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Information Technology Professionals' Skill Requirements in Hong Kong

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ABSTRACT

This study tracked changes in skill requirements of information technology (IT) professionals in Hong Kong. The study coded representative job advertisements that appeared in the newspapers over a period of fourteen years – from 1990 to 2004. As there are many IT job titles, this study focused on three – namely, programmer, systems analyst, and IT manager. The coding results showed that there are changing emphases among three types of skills, vis-a-viz technical skills, business skills, and systems skills. Technical skills, however, remained the most important for programmers while business skills continued to be the most sought after for IT managers. Systems skills are marginally less important than technical and business skills for systems analysts. One discerning result concerning skill changes is that business skills appear to be increasing in importance for programmers and systems analysts. The study discussed the implications of the results.

Keywords: Information Technology Professionals, Hong Kong, Skill Requirements, Job Advertisements.

INTRODUCTION

Information technology (IT) professionals need to possess various skills for them to perform well in their job. Understandably, they need to have technical skills to enable them to work with computers. They also need to have systems and business skills so that they can apply their technical knowledge to solve business problems, and in this way, help organizations to thrive in today's competitive environment. Furthermore, IT

professionals also need to possess good interpersonal skills because they need to be able to work effectively with computer users (Earl and Skyme, 1992). IT professionals, therefore, need to be trained in different skills as employers are keen to recruit employees who possess technical as well as non-technical skills.

Given the context of skill requirements for IT professionals, one question that researchers and prospective IT professionals are interested to find out is whether employers value any one particular skill more than another. The general theme in the literature seems to be that generalist skills are important, or even more important than specialist/technical skills (Albin and Otto, 1987; Watson et al., 1990; Davis, 1993; Nord and Nord, 1995; Hunter and Palvia, 1996, Young and Lee, 1996). Not many studies, however, have verified that this theme is empirically correct, or that there has been a shift in emphasis between technical and non-technical skills over time. One study, which analyzed the contents of job advertisements in the United States and Canada over the period 1970 to 1990, has found that in the case of systems analysts, technical skills have become increasingly important compared to business and systems skills (Todd et al., 1995). This finding is surprising because it contrasts with the general perception that computer professionals need to place more emphasis on business and interpersonal skills. It is important to note, however, the study was conducted more than a decade ago in the United States and Canada. The results may not be generalizeable to current labor conditions. It would be interesting to find out if changes in skill requirements are similar in other countries. Given that the computer industry is increasingly becoming global in nature, recognizing similarities and differences in skill requirements of computer professionals across time and locations would be useful in helping to manage human resources in the industry.

The purpose of this study was to determine changes in skill requirements of IT professionals in Hong Kong. Generally, there has been a tight labor market for IT personnel in Hong Kong (Wong, 2001). A recent survey on IT manpower in Hong Kong found that one of the top concerns among employers is that prospective IT employees lacked the relevant skills and expertise (ITTDC, 2002). This may be due to shifting emphases on different skills brought about by structural changes in the nature of work. For example, end-users increasingly want IT specialists to deliver solutions as opposed to just solving technical problems. IT professionals, therefore, should understand business and other non-technical needs. It would be useful, therefore, to know the skills employers are seeking so that educators can impart the necessary knowledge to their students. Indeed, prior studies have highlighted the need to monitor the skill requirements so that the gap between industry expectations and academic preparation can

be minimized (Trauth et al., 1993). Monitoring skill requirements is also important to IT professionals because it would assist them to identify the relevant skills and help them to maintain currency in their profession. Even though there is an abundance of research on skill requirements of IT professionals in Western countries (Cheney and Lyons, 1980; Albin and Otto, 1987; Watson et al., 1990; Nelson, 1991; Davis, 1993; Nord and Nord, 1995, Todd et al., 1995), there is little that is related to the Asian context (Lu et al., 1999). There have been a few studies about work of IT professionals in Hong Kong – for example, Burn et al., (1992) and Martinsons and Cheung, (2001) – but few have focused on skill requirements. The motivation for this research arises from the belief that results of this research might provide valuable information to the IT professionals, the education providers, the manpower planners, as well as the occupational counselors about the skill requirements of IT professionals in Hong Kong.

