

Educational perceptions of requirements of the information profession in China

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Abstract.

The aim of this study is to analyse the perceptions and demands concerning educational and working requirements of the information profession from the perspectives of employers *and* employees in the Chinese public and private information sectors, with focus on information science and information management (IS/IM) training and skills. The paper introduces recent developments of Chinese information education as background for two surveys, one targeting 49 employers of information professionals in public institutions and small, medium and large enterprises, and one aiming at 68 employees from the same sectors, all with academic degrees in IS/IM. Central findings demonstrate a mismatch between the perceptions of the employees with IS/IM background and those of the employers concerning central work functions, actual positions, importance to and status in institutions and enterprises. IS/IM staff are primarily employed for their information retrieval skills, but are also used in clerical work; in contrast, the employers perceive market analytic skills and industrial expertise as most central for the information profession. (Dis)advantages of the current curriculum and proposals for specific reforms of the Chinese IS/IM educational objectives, structure and curriculum are discussed.

Keywords: case study; China; education of information science; information profession; professional requirements

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1. Introduction

The Chinese National Social Science Fund has initiated studies of the requirements and perceptions by employers, as well as by employees, in modern IT departments, information-associated industry and public sectors. This encounter is in line with investigations of competencies and skills, and their perceptions by information educators and professionals, which took place in the developed countries during the 1990s, e.g. Trauth et al. [1], Lee et al. [2], Goulding et al. [3] or Xu Hong and Hsin-Liang Chen [4].

The present study forms an important part of a broader Chinese research agenda investigating the potentials of the integration of information and competitive intelligence. Through questionnaires the present study analysed the sustainable development of information science in China from two perspectives: information education on the one hand and the career identity of the information profession on the other. Its main objective was to observe how the same educational facets as well as requirements for information work in various organizational contexts are viewed by the *employers* – the managers – of the institutions and companies and, at the same time, perceived by their *employees*. The latter are all former graduates from information science or information management (IS/IM) with more than six months of work experience. In addition, the study provided insights into the use and ranking of information and staff positions in the dominant industrial and public sectors in China.

Although on the surface the conceptions of the fields of IS and IM look the same as in the Western world their meaning in a Chinese professional and educational context is somewhat different. For instance, IM is presently regarded as the major field, with IS as a supportive sub-field. This article underlines the development phases of the Chinese information education and profession in order to make the outcomes of the ensuing empirical survey of the perceptions and standings of the employers and employees more comprehensible.

After data collection, applying two complementary data collection instruments and analysis of the results, the study obtained in-depth findings on the capability of IS to meet societal demands and the status of IS/IM. The findings enabled us to discover the problems in IS education and to advise with respect to the real needs of organizations employing information professionals. These suggestions will further develop IS and IM in China and elsewhere.

The paper is organized as follows. After the Introduction, related work is outlined and discussed in Section 2. This is followed by a brief outline of the development of the Chinese information profession from an educational perspective. This background section is followed by the methodological section describing the data collection, processing and analysis methods. Section 5 presents the analysis results with respect to the employers' or managers' requirements and ranking of information positions, status and educational background. Section 6 outlines the findings concerning the information-educated employees' perceptions of their work with respect to requirements and information-related positions. The final sections discuss the problems facing Chinese IS and IM education and conclude the paper.

2. Related work

Trauth et al. [1], Lee et al. [2], Goulding et al. [3] and Xu Hong and Hsin-Liang Chen [4] investigated competencies and perceptions by information educators, employers and information professionals. The first two studies analysed the industry's expectations of skills and knowledge requirements for IS professionals against the academic preparations. Goulding et al. [3] made a forecast of the 'personality' of the future information workforce in an international perspective based on observations made prior to 2000, while Hong and Chen [4] analysed characteristics of the information employees actually hired by employers.

Some empirical studies of the educational background for information professionals in industrial and governmental contexts, in particular information and knowledge management skills, have been performed during recent years. Kahn and Kukalis identified the educational background of (non)

managers of information (systems) and, associated with the present study, analysed the perceptions of both managers and non-managers with respect to factors contributing to their professional advancement [5]. Yen et al. classified four broad categories of IM and systems skills that are regarded as critical and required by industries via a survey [6]. The categories covered IS/IT knowledge; organizational and societal skills; interpersonal knowledge and capacities; and personal trait knowledge. Also of interest to the present study, Chou et al. observed the organizational knowledge management performance in terms of employees' satisfaction. Their empirical data derived from a sample of 157 enterprises from the Taiwanese IS industry [7]. Taylor and Corral [8] investigated the feasibility of personalized information service in a government department. Their findings demonstrated in particular the need to understand business processes and to focus on service definition, strategic marketing, resource utilization, and performance measurement.

The current status of the library as well as archives and museum fields in China is provided in an extensive up-to-date article by Yu and Chiou-Peng [9], which also provides historical overviews. In addition, one may point to Wu [10] on the development stages of the modern Chinese library and to Yu [11] who discusses the politico-economic aspects of the public library developments after 1978 in China. Liu, Zhao and Ma analyse the modern pre-2005 developments of the digital libraries in China [12].

Educational elements of the IS/IM competences from Chinese perspectives have recently been advocated by Zheng and Shen [13] who discussed the construction and underlying discourse of library and information science (LIS) experimental teaching centres. Changping and Xueqin analysed through a case study of course websites the design of a web-based learning platform for management [14]. Annually the Chinese government put out on the web a so-called 'Notice for the national excellence courses' [15]. Historically the Chinese information education started in 1978 when Wuhan University set up a new major, Scientific and Technical Information, and enrolled, at first, undergraduate students. In 1984, the Scientific and Technical Information Institute of China and Wuhan University acquired master's degree authorization centres. This marked the beginning of postgraduate education in information science in China [16]. It also symbolized the Chinese information education at a higher level. In the past 30 years, Chinese information education has developed and established an entire academic degree system, including bachelor's, master's and doctoral degrees.

At the same time the Chinese information industry entered a new era of rapid development. The level of social information was constantly improved. Citizens' information consciousness became strengthened. Accordingly, the social demands on the information profession have changed remarkably. The concept of information became emphasized, and a professional background in IS became the necessary qualification for an information professional. Chinese information education has experienced three important reforms, influencing the development of Chinese information education, and the outcome of the present survey.

3. The development of Chinese information education

The reform in 1978 facilitated information education becoming an independent major/department in Chinese universities. At a meeting in 1983 held in Wuhan University that included the Chinese Ministry of Education the necessity of education in IS was recognized. Also, in 1983, the Chinese Ministry of Education issued comments on the development of education in LIS. The comments accelerated the growth rate of information-related studies. In some universities a course entitled Introduction to Scientific and Technical Intelligence was renamed Introduction to Information Science.

The most important achievement was the development of various multi-level forms of education. Junior college and continuing education emerged. In succession, the universities of Beijing and Wuhan started correspondence courses and evening schools for adults. This measure alleviated the serious problem of the shortage of information skills in all types of libraries in China. Meanwhile, the quality and the quantity of textbooks on IS were improved. From 1978 to 1990 58 textbooks on LIS were published [17]. This not only enriched the teaching material, contents and structure but also inspired research in the field.

