
- Cullen, J., “A Review of Library and Information Service Job Advertisements: What Do They Tell Us about Work in The Irish Library Sector?”, *Journal of Information Science*, Vol. 26, No. 4, 2000, pp.278-281.
- Davis, S., K. Siau, and K. Dhenuvakonda, “A Fit-Gap Analysis of E-Business Curricula Vs. Industry Needs”, *Communications of the ACM*, Vol. 46, No. 12, 2003, pp.167-177.
- Delaney, C., “The Development of Technical Managers”, *Journal of Information Systems Management*, Vol. 2, No. 1, 1985, pp.73-76.
- Gallivan, M. J., D. P. Truex, and L. Kvasny, “Changing Patterns in IT Skill Sets 1988~2003: A Content Analysis of Classified Advertising”, *ACM SIGMIS Database*, Vol. 35, No. 4, 2004, pp.64-87.
- Gibson, C. F., “Organizing and Managing Computer Personnel: Conceptual Approaches for the MIS Manager”, *Proceedings of the 11th Annual Computer Personnel Research Conference*, 1973, pp.19-45.
- Grotticelli, M., “Job Market for Hire”, *Broadcasting & Cable*, Vol. 131, No. 24, 2001, p.19.
- Hardin, A. M., K. D. Joshi, and X. Li, “Business as usual? IS Job Skill Requirements during the Internet Era”, *Proceedings of Eighth Americas Conference on Information Systems*, 2002, pp.2143-2150.
- Ives, B. and M. H. Olson, “Manager or Technician? The Nature of the Information Systems Manager’s Job”, *MIS Quarterly*, Vol. 5, No. 4, 1981, pp.405-406.
- Jiang, J. J., G. Klein, and S. Margulis, “Important Behavioral Skills for IS Project Managers: The Judgments of Experienced IS Professionals”, *Project Management Journal*, Vol. 29, No. 1, 1998, pp.39-43.
- Kanter, J., “The CEO Goes On-line”, *Information Systems Management*, Vol. 18, No. 2, 2001, pp.74-79.
- Karr, A. R., “A Special Report about Life on the Job and Trends Taking Shape There”, *Wall Street Journal*, Apr. 4, 2000, p.A1.
- Lee, C. K., “Analysis of Skill Requirements for Systems Analysts in Fortune 500 Organizations”, *Journal of Computer Information Systems*, Vol. 45, No. 4, 2005, pp.84-92.
- Lee, C. K., “Analysis of Information Technology Job Skills Requirement in Fortune 500 Corporations”, Ph. D. Dissertation, The University of Nebraska-Lincoln, 2003.
- Litecky, C. and K. P. Arnett, “An Update on Measurement of IT Job Skills for Managers and Professionals”, *Proceedings of the Americas Conference on Information Systems*, 2001, pp.1922-1924.
- Morris, M. G. and S. E. Bartczak, “IT Skills in the Public Sector: Comparing the Views of Middle Managers and Their Supervisors”,



- Proceedings of Americas Conference of Information Systems*, 2000, pp.1963-1967.
- Nunamaker, J. F., J. D. Couger, and G. B. Davis, "Information Systems Curriculum Recommendations for the 80's: Undergraduate and Graduate Programs, A Report of the ACM Curriculum Committee on Information Systems", *Communications of the ACM*, Vol. 25, No. 11, 1982, pp.781-805.
- Reichgelt, H., B. Price, and A. Zhang, "Designing an Information Technology Curriculum: the Georgia Southern Experience", *Journal of Information Technology Education*, Vol. 1, No. 4, 2002, pp.213-221.
- Stokes, S. L., "The New IS Manager for the 1990s", *Journal of Information Systems Management*, Vol. 8, No. 1, 1991, pp.44-50.
- Todd, P. A., J. D. McKeen, and R. B. Gallupe, "The Evolution of IS Job Skills: A Content Analysis of IS Job Advertisements from 1970 to 1990", *MIS Quarterly*, Vol. 19, No. 1, 1995, pp.1-24.
- Yen, D. C., H. Chen, S. Lee, and S. Koh, "Differences in Perception of IS Knowledge and Skills between Academia and Industry: Findings from Taiwan", *International Journal of Information Management*, Vol. 23, No. 6, 2003, pp.507-522.

## **Skill Requirements for Information Technology Managers in South Korea**

Choong Kwon Lee\* · Sangjin Yoo\*\* · Han Reichgelt\*

### **Abstract**

Information technology (IT) managers play a very important role in implementing information systems as well as in organizing IT resources. In order to adequately prepare candidates for such positions, it is important that one determine exactly what skills are required for success in this position. This study is intended to reveal the most up-to-date skill requirements for IT managers through analyzing job ads posted on online job boards in South Korea.

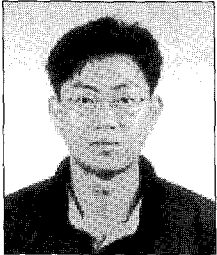
**Keywords:** *Skill, IT Manager, Job Ad, Content Analysis*

---

\* Department of Information Technology, Georgia Southern University

\*\* Department of MIS, College of Business Administration, Keimyung University

## ● 저 자 소 개 ●



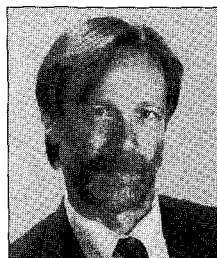
이 충 권 (cklee@georgiasouthern.edu)

Dr. Choong Kwon Lee has been serving as an assistant professor at Georgia Southern University since August 2003. Prior to that, Dr. Lee worked as 1995~1997 - systems analyst at Korea Aerospace Research Institute. Dr. Lee received his Ph.D. from University of Nebraska-Lincoln. He received his BA from Keimyung University and MBA from Southeast Missouri State University. Dr. Lee continues his active research in the fields of 'IT Job Skills for the New Millennium' and 'Strategic Uses of IT.'



유 상 진 (yoosj@kmu.ac.kr)

서강대학교에서 물리학(이학사), 경영학(경영학사)을 복수 전공하였으며, 미국 University of Nebraska-Lincoln에서 MIS전공으로 박사학위를 취득하였다. 현재 계명대학교 경영정보학과 교수로 재직 중이며, 현직에 오기 전에는 미국 Bowling Green State University 조교수로 재직하였다. 한국경영정보학회 부회장, 한국 정보시스템학회 회장을 역임하였으며, 현재 대구경북 CIO협의회 회장, 대구경북 ECRC전문위원, 대한상사 중재원 중재인으로 활동하고 있다. 주요 관심분야는 IS/IT의 전략적 활용, 경영혁신, 지식경영, 인터넷창업 등이다.



Han Reichgelt (han@georgiasouthern.edu)

Han Reichgelt holds degrees in philosophy and psychology from the University of Nijmegen in the Netherlands, and a PhD in cognitive science from the University of Edinburgh in Scotland. He currently is associate dean of the College of Information Technology. He is the (co-) author of more than sixty journals and refereed conference papers, as well as of a textbook on knowledge representation in artificial intelligence. His research interests include IT and economic development, IT application delivery quality, and computing education. He is chair of the ACM Special Interest Group on IT Education.