RESEARCH METHOD

The specific research question addressed in this study was, "Has the mix of job skill requirements changed over the years for IT professionals in Hong Kong?" Several possible research methods can be used to answer this question. For example, we may ask managers in charge of IT personnel recruitment to recall the mix of job skills required of IT personnel over time (Fang et al., 2005). We may also ask job holders themselves whether their skill requirements have changed. These methods, however, have the disadvantage that they require people to recall past events. To overcome this limitation, this study addressed the research question by coding and analyzing the contents of recruitment advertisements (ads). Recruitment ads are a useful source of information because they list job requirements so that employers can shortlist applicants before selecting the prospective employee. The advantage of using recruitment ads is that archival records are easily available. There are no problems in recalling past information. Recruitment ads, therefore, should provide a reasonably reliable and convenient source of information for analyzing changes in skill requirements of IT professionals.

This study coded ads that appeared in the South China Morning Post (SCMP). SCMP is the leading English newspaper in Hong Kong. It started printing the first edition of its newspaper in Novemeber 1903. About 70 percent of its print readers are professionals, managers, and executives. Every Saturday, SCMP has large number of recruitment ads that help readers to look for jobs. This study coded representative ads from the SCMP from the year 1990 to 2004. With the exception of the last coding period, the ads were coded based on a five-year interval, an interval which we believe could help to detect changes in skill requirements over 14 years. For the year 1990, ads for

recruitment appeared mostly on Wednesday. As such, ads appearing on the second Wednesday of February, May, August, and November were coded. These ads were taken to be representative of ads for the whole year. For the years after 1990, recruitment ads appeared mostly on Saturdays in the SCMP. Ads appearing on the second Saturday of February, May, August, and November, therefore, were coded. Given that there were many IT jobs with different job titles in the industry, ads for three main categories of IT professionals – namely, programmers, systems analysts, and IT managers – were coded. Prior research on skill requirements of IT professionals has also focused on these three job titles. Literature review pertaining to skill requirements of IT professionals, including the three IT job categories studied in this research, is provided in Gallivan et al. (2004) and Todd et al. (1995).

A research assistant, who was also a post-graduate student in business information systems, carried out the coding for this research. He followed the research method and coding scheme provided in Todd et al. (1995). The coding scheme categorized skills into three main types – namely, technical, business, and systems skills. The technical category refers to skills related to use of computers such as hardware and software. The business category refers to areas such as functional knowledge as well as management and social skills. The systems category refers to problem solving and development methodology skills. These three skill categories represent a consolidation of skill mix for IT professionals.

The coding was carried out by reading the ads and then counting how many times phrases related to each skill category appeared. Two sets of measures were used – namely, number of phrases and percentage of phrases. Number of phrases shows the number of times phrases belonging to a particular skill category appear in the ad. Percentage of phrases is the number of phrases per category expressed as a percentage of the total number of phrases in the ad. Each set of measure highlights a different perspective of the data. For example, the number of phrases shows the absolute number of phrases in an ad, and the percentage of phrases indicates the relative number of times a particular skill category is mentioned in an ad.

RESULTS

Table 1 shows the breakdown on the number of ads coded. The table shows that in total, the study coded the most job ads for programmers, followed by systems analysts, and then IT managers. The table also shows that there are more ads for systems analyst and IT manager at the end of the coding period than at the beginning of the coding period. The increase is consistent with the expectation that with expansion of the computer

industry, more IT professionals are required to work in the industry. In the case for programmers, the number of ads for programmers in 1990 is more than the number of ads for 2004. There could be a number of reasons for the contraction in the number of ads across time. First, it may be possible that employers used other avenues – such as internet advertisements or advertisements in computer magazines – to recruit for prospective programmers. Second, employers might require fewer programmers because most systems had been developed. Third, after year 2000, most work related to Y2K had been completed. Hence, there may be less demand for programmers.

