

# An Analysis Of Library And Information Science Job Market In Mainland China: Content Analysis Of Job Vacancy Advertisements Of Library Professionals

Chenwei Chen, Moses M. Naga

**Abstract:** Purpose of the study: Based on the analysis of recruitment advertisements, the main items of competency skills of library professionals in Mainland China will be analyzed, in order to provide basic reference for professional education of higher education and retraining programs of working professionals in Mainland China. Methodology: Through the self-built crawler system to collect relevant advertisements, this study will use content analysis method and social network analysis method to analyze the competency skills required for library professionals in Mainland China. Main Findings: The relationship between the competency skills were obtained along with classification of seven capacity modules. According to the final results of data analysis, three directions with regards to the development of library professionals in Mainland China were suggested, namely, optimizing job-oriented LIS curriculum, establishing qualification certification system of library professionals and retraining education for working library professionals. Novelty/Originality of this study: A missing gap of research in competencies and skills required by current Library and Information Science job market in Mainland China shall be bridged. Meanwhile, the competency skills of library professionals can be interpreted from multiple dimensions through the social network analysis method.

**Index Terms:** Library and Information Science job market; Competency skills; Content analysis; Library professionals; Job advertisements; Mainland China

## 1. INTRODUCTION

With the coming era of great science and technology, the function and role of traditional Library and Information Science (LIS) profession has changed tremendously. The distribution of employment sections and job types of LIS graduates is increasingly dispersed. The requirements from employers towards LIS professional skills have become more and more diversified. Thus, it is mandatory for LIS graduates to master new competencies in order to meet demands of emerging job market. Meanwhile, the employment market situation of LIS professionals is also changing: (i) The recruitment requirements are gradually relaxed to other related disciplines instead of pure LIS subject; (ii) The standards of education qualification of recruitment are becoming more and more strict year by year, Bachelor degree is increasingly difficult to meet recruitment requirements. (iii) More and more jobs are no longer offered directly on a permanent basis, instead jobs are based on contract nature firstly and will be turned into permanent positions through meritocracy in selection. The current job market is not only influenced by the social changes in all aspects, but also pushes forward social development and progress in its own way [1]. At present, the employment of graduates majoring in Library and Information Science is mainly concentrated in libraries or information centers (academic libraries, public libraries and special libraries).

Library professionals in this study are defined as those who will perform job duties that are either equivalent to duties performed by librarians or who will perform professional duties in support of any type of library from within the library organizations, such as library acquisition, cataloguing, user services, circulation, information technology support and so on [2]. The huge changes regarding reform of libraries in new era, largely the result of rapidly evolving Information Technologies (IT), have impacted significantly on the competencies and skills required for library professionals practising in current environment, which shaped to be the core issue of development of libraries. Therefore the transformed landscape requires a new generation of LIS professionals to effectively and efficiently mediate it [3]. It means the development level of a library depends to a large extent on the abilities and skills owned by librarians. A strong necessity regarding research on library professionals' competency skills matching with modern information technology society has been valued by more and more scholars globally.

## 2 LITERATURE REVIEW

For abroad aspect, especially in the United States, there has been a long tradition of publishing recruitment announcements in Library and Information Science journals. Therefore, through in-depth and systematic analysis of recruitment announcements, it can be easily found that the current situation and changes of LIS job market demand. In historical retrospect of published literature, since the late of 1980s the research regarding the requirements of library and information science professionals have been done through the analysis of job advertisements. In 1989, Cote analyzed 229 job vacancy advertisements at the McGill LIS Graduate School in Canada, during a period of one year to identify required skills of LIS job market. Results showed that employers needed librarians to have good computer skills such as the use of office application, searching databases, library catalogues, CD-ROM, managing automated systems and use of computers for

• Chenwei Chen is currently a PhD candidate in Library and Information Science at Department of Library and Information Science, North-Eastern Hill University, India, PH-(91)9436339097. E-mail: chenchenweilis@gmail.com