3.1. Trends of renaming colleges and re-arrangement of undergraduate programmes

In 1992, the China Science and Technology Intelligence¹ Center was renamed by the Chinese State Science and Technology Commission as the China Science and Technology Information Center. In the same year, the Department of Library and Information Science of Beijing University was renamed the Department of Information Management. These actions exerted a wide and far-reaching impact on other universities and research institutes. Increasingly, LIS departments were renamed as IM or information resources departments or other information-related names. From 1993, Technical Intelligence was renamed as Technical Information. With this renaming, education, as well as the research contents of the Chinese IS field began to develop in the direction of IM.

At the end of the 1990s, the social demands on the information profession became increasingly stringent. For example, to be employed in the information industry, an information education background *and* other professional skills, such as industrial knowledge, were required. Furthermore, information agencies or academic institutes needed employees with higher level education and inter-disciplinary knowledge to do research work in the field. Therefore, in quantitative terms, the demand for information undergraduates shifted to an increasing demand for master degree candidates. Following this development, the Chinese Ministry of Education amalgamated five different specialties: Economic Information Management, Information Science, Technology Information, Management Information Systems and Forestry Management Information Systems, into one major field, Information Management and Information Systems. This field is often called IM for short. Consequently, IM became the first level discipline on the list of the undergraduate programme Library, Information and Archives Management, which, altogether, belong to the Management Science category.

Different from the earlier renaming reform, this reform not only determined the new direction of information education towards IM, but also allowed the specialty to become cross-disciplinary through the integration of other disciplines. Distributed over China, there are almost 200 colleges or universities with education on IM science at different levels.

The objective of the undergraduate education on IM is to cultivate advanced specialized personnel who should be qualified as information managers, IS analysts, designers, implementers, IS managers and evaluators at all levels of governmental departments, business enterprises, monetary institutions and research institutions.

According to the educational objectives, eight main IM subjects constitute the undergraduate curriculum:

- principles of management;
- economics;
- information management;
- data structure and databases;
- information organization;
- information retrieval;
- computer networks;
- management information systems.

Every educational institution can make specific curricula on the basis of their own research areas of IM. However, notwithstanding the variation in curricula foci this information *management* perspective in the Chinese information education makes it *quite different* in scope from the Western mainstream LIS programmes.

3.2. The postgraduate education

On the list of postgraduate programmes, IS is a second level discipline belonging to the Library, Information and Archives Management field. It differs greatly from IM on the list of undergraduate programmes outlined above by promoting the information (systems) technology aspects. At present,

the curriculum for postgraduates focuses on information retrieval; information systems; information technology; theory of information science; competitive intelligence; information organization; information management; information resources management; databases; and knowledge management. On the surface this structure is rather in line with Western IS programmes.

The organizations cultivating postgraduate programmes are many and varied and not limited to the colleges/universities of management and institutes of library and information education. They may include colleges/universities of science and engineering, colleges/universities of humanities and social sciences and other specialized scientific research institutes. A survey of enrolled information postgraduates conducted in 2009 showed that 62 organizations have authorization for a master's degree in IS, not including those in military intelligence. They belong to various departments, institutes, colleges or schools of IM or information resources management (13); public administration (12); economics and management or business (10); medical and public health (8); information science and engineering or computer science (5); or libraries, scientific information, press and media, miscellaneous fields (13).

However, different educational organizations lay down various educational goals and foci. Some institutions emphasize research ability in the IS/IM areas listed above; others simply emphasize that students need to learn and grasp knowledge of IS. On the other hand, some institutions emphasize good practice skills of information systems, information analysis and information service, etc.

3.3. PhD education and research themes

In China there are 10 authorization centres of PhD degrees in IS/IM. Eight are from departments or institutes of IM or similar fields and three from the National Academy of Science and the Institute of Scientific Information (ISTIC). Excellent command of English (first foreign language) is required. A second foreign language is even required in some universities in China, which is a prerequisite for international academic exchanges.

The IS/IM research themes may vary depending on the individual university providing the PhD education. For example, the well-known School of Information Management (SIM) at Wuhan University concentrates on information technology and systems; competitive intelligence; information management and knowledge management. However, information retrieval; information resources management; information consultation and service; and information economy are also central research fields. Some new related research areas have emerged in recent years, such as digital media and internet communications. The PhD course syllabus at SIM follows the same structure but also includes studies of management of high-technology industry and information assurance; digital economy and e-business; and information mining and knowledge retrieval. In contrast, the Chinese Medical Sciences University, in Beijing, in its perception of IS/IM emphasizes areas like textual data mining of bio-medicine; medical literature IM; evidence-based medicine and decision-making informatics.

Evidently, the Chinese educational and research objectives in the information field at postgraduate and PhD levels are highly IT and management related, effectively mixed with economic and organizational flavours, and with strong information retrieval, data mining and systems design applications. IS forms a sub-discipline within a strong IM educational- and research-oriented framework. One has to have these perspectives in mind when interpreting the results of the ensuing survey of perceptions of employer and employee of their roles and of importance and strengths in the information sectors.

4. Data collection and processing methods

The survey data were collected mainly by online questionnaires. For this purpose a website was developed. Respondents filled in the questionnaire online. The results of the questionnaires were stored in a dedicated database. In order to activate more people to participate in the survey, the links to the questionnaires were advertised in many well-known information-related websites, in homepages

of information providers and in several recruiting websites. Furthermore the questionnaires were published in network communities and forums.

The project team designed the so-called 'Survey of Information Profession 2008', which was composed of two different questionnaires. The first aimed at studying employers, e.g. executives and other managers of enterprises and public institutions. It included 12 closed questions involving types of enterprises and public institutions, products and services areas, industry competition, types of information demand, ranking of information positions, demands for information skills, requirements of knowledge background, and positions of employees with information background and so on. The questionnaire mainly collected data from managers concerning information needs, demands for employees with IS background, and degree of importance of information work.

The second questionnaire aimed at studying employees, i.e. staff members with at least six months' experience and who also had an IS/IM graduate background. It included 12 closed questions and two open-ended questions for employees in information executive positions. The questionnaire involved types of employers whom the respondents worked for, academic degree, product and service area, industrial competition, types of information demands, positions held, whether the information skills met the position demand or not, whether respondents perceived an advantage or not, the extent of the respondents' contribution to the company and the extent of importance that the employers attach to them, core courses of IS/IM and suggestions for the reform of IS/IM. The purpose of the questionnaire was to collect data with respect to the respondents' understandings of IS *after* their graduation when working or job hunting; the advantages, disadvantages and career identity of IS; the extent of the respondents' perceived importance working for the company and suggestions as to course offerings and educational reform.

The second questionnaire was also sent out by email through information professional associations and online through ex-classmate networks. The different ways of surveying ensured the sample size. Altogether 117 respondents from employers (49) and employees (68) were collected with 63 from the online survey and 54 by email. For a single choice question, the simple percentage of an item is calculated so that the sum of the percentage of all items is 100%. For a multiple choice question the sum of the percentages exceeds 100%.

5. Survey results of employer perceptions and demands for information professionals

This section analyses the different kinds of companies, institutions and government agencies who need information professionals and who answered the questionnaire.