Table 2 shows the number of coded phrases per ad. Interestingly, the table shows there are more phrases in the ads for systems analyst than IT manager or programmers. While it is usual to find more phrases in an ad for systems analyst compared to those for a programmer because the systems analyst's job requirements are more than those for the programmer, it is quite unusual to find more phrases in an ad for systems analyst compared to those for an IT manager because the work of an IT manager is broader in scope compared to that of the systems analyst. To shed light on this, we analysed Table 3, which shows the results of detailed coding. The summary data in Table 3 shows that while the number of business phrases per ad for systems analyst is less than that for the IT manager, the number of technical or systems phrases per ad for the systems analyst is more than that for the IT manager. Thus, the details provided in the job ads for systems analyst are more than those provided for in the ads for the IT manager.

Table 1. Number of ads coded

Job Title / Year	1990	1995	2000	2004	Total
Programmer	171	190	188	147	696
Systems analyst	100	111	107	138	456
IT manager	53	80	83	84	300
Total	324	381	378	369	1452

Table 2. Number of coded phrases per ad

Job Title / Year	1990	1995	2000	2004
Programmer	9.76	11.82	14.39	13.34
Systems analyst	11.94	16.19	16.86	15.41
IT manager	11.19	11.88	12.07	11.99

Figure 1 comprises 6 graphs that summarize the coding results shown in Table 3. Each graph displays the coding results based on three broad categories of skills, i.e., technical, business, and systems skills. As shown in Table 3, the technical category is divided into hardware and software. The business category is divided into functional, management, and social areas. The systems category is divided into problem solving and development methodology. The following sections discuss the results of coding the three categories of skills for each IT job. They also discuss the common trends pertaining to skill requirements for IT jobs.

Programmers. In Figure 1, graphs 1a and 1b show that technical skills were the most emphasized skills for programmers throughout the period under study. Graph 1b shows that in percentage terms, there is a noticeable decrease in emphasis for technical and systems skills and an increase in emphasis on business skills throughout the fourteen years. Thus, while business skills ranked third in importance in 1990, they progressed to become the second most important skill in 2004.

Systems Analysts. In Figure 1, graphs 1c and 1d show that technical, business, and systems skills are all well emphasized in the skill requirements for systems analyst. Systems skills, however, are marginally less emphasized than technical and business skills. While technical skills are the most important for systems analyst in 1990, they ranked second after business skills in 2004. Business skills became the most important in 2004. As shown in graph 1d, the increasing emphasis on business skills is at the expense of technical and systems skills.

IT Managers. In Figure 1, graphs 1e and 1f show distinctly that business skills are the dominant skill required for IT managers. On average, an ad had three or more additional phrases of business skills compared to technical or systems skills. Technical and systems skills were ranked almost equally throughout the fourteen years.

Common trends. The detailed coding in Table 3 shows several common trends across the three job profiles. In terms of technical skills, more emphasis was placed on software than hardware. Among the software phrases, increasing emphases were placed on database and third and fourth generation languages. For business skills, increasing emphasis was given for all three aspects – functional, management and social skills. For systems skills, more emphasis was given to development methodology than problem solving.

DISCUSSION

The results of this research can be summarized into three main parts. First, the dominant skill requirement for programmers and IT managers had not changed over the

years. Technical skills remained highly emphasized for programmers and business skills continued as the most demanded skills for IT managers. In the case for systems analysts, all three skills were given emphasis, with systems skills given marginally less emphasis, and business skills gaining increasingly emphasis than technical skills. The results pertaining to systems analyst are slightly different from those obtained by Todd et al. (1995), which showed that systems analysts have increasingly emphasized on technical skills. It should be noted, however, the difference in results might be due to different timeframe used in the studies.