• Moses M. Naga is currently a professor in Department of Library and Information Science, North-Eastern Hill University, India, E-mail: mosesmnaga@gmail.com

searching or retrieval of information [4]. Beile and Adam's investigation is one comprehensive study that looked at the breadth of academic library job announcements published in four journals in the year of 1996 and then analyzed the reported job vacancy across a number of dimensions to identify the changes made in job market for a period of 8 years till 1996 [5]. An analysis of the US Online Library and Information Science Recruitment database showed that: The proportion of comprehensive posts without specific job description is 8%, however, the proportion of reference and user guidance positions together account for 45%. It was found that American libraries are highly targeted in recruiting talents through specifying the concrete requirements in job vacancy advertisements [6]. In 2013, Ocholla and Shongwe made a thorough survey of Library and Information Science Job Market in the Republic of South Africa using content analysis method as tool of recent. The data was collected from 2009 - 2012 longitudinal newspaper scanning of LIS job vacancies advertisements in whole country. The results showed that LIS job market of South Africa grew rapidly from the year of 2009 to 2011, however which suddenly declined in 2012; Public sectors are the main sections to enroll LIS graduates; It is important for LIS professionals to master Information Technology (IT) competencies which has already become an important skill in new era [7]. Sinha and Pandey carried out a study to analyze advertisements collected from the printed weekly issues of Employment News and the LIS Link (a LIS Job Portal) which reflect the different aspects of LIS professions, the period of advertisements are from January 2011 to December 2011. Finally some suggestions were came up to ensure employability of LIS professionals in India showing state wise job opportunities and employment [8]. In 2016, one study spanning ten countries and sampling about 110 digital librarian job vacancy announcements from the employment website "Indeed" found that communication, teamwork and problem solving skills were the most required, "behavioral characteristics" accounted for 59%, 17% and 15% of listings respectively. Meanwhile, online searching, reference interview and database skills were required in 38%, 35% and 31% of listings respectively [9]. Khan and Du surveyed fifty job advertisements regarding data librarians which was collected from ALA Job LIST, Indeed, Glassdoor and IASSIST, along with analyzing the data through three aspects, namely, job titles, required skills and preferred skills [10]. Compared with research carried out abroad, domestic research is rather backward and simple with rare systemic analysis of competency skills needed by LIS job market through job vacancy advertisements. In 2011, three Chinese scholars used content analysis method to analyze a total number of 355 library job vacancy advertisements for the period between January 1st 2008 to November 30th 2010 keeping in view of three main aspects, namely, types of libraries, required competency by library professionals, requirements of foreign language skills and requirements of computer skills [11]. Huang and Yao analyzed the library job announcements collected from 5 biggest recruitment website in Mainland China for a period of 5 years from 2008 to 2013. Through the analysis of job advertisements, six problems of library deprofessionalization were summarized, finally suggestions with regard to establishing qualification system of library professionals and reforming LIS higher education were put forward [12]. Fu and Zuo conducted a survey on the investigation of job status of 925 LIS graduates majoring in LIS

discipline in Fujian Normal University from 1987 to 2014. The result demonstrated that 52% of graduates choose library positions, however the proportion only accounted for 34.8% between 2012 to 2014, which is decreasing gradually in recent 10 years. School libraries, public libraries and university libraries are the main three types of libraries where graduates will work [13]. Although recruitment advertisements can not fully explain all aspects of the demand for talents in the LIS job market, they can basically present the demand for professional knowledge, skills and competencies in a relatively short period of time [14]. Therefore, this study will carry out a survey on the competency skills required for the library professionals of Mainland China from the job vacancy advertisements through content analysis method and social network analysis method.

### 3 ANALYSIS OF JOB POSITIONS IN VARIOUS TYPES OF LIBRARIES

With the advent of information society and web technology, the web is full of unstructured data called "Big Data" including various social media platforms, job advertisement websites, blogs or news link. However, these data are not easy to collect, access, and process at large scale [15]. Web Crawling is an optimization problem. Based on a web crawler system created by the author himself, this study will obtain the recruitment advertisements of various types of libraries from different famous recruitment websites in Mainland China. Key words for retrieval are "Library Science", "Information Science" and "Library and Information Science". Starting from April 01 to July 01 in 2019, self-construct crawler system will grab relevant information from top four job advertisements websites in Mainland China, namely, "51 job", "Zhaopin", "Gaoxiaojob" and "Liepin" according to the above key words every 24 hours. Through data cleaning and eliminating duplication, 196 effective job advertisements were obtained finally. 415 job positions were included into the advertisements.