5.1. Types of employers

In Figure 1, the employers are divided into six categories: governmental; public institutions; research institutions; large enterprises; small and medium-sized enterprises (SME); and information service agencies. Most of the participants were from SME and public institutions, accounting for 33 and 29%, respectively, as they recruit many more employees majoring in IS. The other reason is that SME have a high level of information sensitivity. The percentage of government and research institutions is the smallest, each category having only one respondent. They do not form part of cross-tabulations involving institutional categories.

5.2. Information requirements by employers

Figure 2 shows the percentage of the different information requirements. Of all the employers, 88% consider industry information as necessary, followed by competitor (82%) and customer and supplier information (80%). However, just 53% of the employers require employer information.

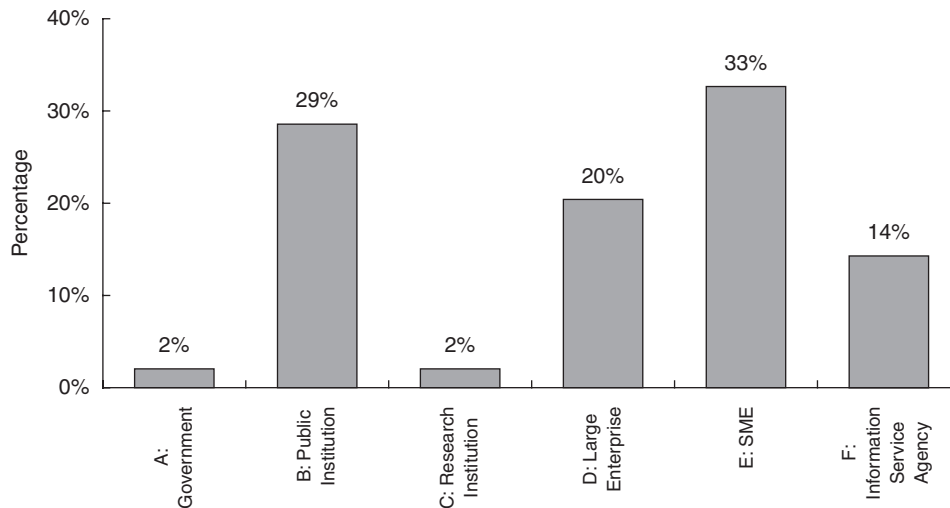


Fig. 1. Distribution of types of employers ($n = 49$) (SME = small and medium-sized enterprises).

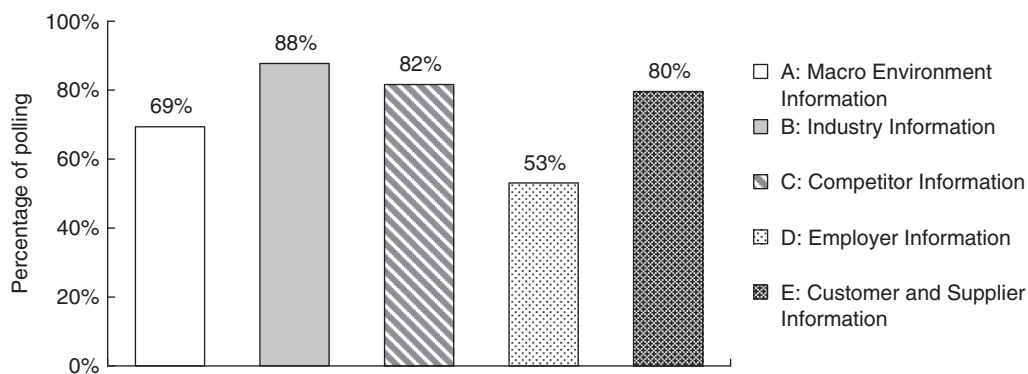


Fig. 2. Information requirements of employers (multiple choice; $n = 49$).

In order to determine the correlation between types of employers and their information requirements, a cross tabulation of Figures 1 and 2 was carried out, see Table 1. Macro-environment includes economic analysis, trends of national policy, society and humanities information and so on. It is heavily demanded by public institutions, information service agencies (23%) and large enterprises (22%). This is understandable since all three categories are dependent on macro-information, such as status of society development and economical operations made by government so as to regulate or issue a new policy. The result coincides with findings in [6] concerning organizational and societal knowledge and skills required by industry.

Customer and supplier information is of importance for information service agencies (23%) and to SME (25%). This reveals that the SME may easily be influenced by customer behaviour and offers from suppliers. At the same time, SME face more severe competition in the industrial sectors. Hence, they need the most industry (29%), as well as competitor (27%), information. They are not as dependent on macro-environment information (10%), compared to the larger companies (22%).

To large enterprises, industry information and competitor information are also very central types of intelligence, in addition to the macro-environment information, each accounting for 22%. Large enterprises are under the influence of economic policy, industrial development, challenges from competitors, and so on. Public institutions and information service agencies need to collect all kinds of information, as is reflected in the table, with the exception of employer information for the agencies.

Table 1
Information requirements by different employers (highest demand in bold; $n = 47$)

Types of employers (numbers)	Information requirements of employers				
	A: Macro Environment Information	B: Industry Information	C: Competitor Information	D: Employer Information	E: Customer and Supplier Information
B: Public Institution (14)	22%	20%	18%	20%	20%
D: Large Enterprise (10)	22%	22%	22%	16%	18%
E: Small and Medium-Sized enterprise (16)	10%	29%	27%	8%	25%
F: Information Services Agent (7)	23%	23%	19%	12%	23%

As for governmental institutions in the UK [8], employees' understanding of business processes is seen as important in the Chinese public information sector (20–23%).

5.3. Ranking of information positions according to managers

Most enterprises rank information positions in order to meet their information requirements. For all organizations, enterprises, SME and public institutions, information workers are asked to collect, gather, analyse and publish information. In 47% of the organizations, the position of information collector or market research specialist is the dominant employment position, followed by information analyst (39%) and information specialist positions (37%). Therefore, the market researcher (business intelligence) is the most important information position.

In 27% of the entities the leading positions, such as CIO or information centre director, are central. Compared to organizations with distributed information positions and work, those particular organizations have entire information departments and therefore can employ more information specialists and invest more money in information work. They place more emphasis on their information