The second set of results obtained from this study is that there is a discerning increase in emphasis on business skills, particularly for programmer and systems analyst. This result is consistent with the general theme in the literature that IT professionals have increasingly emphasized non-technical skills. This result would be useful to educational institutions that prepare students to work as IT professionals. They could emphasize more business contents in their IT courses. Indeed, educational institutions in Hong Kong may already have recognized the industry's needs regarding business skills because there has been recent reorientation in introducing less technical subjects in computing courses (Talyor, 2006).

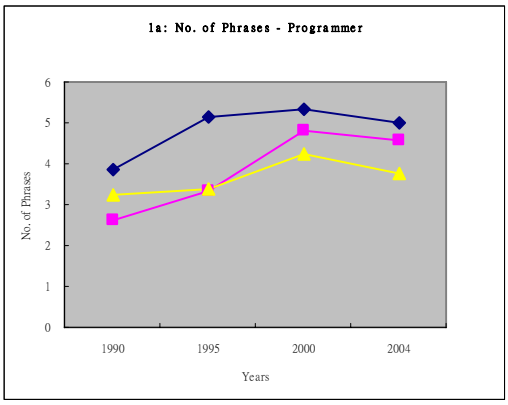
The third set of result obtained from this research is that the skill composition for IT managers had consistently been different from those of programmers and systems analysts. IT managers emphasized more on business skills while programmers and systems analysts tend to emphasized more on technical skills, although the results also show that the latter two are increasingly putting more emphasis on business skills. IT professionals need to be aware of the differences in skill composition as they progress through various IT jobs in their careers in the IT industry.