**TABLE 1.** Qualification Background of Library Professionals in Job Advertisements

Libraries Types	Total	Degree	LIS	IT	Other HSS	Other SCI
Academic Libraries	306	JC	14	0	0	1
		B	104	53	27	31
		M	126	31	15	18
		PhD	32	3	0	0
School Libraries	14	JC	7	4	2	2
		B	6	0	0	0
		M	1	0	1	0
		PhD	0	0	0	0
Public Libraries	68	JC	4	2	0	0
		B	25	17	6	1
		M	26	1	0	0
		PhD	6	0	0	0
Professional Libraries	21	JC	0	0	0	0
		B	2	0	0	0
		M	6	0	0	0
		PhD	13	2	0	1
Corporate Libraries	6	JC	1	0	0	1
		B	5	3	2	2
		M	0	0	0	0
		PhD	0	0	0	0
Total	415	-----	378	116	53	57

Notes: JC stands for Junior College; B stands for Bachelor; M stands for Master; LIS stands for Library and Information Science; IT stands for Information Technology; HSS stands for Humanity & Social Science disciplines; SCI stands for Science

disciplines; There is duplication in the total statistics under each category.

**3.1 Analysis of Types of Libraries**

For the overall situation of library recruitment, the demand for talents in academic libraries is much higher than that of other types, whose proportion accounted for 73.7%. Coming in a distant second was public libraries, as the public informational, cultural and arts center, it play as important role as academic libraries in society’s development. Although other three types of libraries far lag behind in proportion of recruitment, their important attributes and functions can not be ignored either. From the above analysis, it can be seen that majority of LIS graduates are demanded by academic libraries and public libraries which is consistent with the current trends in LIS job market of Mainland China.

Proportion of Recruitment in Various Types of Libraries

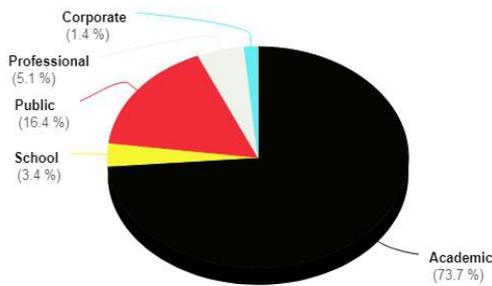


Figure 1: Proportion of Recruitment in Various Types of Libraries

**3.2 Analysis of Recruitment Discipline Background**

The educational background of library professionals directly determines the efficiency of their work. It can be discerned from the below figure that current professional subject demands of talents recruitment still fall under Library and Information Science discipline [16]. However, with the deep integration of LIS profession, libraries in Mainland China are gradually preferring to inter-disciplinary talents instead of single background talents, which leads to the result of rapidly growth of other discipline needs. As the most potential new productivity, information technology will inevitably become the important strategic resource for the development of the society. Therefore, IT occurs with LIS frequently to be important factor of recruitment background required by modern libraries, which is multidisciplinary integration of the depth of the product.

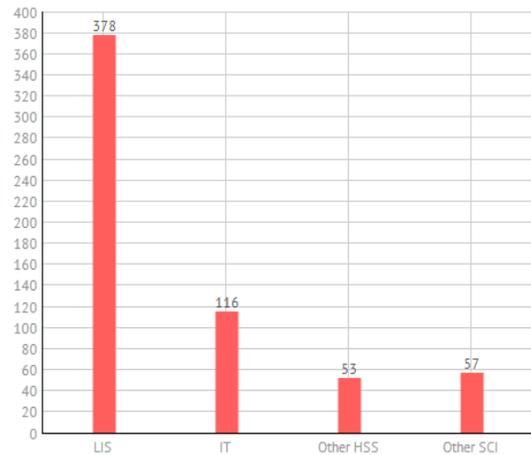


Figure 2: Number of Recruitment (Including duplicate statistics)

**3.3 Analysis of Qualification (Degree) Requirements**

Compared with other professional fields, libraries have higher requirements of qualifications in degree level for recruiting talents [17]. From the above given data in Table 1, it can be easily seen that demand is greatest for the library professionals with both bachelor degree and master degree. Special libraries more prefer to recruit PhD talents compared to other types of libraries, since this is determined by the function of specific types of libraries.

**3.4 Types of Recruitment Positions**

Through the collation of data and analysis, integration of various description of library positions extracted from library recruitment advertisements, finally the list of library recruitment position was formulated into Table 2, which can well cover the overall function of job posts in different types of libraries [18], [19]. Except for unspecified positions, the “User Services” position and “Periodical” position in business categories as well as the “Digital Resources Construction” position in technical categories are the most demands for the recruitment of library professionals, which also have the closest link to specific competency imparted by LIS department or schools. Meanwhile, it can be found that percentage of unspecified positions have ranged to as high as 32.8%. This is primarily due to fuzzy cognition of professional knowledge and professional competency. Invariably, it will lead to the disjunction between LIS education and demands of LIS job market.