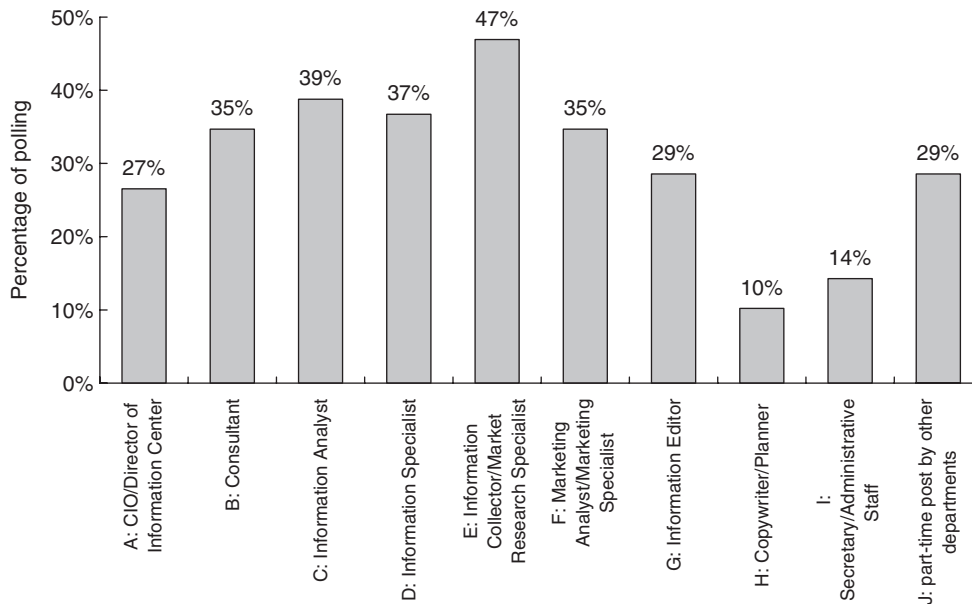


Fig. 3. Ranking of importance of information positions (multiple choice; $n = 49$).

requirements. In contrast, in 29% of the organizations staff from other departments serve as information workers. This is probably because there are no personnel directly specialized in IS/IM, and indicates that these enterprises do not pay substantial attention to information work.

5.4. Recruitment requirements

5.4.1. Requirements of knowledge background

According to the survey, quite surprisingly only 20% of the enterprises and institutions choose to employ staff educated in IS/IM. Of the enterprises, 35% choose to employ people educated in related majors. Also, somewhat surprisingly, 41% do not demand educational background in IS/IM or related areas, but prefer to employ applicants with relevant industry (domain) knowledge. Only 4% of the institutions employ computer engineers or IT educated staff in the information professional positions.

5.4.2. Requirements of information skills by employers

Figure 4 shows the requirements of information skills of staff members. Of the enterprises or institutions, 94% consider proficiency in using all kinds of information retrieval tools and in mastering information retrieval skills as necessary. Given the findings in the previous section concerning (the lack of) IS/IM background required for the information staff, this requirement of information retrieval proficiency is quite surprising. However, the skills required seem limited to practical searching capabilities, not necessarily dealing with information retrieval systems design (18%), and correspond to the activities of mining and market analysis (Table 1). Of the organizations studied, 63% require that employees are able to perform information analysis, data mining and basic market forecasting and market research. Thirty-seven per cent of the managers, dominated by the categories of SME and larger companies, require industrial knowledge and ask their employees to do deep industrial analysis. However, knowledge of eBusiness, eGovernment and webpage making (4%), as well as systems development and networking, are of least importance.

Table 2 analyses the relationships of requirements between knowledge background and information skills. Whatever the demand of knowledge background, proficiency in information retrieval (searching) is the most important and basic information skill. One may observe that the large staff group without formal information or computer-related educational backgrounds is, nonetheless, required to carry out searching. The same group is also asked to carry out market analysis and business intelligence gathering (18%).

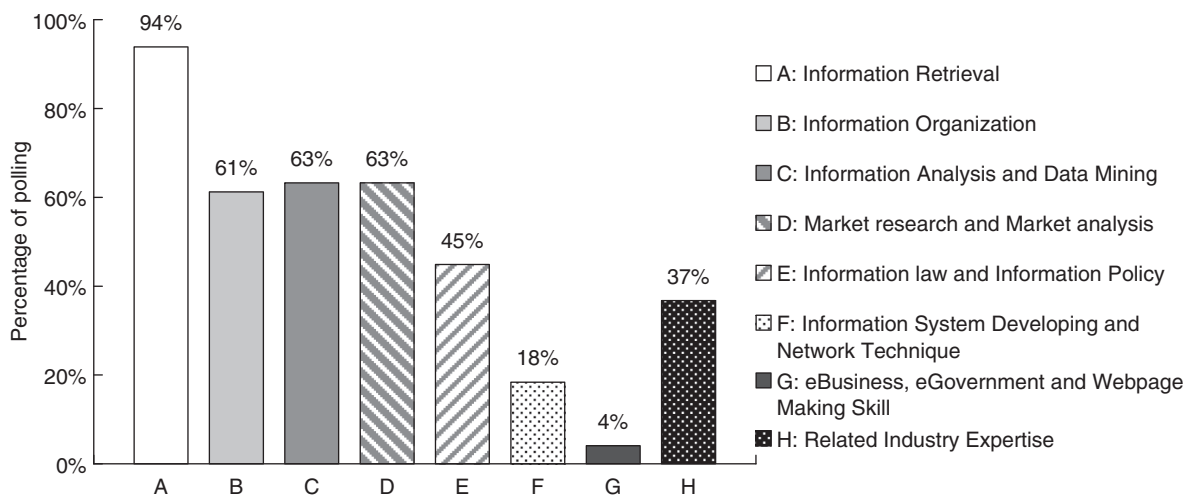


Fig. 4. Requirements of information skills as viewed by employers (multiple choice; n = 49).

Table 2
Requirements of information skills by different knowledge backgrounds (grey zones: IS/IM or related skills; $n = 49$)

Demands of knowledge background (Section 5.4.1)	Requirements of information skills (Figure 4)							
	A: Information Retrieval	B: Information Organization	C: Information Analysis and Data Mining	D: Market research and Market analysis	E: Information Law and Information Policy	F: Information System Dev. and Network Technique	G: eBusiness and Webpage Making Skills	H: Related Industry Expert
A: Information Science or IM (20%)	24%	17%	15%	7%	10%	7%	2%	17%
B: Related majors (35%)	17%	13%	12%	15%	11%	11%	7%	15%
C: Computer/Software Engineering (4%)	17%	17%	17%	13%	9%	9%	4%	13%
D: Not Specified (41%)	21%	10%	14%	18%	10%	6%	5%	14%

Employers that require an IS/IM background demand not only information retrieval proficiency but also information organization skills *and* related industry expertise as well. The latter account for 17% equally. Surprisingly, according to the managers and executives, the IS/IM background does not seem to require in-depth proficiency in central information work processes, such as data mining (15%) or systems development and networking (7%).

In addition to information retrieval skills, market research and analysis (business intelligence) proficiency and related industry expertise are also necessary requirements for persons with an information-related background, accounting for 15% equally. Again, systems development, information analysis and data mining are less in demand for this category.

Employees with a 'not specified' background still need to be skilful at information retrieval (21%) and market research and analysis (18%). This reveals the problem in Chinese IS/IM education vs the requirements and opinions of society. A reason for this may be that IS/IM is a new major in China. However, the employees already trained with relevant industry knowledge plus some information skills meet the needs. From an educational point of view, university teaching of IS/IM is interdisciplinary and does not cultivate students with a unique ability and does not give them a competitive advantage. This confirms the results in the UK by Goulding et al. [3] investigating the perceptions of employers, teaching staff and graduate students with an IS background.

It can be concluded that employers require the basic and daily used information skills of information workers, for instance, using search engines to retrieve target information. The organization of information, as well as the abilities to analyse and synthesize industry information, are also needed – but perhaps enough training is not provided by the formal education in IS/IM, as one can detect in Sections 3.2–3.3, *and* observed by staff with no specified background.