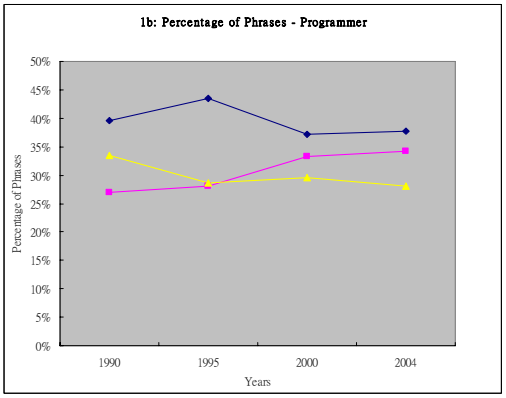
Table 3: Results of detailed coding

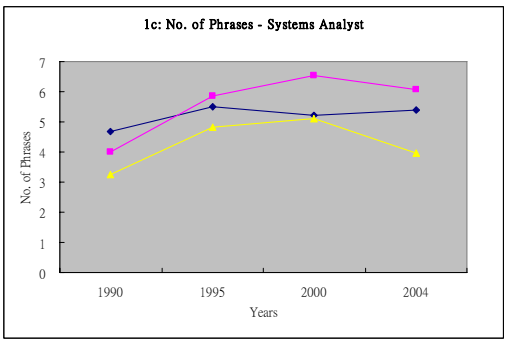
		Programmers				Systems Analysts				IT Managers			
	Year	1990	1995	2000	2004	1990	1995	2000	2004	1990	1995	2000	2004
	N	171	190	188	147	100	111	107	138	53	80	83	84
Knowledge/Skill Categories		Number of Phrases											
TECHNICAL													
Hardware	Mainfame	98	140	132	78	74	79	57	106	31	58	21	35
	Mini	0	7	8	8	0	0	0	0	0	0	0	0
	Desktop	86	102	118	48	51	76	47	5	0	11	32	5
Software	2GL	39	40	28	54	0	0	15	56	0	0	0	2
	3GL	116	175	180	139	79	111	99	138	30	43	57	40
	4GL	90	143	170	147	90	111	107	138	38	45	61	42
	COBOL	54	79	30	7	51	69	16	5	0	0	0	0
	Database	117	147	188	147	86	92	107	138	20	36	45	48
	CASE	0	48	26	34	3	15	41	94	2	3	0	11
	Operating Systems	61	94	124	67	34	57	69	55	11	23	34	15
	Packages	0	0	0	4	0	0	0	7	0	0	0	0
	Others	0	0	0	11	0	0	0	8	0	0	0	0
BUSINESS													
Functional	Industry specific	3	3	19	5	0	17	23	21	2	17	22	22
	Function specific	0	4	10	2	0	22	22	22	4	4	19	19
Management	General management	2	15	18	3	2	37	41	52	11	44	45	42
	Leadership skills	0	0	20	23	22	54	23	79	53	79	70	71
	Organization skills	14	71	100	61	24	60	74	68	40	48	63	62
	Project management	58	113	107	92	90	96	83	124	46	60	83	76
	Planning	0	0	89	63	89	96	100	88	46	46	28	57
	Monitoring and Control	0	0	43	29	0	0	46	66	0	13	19	20
	Training	0	20	20	9	0	40	15	6	6	6	6	6
	Others	36	6	6	6	0	0	0	0	0	0	0	0
Social	Communication skills	133	189	188	147	100	108	107	130	53	72	83	82
	Independent/motivated	108	107	147	114	15	25	67	62	19	43	49	51
	Interpersonal skills	97	102	135	121	59	97	97	118	53	55	48	71
	Others	0	0	0	0	0	0	0	0	6	6	6	6

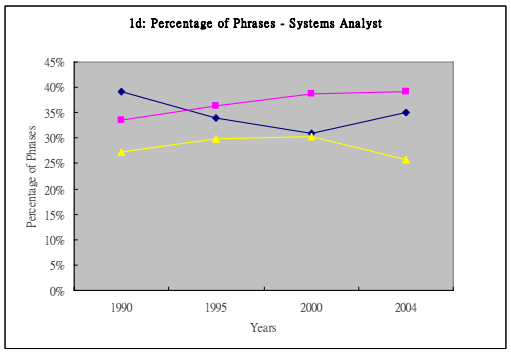
Table 3: Results of detailed coding (Continued)