TABLE 2. Post Setting of Library Professionals in Job Advertisements

Types of posts	Departments	Recruitment Number	Percentage
Administrative categories	Administrative Management	14	3.4%
	Business categories	Library Acquisition	21
Technical categories	Cataloguing	19	4.6%
	Circulation	29	7%
	Special Collections and Ancient Works	20	4.8%
	User Services	62	14.9%
	Periodical	45	10.8%
	Information Technology	31	7.5%
	Digital Resources	38	9.2%

Construction		
Unspecified	136	32.8%
Total	415	100%

#### 4 ANALYSIS OF COMPETENCY SKILLS REQUIRED FOR LIBRARY PROFESSIONALS IN MAINLAND CHINA'S JOB MARKET

Further the recruitment data need to be cleaned up by eliminating the job advertisements without professional competencies and skills requirements, finally 130 effective recruitment advertisements were screened out. In this paper, the data mining tool "Clementine 12.0" developed by SPSS company was used as the mining platform, and the text mining module of the software shall be used to extract and merge keywords from the collected recruitment advertisements of various types of libraries. Later, the calculation of frequency of keywords need to be carried out. In order to ensure the effect of co-word analysis, it is necessary to set the value of minimum frequency to "2" and eliminate the corresponding keywords whose frequency is less than "2". Top twenty-two keywords with highest frequency are finally identified as the basis of co-word analysis, which is shown in Table 3. The formation of final co-word matrix was based on English version, however, extraction of original keywords was based on Mandarin version.

TABLE 3: Frequency of Competency Skills in Job Advertisements

No.	Competency Skills	Frequency
C1	Information Processing Ability	27
C2	Computer Skills	25
C3	Professional Ethics	23
C4	Communication Skills	19
C5	Book Borrowing	19
C6	Written Skills	16
C7	Cataloguing	14
C8	Oral Express Skills	14
C9	Teamwork	14
C10	Information Analysis	14
C11	Foreign Language Skills	13
C12	Professional Software Skills	13
C13	User Service	12
C14	Database Management	11
C15	Information Retrieval	10
C16	Innovation Ability	8
C17	Knowledge Management	8
C18	Sci-tech Novelty Retrieval	7
C19	Research Ability	5
C20	Archival Management	4
C21	Computer Network	2
C22	Marketing Skills	2

#### 4.1 Construction of Co-word Matrix

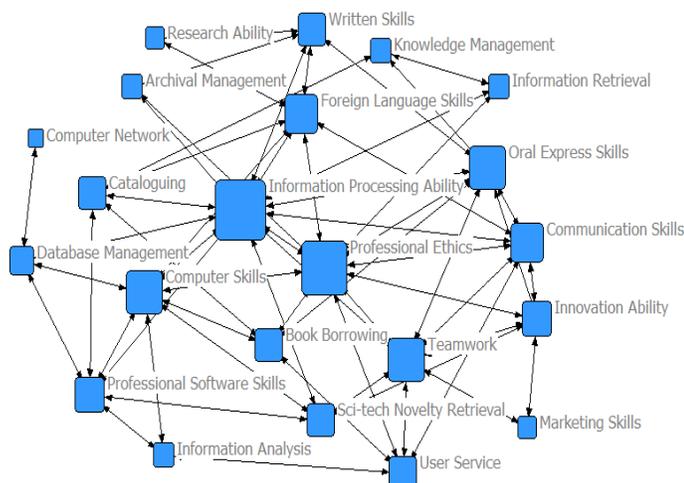
The values inside matrix indicate the frequency of occurrence of every two competency items appeared in the selected job advertisements. Later, a 22x22 co-occurrence matrix was formed through Excel.

TABLE 4. Co-word Matrix of Competency Skills of Library Professionals in Job Advertisements