5.4.3. Actual positions of staff with IS/IM background

Fifty-five per cent of employers require staff members with IS/IM or related academic backgrounds. However, the data in the survey demonstrates that 42 out of 49 employers (83%) *actually* have hired staff with IS/IM or other related majors as educational background. Seven employers chose the 'no answer' option.

Figure 5 shows the distribution of *actual* positions over all 49 employers, thus demonstrating the distribution of the staff with IS/IM or related education. A third of the employees actually work as information analysts or as information editors (31%); 24% work as information specialists. Only 2% work as a CIO or information centre director. Perhaps surprisingly, given the few staff members with

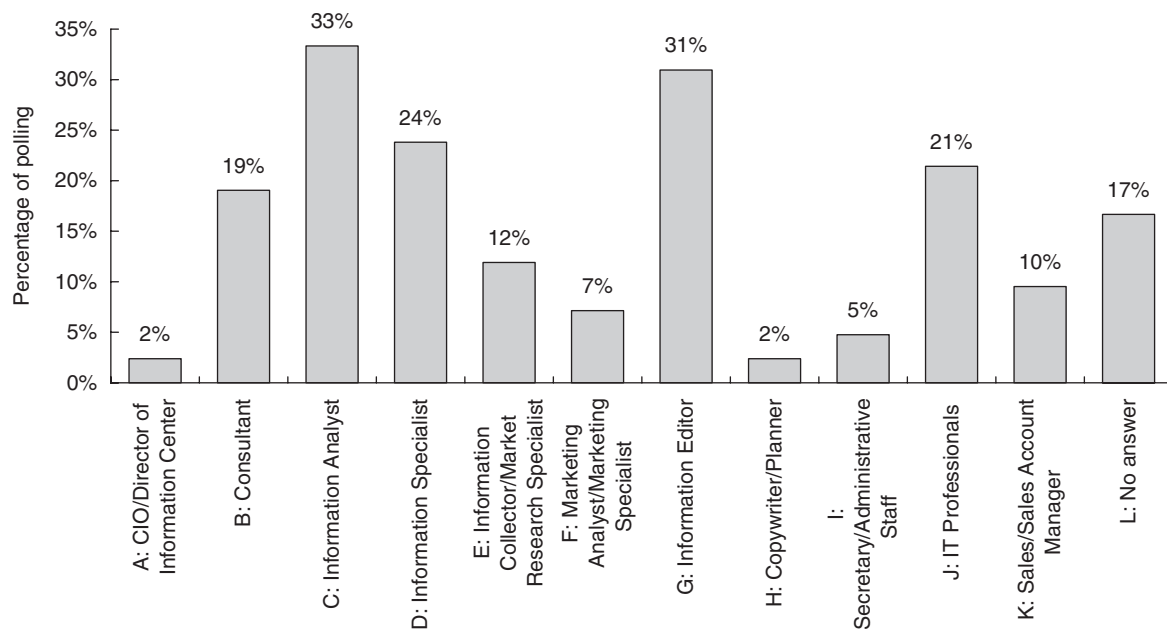


Fig. 5. Actual distribution of positions of employees with IS/IM background (multiple choice; $n = 49$).

computer science backgrounds, 21% work with IT processes. Compared to the results on ranking the importance of positions by the enterprises (Figure 3), one observes that people with IS/IM background to a lesser degree hold CIO/director or marketing analyst/marketing specialist positions. These are held by employees from *other* educational backgrounds. Hence, it can be concluded that staff with IS/IM backgrounds often work with basic information activities, such as information collection, information processing and information analysis, but also with administrative or indeed clerical tasks, e.g. as information editor as well.

6. Analysis of employees' perceptions

The section aims at data analysis of the information about employees who have worked for at least six months after graduating with an IS/IM background (number of respondents 68).

6.1. Academic degrees of employees

Most of the graduates of IS/IM in the analysis have a bachelor degree, accounting for 74%, while 18% have a master's degree. Six per cent hold a PhD degree and 2% only possess a junior college education. This fact may in part explain the rather traditional and even clerical work activities most of the employees encounter, as demonstrated in Figure 5.

6.2. Types of employing organization and importance of markets

Figure 6 indicates that most staff members in the analysis are employed by public institutions (40%). But large enterprises and SME employ in total 49% of the employees.

This distribution is slightly different from that of employing institutions (Figure 1) which had SME as the dominant type of organization. From cross tabulation (not shown) we can observe that staff with undergraduate and graduate background primarily work in public institutions or enterprises, while PhD educated employees, as expected, work in research institutions.

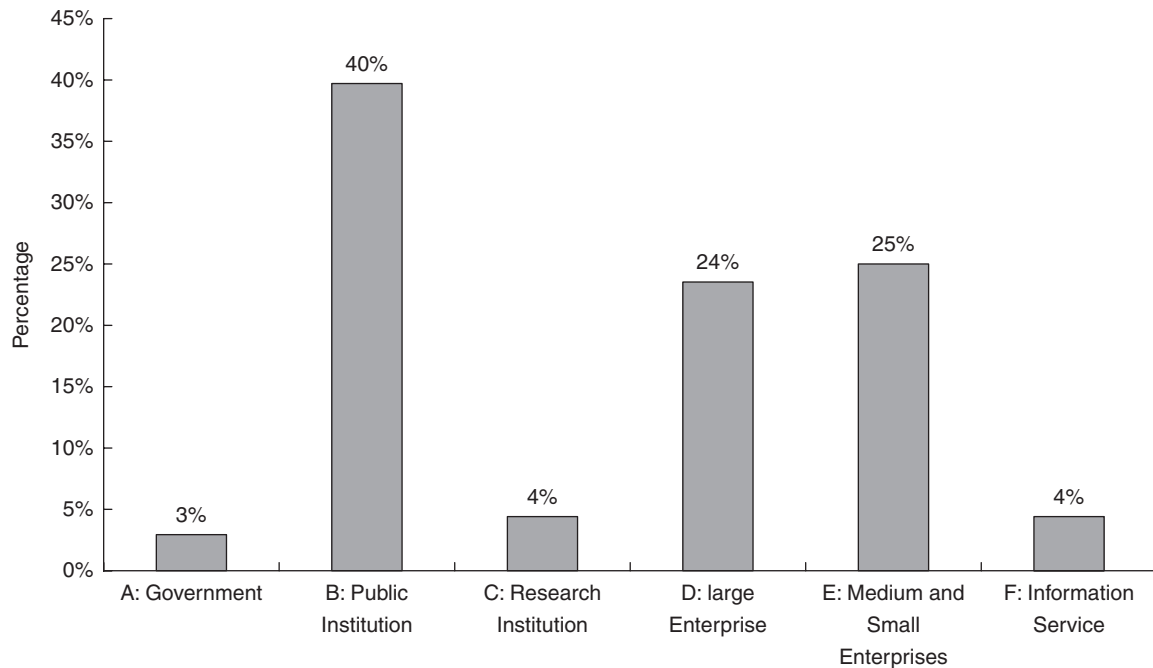


Fig. 6. Distribution of types of employment sectors ($n = 68$).