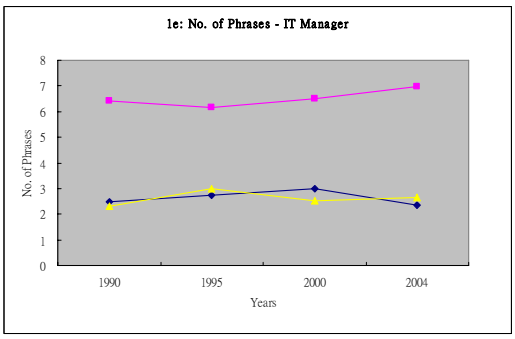
SYSTEMS													
Problem Solving	Quantitative/logical	0	0	0	0	0	0	4	4	0	0	0	0
	General problem solving	0	0	6	6	0	66	66	66	22	37	32	14
	Technical expertise	145	159	142	142	2	49	62	62	11	5	2	6
	Creative/innovative	0	0	28	28	2	35	53	53	24	61	66	61
Development Methodology	Analysis	136	159	154	94	100	110	107	107	34	58	46	46
	Design	115	159	154	111	100	110	107	107	31	58	46	70
	Programming	156	156	188	137	69	84	67	67	0	9	9	9
	Implementation	0	0	86	10	52	64	55	55	0	0	0	0
	Operations/maintenance	0	0	33	15	0	9	19	19	0	0	0	0
	General technology	2	2	2	5	0	8	8	8	0	10	10	12
	Other	3	6	6	5	0	0	0	0	0	0	0	6
Summary Data													
Total number of Technical phrases		661	975	1004	744	468	610	558	750	132	219	250	198
Total number of Business phrases		451	630	902	675	401	652	698	836	339	493	541	585
Total number of Systems phrases		557	641	799	553	325	535	548	548	122	238	211	224
Total number of phrases in all ads		1669	2246	2705	1972	1194	1797	1804	2134	593	950	1002	1007
Number of phrases per ad		9.76	11.82	14.39	13.41	11.94	16.19	16.86	15.46	11.19	11.88	12.07	11.99
Phrases per ad for Hardware		1.08	1.31	1.37	0.91	1.25	1.40	0.97	0.80	0.58	0.86	0.64	0.48
Phrases per ad for Software		2.79	3.82	3.97	4.15	3.43	4.10	4.24	4.63	1.91	1.88	2.37	1.88
Technical Phrases/Ad		3.87	5.13	5.34	4.99	4.68	5.50	5.21	5.38	2.49	2.74	3.01	2.36
Phrases per ad for Functional		0.02	0.04	0.15	0.05	0.00	0.35	0.42	0.31	0.11	0.26	0.49	0.49
Phrases per ad for Management		0.64	1.18	2.14	1.95	2.27	3.45	3.57	3.50	3.81	3.70	3.78	3.98
Phrases per ad for Social		1.98	2.09	2.50	2.60	1.74	2.07	2.53	2.25	2.47	2.20	2.24	2.50
Business Phrases/Ad		2.64	3.32	4.80	4.59	4.01	5.87	6.52	6.06	6.40	6.16	6.52	6.96
Phrases per ad for Problem Solving		0.85	0.84	0.94	1.20	0.04	1.35	1.73	1.34	1.08	1.29	1.20	0.96
Phrases per ad for Develop Methodology		2.41	2.54	3.31	2.56	3.21	3.47	3.39	2.63	1.23	1.69	1.34	1.70
Systems Phrases/Ad		3.26	3.37	4.25	3.76	3.25	4.82	5.12	3.97	2.30	2.98	2.54	2.67
Percentage of phrases for Technical		0.40	0.43	0.37	0.38	0.39	0.34	0.31	0.35	0.22	0.23	0.25	0.20
Percentage of phrases for Business		0.27	0.28	0.33	0.34	0.34	0.36	0.39	0.39	0.57	0.52	0.54	0.58
Percentage of phrases for Systems		0.33	0.29	0.30	0.28	0.27	0.30	0.30	0.26	0.21	0.25	0.21	0.22

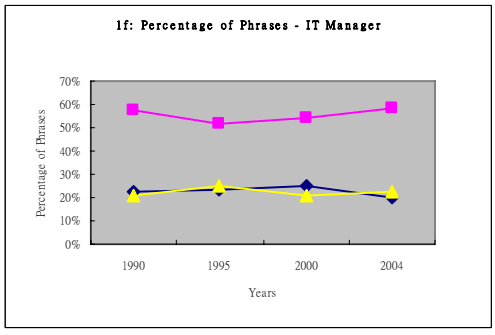












Legend:

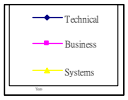


Figure 1. Summary of coding data

The results of this research are subject to a number of limitations. One is that the ads may not fully describe the requirements of the jobs. It is possible that ads were used only as an initial screening tool, and that they could be written by people who had a slight understanding of the jobs. Another limitation is that some organizations may use recruitment ads to enhance their image by using more technical terms so as to appear more sophisticated even though there may not be much technical contents in the job. If job ads do not reflect the job requirements accurately, alternative methods of carrying out this research – for example, interviewing the job incumbent – may provide different insights. However, employers have good reasons to place ads that accurately describe job requirements since such ads facilitate the efficient shortlisting of job candidates. To ensure validity of the research findings, however, future studies could use a variety of research methods to determine the skill requirements of IT professionals. Finally, this study used job ads from one leading newspaper. Job ads from other language newspapers, for example, those in mandarin or cantonese, should also be used to analyse changes in skill mix of IT professionals as people in Hong Kong also read newspapers in other languages.

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