	Info...	Com...	Prof...	Com...	Book...	Writ...	Catal...	Oral...	Tea...	Info...	Forei...	Prof...	User...	Data...	Info...	Imno...	Kno...	Sci...	Res...	Arch...	Com...	Mark...
Information Processing Ability	0	4	3	2	0	2	3	1	3	0	1	1	0	1	2	0	0	2	0	1	0	0
Computer Skills	4	0	1	0	1	0	0	0	0	2	3	1	0	2	0	0	0	1	0	0	0	0
Professional Ethics	3	1	0	1	2	0	0	2	1	0	3	0	3	0	1	2	0	0	0	1	0	0
Communication Skills	2	0	1	0	0	0	0	5	3	0	1	0	2	0	0	1	0	0	0	0	0	0
Book Borrowing	0	1	2	0	0	0	1	3	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Written Skills	2	0	0	0	0	0	0	1	0	0	4	0	0	0	0	0	4	0	0	3	1	0
Cataloguing	3	0	0	0	1	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0
Oral Express Skills	1	0	2	5	3	1	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0
Teamwork	3	0	1	3	0	0	0	2	0	0	0	0	3	0	0	0	0	1	0	0	0	1
Information Analysis	0	2	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0
Foreign Language Skills	1	3	3	1	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
Professional Software Skills	1	1	0	0	0	0	3	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0
User Service	0	0	3	2	3	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0
Database Management	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Information Retrieval	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Innovation Ability	0	0	2	1	0	0	0	1	3	0	0	0	0	0	0	0	0	1	0	0	0	0
Knowledge Management	0	0	0	0	0	0	4	0	0	0	0	0	0	0	7	0	0	0	0	0	0	1
Sci-tech Novelty Retrieval	2	1	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	0	0	0	0
Research Ability	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Archival Management	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Computer Network	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marketing Skills	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0

#### 4.2 Drawing the Network Map of Library Professionals' Competency Skills

The matrix data was imported into Ucinet software. Through operation and analysis, the following library professionals' competency skills network diagram was obtained through Netdraw's visual imaging, which visually demonstrated the required competencies and skills of library professionals in Mainland China and the relationship between them.



**Figure 3: Network Map of Library Professionals' Competency Skills**

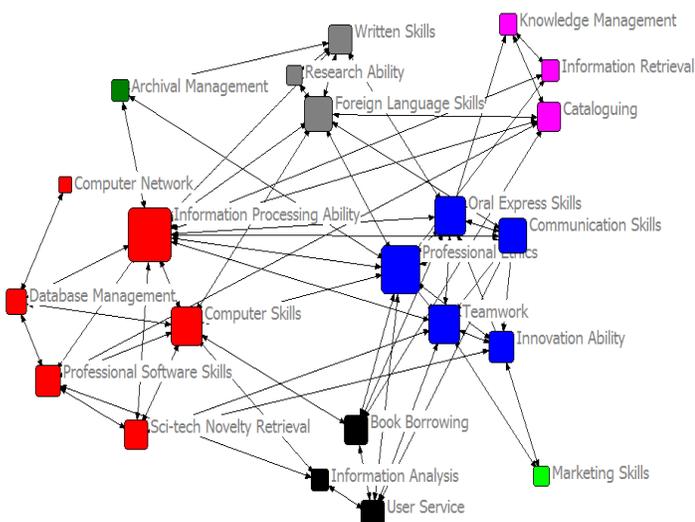
betweenness centrality and closeness centrality. The choice of centrality should be based on the background of the problems being studied. For this study the only need is to focus on the direct interaction, therefore, it is proper to study about degree centrality which is the measurement based on degree. Degree centrality is the most direct measure to describe node centrality in network analysis. The greater the degree of the node, the more interconnected it is with other nodes, therefore its location is closer to the center than other nodes [20]. The value of centrality degree of competency items above 15.000 are namely, Information Processing Ability, Professional Ethics, Teamwork, Foreign Language Skills, Oral Express Skills, Communication Skills and Computer Skills. In the network diagram, these seven competency indicators are closer to the center location.

**TABLE 5. Degree Centrality of Competency Skills of Library Professionals**

No.	Competency Skills	Degree Value
C1	Information Processing Ability	26.000
C2	Computer Skills	15.000
C3	Professional Ethics	20.000
C4	Communication Skills	15.000
C5	Book Borrowing	10.000
C6	Written Skills	11.000
C7	Cataloguing	12.000
C8	Oral Express Skills	16.000
C9	Teamwork	17.000
C10	Information Analysis	14.000
C11	Foreign Language Skills	16.000
C12	Professional Software Skills	11.000
C13	User Service	14.000
C14	Database Management	8.000
C15	Information Retrieval	10.000
C16	Innovation Ability	9.000
C17	Knowledge Management	12.000
C18	Sci-tech Novelty Retrieval	7.000
C19	Research Ability	6.000
C20	Archival Management	3.000
C21	Computer Network	2.000
C22	Marketing Skills	2.000