Across the employment sectors, Figure 6, the employees regard the regional (local Chinese) market (and information) as important as the domestic market for their employers, each with a market share of 35%. The global market is somewhat less important (30%). The key reason is that at the time of survey (2008) Chinese enterprises and institutions invested mainly *inside* China. Only a few large companies were operating in the overseas market. Therefore, regional and domestic information were primarily required by Chinese companies or institutions.

6.3. Types of information requirements as seen by employees

Figure 7 shows the ranking of information requirements by importance, as perceived by the employees. 'Business intelligence' in the shape of industry information (78%) and customer and supplier information (71%) as well as competitor information (69%) is seen as the most important requirement. To a lesser degree information on employers themselves (62%) and macro-economic information (59%) are regarded as vital. Interestingly, this ranking matches the result shown in Figure 2, i.e. it matches the perception of the managers.

6.4. Types of positions held by employees

Figure 8 demonstrates that IS/IM educated employees take different kinds of work. The largest group works with clerical duties as information editors (18%).

Other central work positions are IT professional (16%), secretary and administrative staff (15%), and information analyst (12%). This employment profile corresponds roughly to the position distribution seen from the managers' perspective (Figure 5) although the results in that diagram are derived from multiple choices, across the same categories. When asked in this survey 68% of the staff members with an IS/IM background felt that they undertake information positions related to their majors. The remaining 38% corresponds roughly to the proportion of staff holding editing, secretary or clerical positions in Figure 8. IS/IM education is not geared to that kind of job.

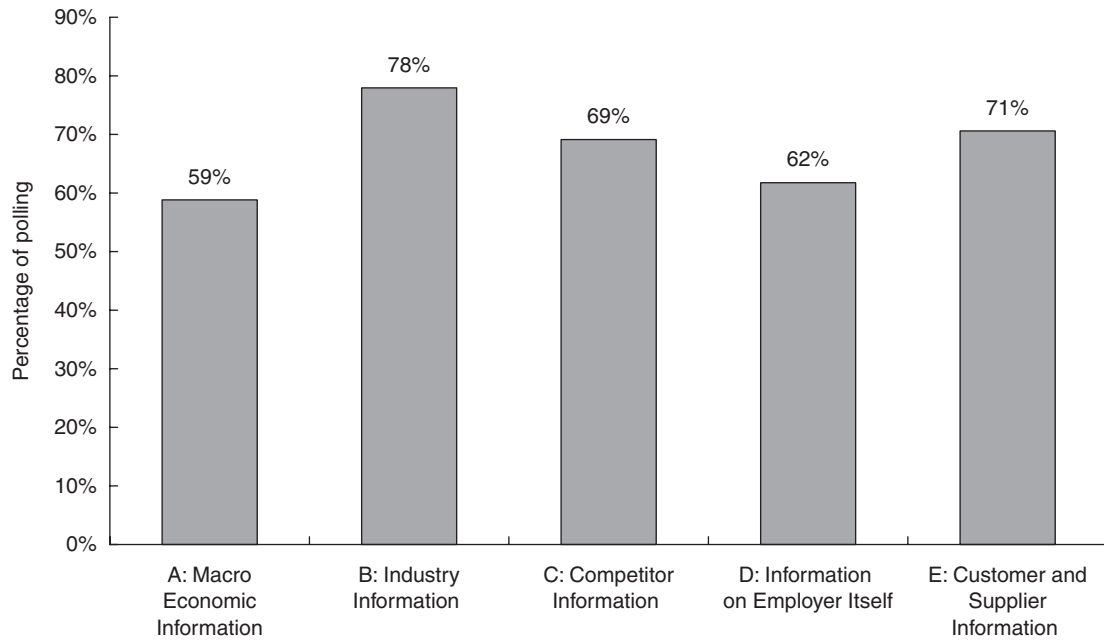


Fig. 7. Distribution of types of information requirements (multiple choice; $n = 68$).

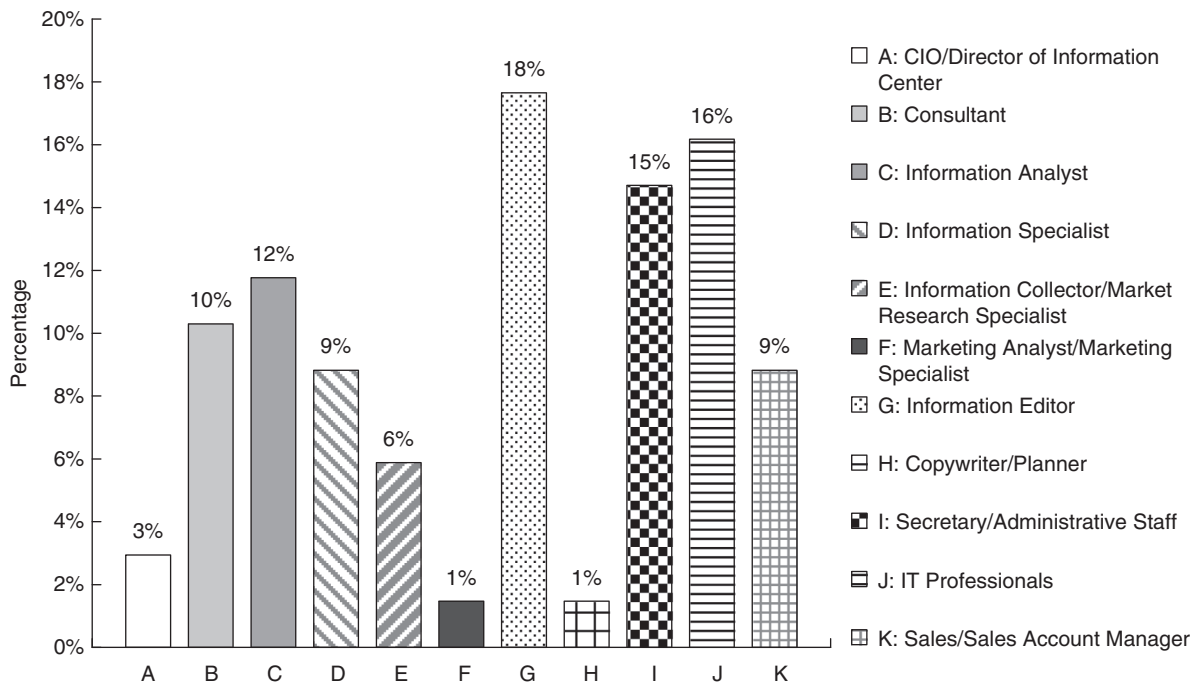


Fig. 8. Distribution of types of positions held by IS/IM employees ($n = 68$).

6.5. Perceived contribution to, and being valued by, the employer

Forty-three per cent of the staff believe that they are valued by their managers and that they contribute much to their employing institutions. Interestingly, 19% perceive that they are ignored but,

nevertheless, they feel that they contribute much to the production of the enterprise. This indicates that graduates have a strong commitment. In contrast, 9% of the employees think that they are ignored by their managers and, at the same time, contribute less to their employing institutions. Thirteen per cent perceive themselves to be valued by their employers, but at the same time they feel that they contribute less to the success of the enterprise. This implies that the staff members believe that managers and executives seem to treasure them in over half of the cases (56%). That feeling gives them a sense of accomplishment in their work. Sixteen per cent did not answer this question.

6.6. *Most useful information skills*

When being asked which kind of working skills are the most useful in their work, 65% of respondents consider mastering many kinds of information retrieval tools and procedures (Figure 9). Of the staff members with IS/IM background, 57% believe that information analysis and data mining are helpful to their work and 53% believe that principles and methods of information organization are good for organizing it. However, four out of 10 respondents find it useful to learn the methods of market research, so that they can conduct investigations, analyse and write analysis reports. In comparison to the data in Figure 4, this result is in agreement with the view of managers about which information skills are required but less in agreement with the actual distribution of activities performed by IS/IM educated staff, as seen from a manager’s point of view (Figure 5) and from the staff members themselves (Figure 8).

The employees thus find it useful to obtain knowledge in areas, such as market research and industry expertise (business intelligence), in which they scarcely hold positions. One notes the low perception score for eBusiness and eGovernment skills, which is associated with the similar low score provided by the managers (Figure 4).

6.7. *Identity of IS/IM – satisfaction with information education*

Very unsatisfying for the educating institutions is that only 7% of respondents believe the courses can fully satisfy their needs. Fifty-five per cent of the staff with IS/IM degrees believe that courses

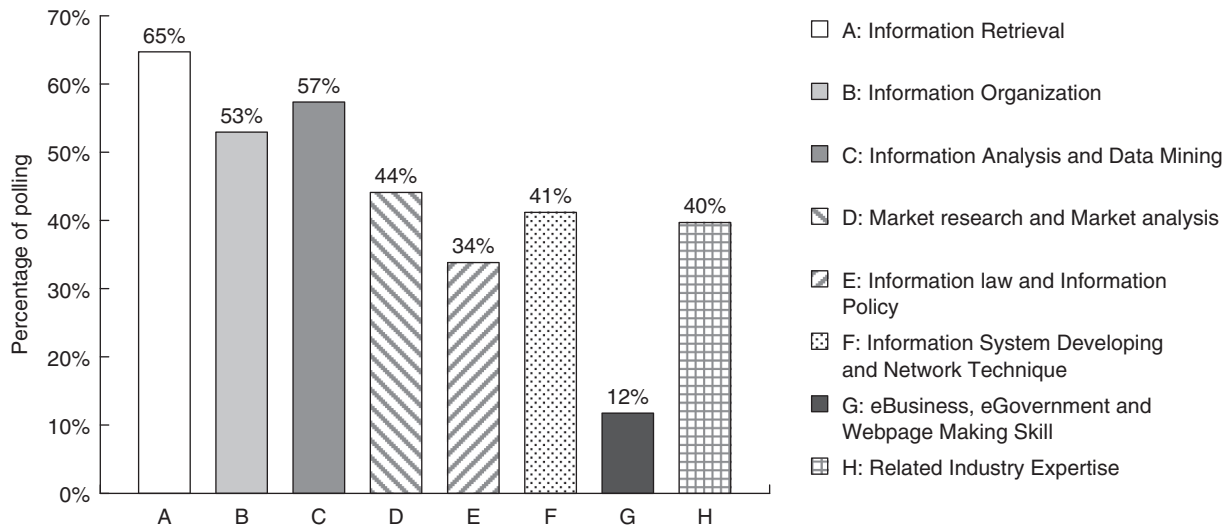


Fig. 9. Most useful information skills as perceived by IS/IM employees (multiple choice; n = 68).

on IS/IM can satisfy their working needs – to an extent. But 38% believe that the courses *do not at all satisfy* the requirements in their job. This indicates that there exists a *large gap* between the aim and contents of the education of IS/IM and the requirements of information professionals. The current courses do not really satisfy the requirements of information work as perceived by the employees, therefore improvements are needed. This somehow contradicts the results in Goulding et al. where the satisfaction among UK IS/IM graduates (and teaching staff) with the formal education was at a much higher level [3].

6.7.1. Core courses as perceived by the information profession

Figure 10 demonstrates that four course are central in the Chinese context: Information Retrieval (63%); Information Systems (54%); Principles of Management (49%); and Information Analysis (47%). This view is fairly traditional although one might have expected greater emphasis on Information (or Knowledge) Organization. Of all the employees, solely 3% believe that Information Industry is a core course and only 13–15% regards eBusiness and Competitive Intelligence as central courses in a relevant curriculum.

Again we observe a kind of mismatch between the information skills perceived as central for employment and the IS/IM courses. Evidently, the educational requirements posed by the employing institutions (Figure 4) are also not in tune with (a) the current courses or (b) the central courses as perceived by employees – in particular concerning Information/Industry Analysis and Market Research.

6.7.2. Evaluation and advice to the IS/IM curriculum

In the questionnaire to the employees, we set up two open-ended questions that included their views of advantages and disadvantages of IS/IM education and practice, and suggestions for improvements. From the feedback, the Chinese information education can cultivate candidates in the following four aspects:

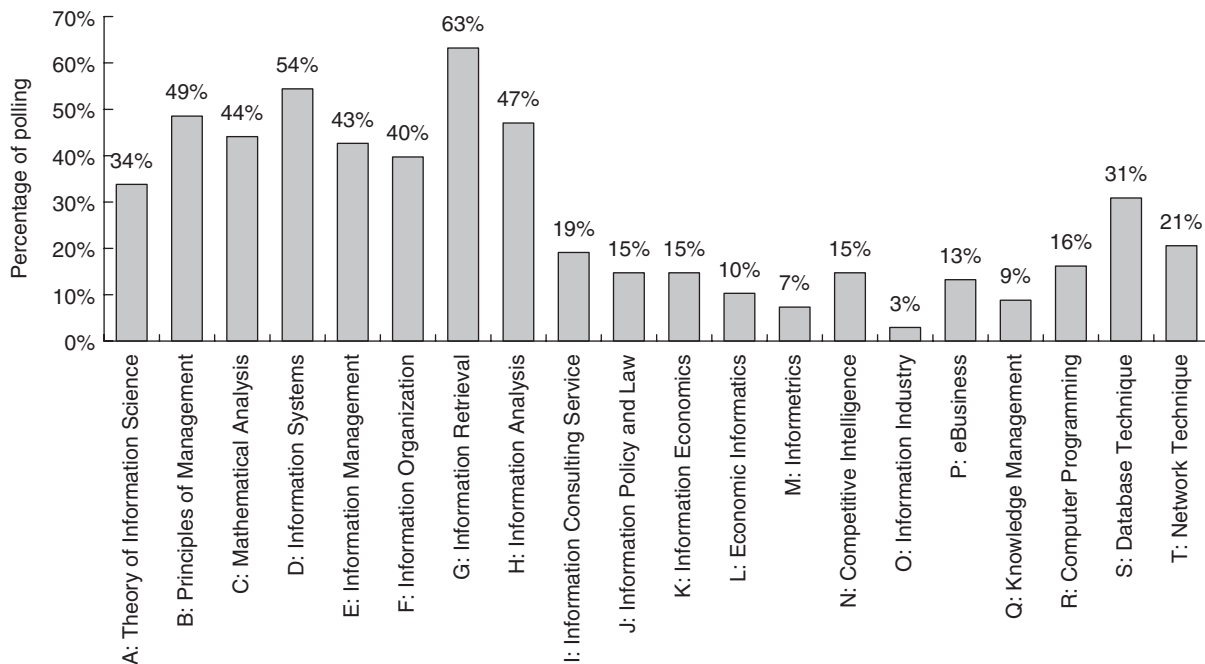


Fig. 10. Core courses according to the IS/IM employees (multiple choice; n = 68).

- candidates become information conscious, so that they can make rational analysis and estimation on policies, providers and competitors;
- they have strong abilities of information acquisition, knowledge of information channels and proficiency in analysing and choosing the right information;
- they possess an integrated knowledge background;
- they have basic knowledge of computer technology.

These aspects, as well as those below, may also concern IS/IM education in a wider international context. The main *disadvantages* are:

- the current education of IS/IM provides few specialties and can be easily replaced by other sciences and skills, such as computer science, software engineering or management studies;
- course offerings weight theoretical research and ignore scientific applications;
- teaching materials are often out of date and lag behind the development of requirements of on-edge enterprises.

Besides, the staff members advise that in order to match the information professional requirements of the society and employing institutions, the education should provide candidates with more opportunities to practise in companies, libraries or information centres. Schools and universities should improve the foreign language ability and computer skills of students. Students should strengthen their knowledge of other professional expertise.

7. Discussion: the problems in Chinese IS/IM education

The survey findings indicate that the education targets of IS/IM in China are not specific. Information graduates who have work experience do not have special knowledge, although they indeed believe they possess it, and that they can be replaced by candidates from other majors at the working place. In China, IS/IM are developed from Library Science and Computer Science, therefore the curricula are set widely and do not have their own focused characteristics.

IS/IM is well recognized by most of the employees because students have learned many superficial courses aside from information retrieval and organization, such as basic economics, basic management, basic computer science, etc. With this kind of broad knowledge employees *believe* that they have more advantage over other candidates. However, from the survey it is evident that managers and executives, as also recognized in [6, 8], prefer staff with relevant industry expertise (Figure 3) rather than employees specialized in IS/IM, even though they at the same time believe in the advantages of information professionals. Perhaps they do not regard the former group as identical to the latter but rather see information professionals as also covering industrial information and skills.

The IS/IM educated staff members' *own perceptions* regarding relevance of courses demonstrate a fuzzy, quite traditional and somewhat pessimistic picture, with almost 40% believing that their academic courses do not satisfy their employers' requirements. Similar to UK results [3], there exists an overrating by the graduates' of their importance and contribution to the companies and institutions that is out of tune with their actual positions held in the enterprises and institutions. Interestingly, IS/IM employees are in agreement with the views of managers of *what is required* of information skills, e.g. information retrieval knowledge and proficiency in market research and business/industry intelligence. In reality, however, the IS/IM staff members commonly function in the public sector and often only function in traditional, even clerical secretarial, positions and do not carry out market and industry research and analysis. These functions are performed by information-related staff or by employees having *other competences*, such as industrial expertise. In contrast to Goulding et al. [3], however, the Chinese IS/IM employees graduated in IS/IM do not regard their curriculum with as much satisfaction as in the UK.

In our opinion, the problems are due to two reasons. First, what employers in the large industry and SME in general need is industrial information intelligence. They are favouring staff

majoring in information-related or directly industry-related specialties. Second, there are limits to the educational objectives and curriculum setting for IS/IM in China. Although the overall framework adheres to the field of IM, and hence, to an extent, to management science, in reality the course content is (perceived as) leading to a lack of a professional edge, unique knowledge background and competitive advantage. In other words, it is cumbersome to hire information graduates and train them with industrial background knowledge, such as finance, export–import economics and banking, medical science, and so forth, as this often means long-term training. However, it is much easier, less expensive and time consuming to teach already industry-specialized staff basic information training and skills, e.g. data retrieval, on site. Employees graduated directly from management and business schools are thus more evident as potential information professional staff members in the industrial sectors since they fit the market research, business intelligence and data mining objectives of the companies.

8. Conclusion

The survey demonstrates several cases of mutual perceptions of managers/employing institutions and information staff members, e.g. on skills required and positions held in enterprises and institutions. However, in line with Goulding et al. [3] the employees believe that they have an advantage having graduated from current IS/IM in the job market – a perception that is in vast contrast to that of their employers, who on the whole prefer staff with non-IS/IM background.

Based on the discussion on the problems and central issues addressed in this study, it is of great urgency to improve the professional competitiveness of IS/IM graduates, to develop a unique professional advantage, and to address the central requirements of information positions in the market place. We believe that improvements can be made in the following aspects of IS/IM in China (and probably also elsewhere in the global landscape of the field).

Educational objectives of IS/IM should be clarified – based partly on the quantitative findings and partly on the open-ended replies from information employees in the present study the following recommendations are proposed:

- *Universities should open their own courses* in accordance with the educational objectives, based on the requirements of the professional market place and society, rather than the standard courses designed centrally by the Ministry of Education. At present, the course setting is confusing, without definite and clear cut goals that may cultivate a competitive edge compared to other disciplines. Sometimes, course settings simply depend on the availability of teachers and not on the cultivation and development of student ability.
- *The introduction of educational tracks* in curricula that are focused according to market place requirements would better support the relevant knowledge background of future information employees in the various industrial and public sectors and, at the same time, make the educational background of candidates more transparent for potential employing institutions, managers and executives.
- *The curriculum should throw off the dependence on library research/science* (librarianship) or basic computer science/skills and should be developed into a truly interdisciplinary academic research-based field with professional characteristics. Management and business organizational theory courses should be implemented or reinforced when already present in relevant tracks. Such course elements would help candidates to achieve proficiency in business intelligence and monitoring of industrial competition.
- *Elective domain-related courses should be offered* in connection with tracks, such as information patterns in chemistry, mechanical engineering, the service industry, the public sector, etc. Through these introductory courses, the relevant business and administrative process and intelligence skills should be taught to students which will broaden their general knowledge base.
- *The courses should be adjusted by the development of society and employers' demands.* The curriculum should be established in accordance with current and forecasted employment and

market requirements. The threshold of course offerings should be lifted. However, selected core information science courses on information retrieval and architecture, data mining, information analysis and systems should be emphasized and further developed, forming a foundation common to all tracks. This not only ensures the development of a specialty advantage and competitive edge, but also meets society's requirements.

- *More social practice should be offered*, in order to train the students' ability to solve problems, make decisions and task mobility. IS/IM involves strong practice and services. Students need to move with companies and public institutions to carry out projects or case studies in their proper contexts as part of the studies.

In short, we propose to develop and strengthen the knowledge and research on the *combination* of information-related processes, like information retrieval and architecture, and business/organizational structures and processes, under the sustained umbrella of IM.

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Endnotes

1. With 'intelligence' is most often meant 'business intelligence'.

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