**4.3 Factions Analysis of Competency Skills Items**

Seven was finally chosen as the number of desired groups, its fitness is the lowest with the value of 72.000. Therefore the items of competencies are divided into 7 groups which represented in seven colour. Red colour nodes include Computer Network, Information Processing Ability, Database Management, Computer Skills, Professional Software Skills and Sci-tech Novelty Retrieval; Blue colour nodes include Oral Express Skills, Communication Skills, Professional Ethics, Innovation Ability and Teamwork; Black colour nodes include Book borrowing, Information Analysis and User Service; Grey colour nodes include Written Skills, Foreign Language Skills and Research Ability; Pink colour nodes include Knowledge Management, Cataloguing and Information Retrieval. Deep green colour nodes include Archival Management; Light green colour include Marketing Skills. The detailed classification were elaborated in the Figure 4.



**Figure 4: Clustering Graph of Competency Skills of Library Professionals**

**4.4 Analysis of Degree Centrality**

Generally speaking, there are three types of methods to measure the centrality in practice, namely, degree centrality,

**4.5 Analysis of the Density of Condensation Subgroups**

Subsequently, the density of condensation subgroups will be measured through analysis of K-plex. A k-plex is a maximal subgraph with the following property: each vertex of the induced subgraph is connected to at least n-k other vertices, where n is the number of vertices in the induced subgraph [21]. The results were shown in Fig 5. It showed that "Professional Ethnicns", "Information Processing Ability",

“Computer Skills”, “Foreign Language Skills” and “Communication Skills” are relatively at the center positions, which occupied five of the top seven positions whose degree value are above 15.000 in the list of degree centrality. This is basically consistent with the node distribution of the network structure diagram.

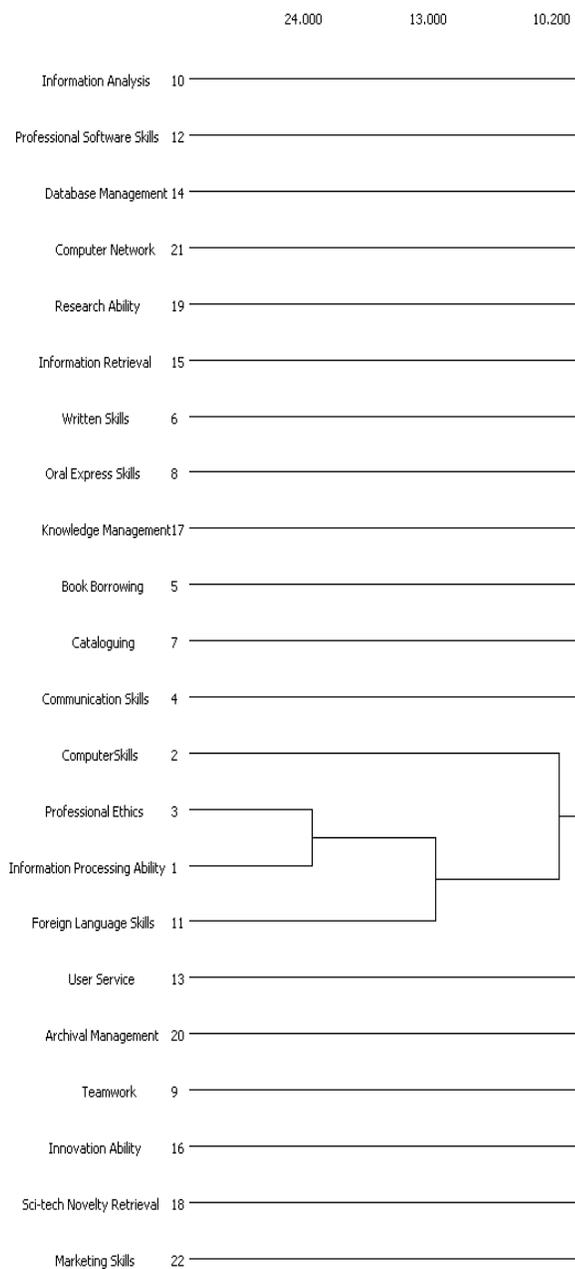


Figure 5: K-Plex Histogram (Parts)

## 5 SUGGESTIONS BASED ON THE ANALYSIS OF LIBRARY RECRUITMENT ADVERTISEMENTS

### 5.1 Optimizing Job-Oriented LIS Curriculum

The job market for LIS professionals is competitive. The real fact is, with the range of library and related jobs, university with LIS departments or schools have no ability to create one updating curriculum that applies to every position. Neither can they incorporate in-depth training on the myriad of constantly

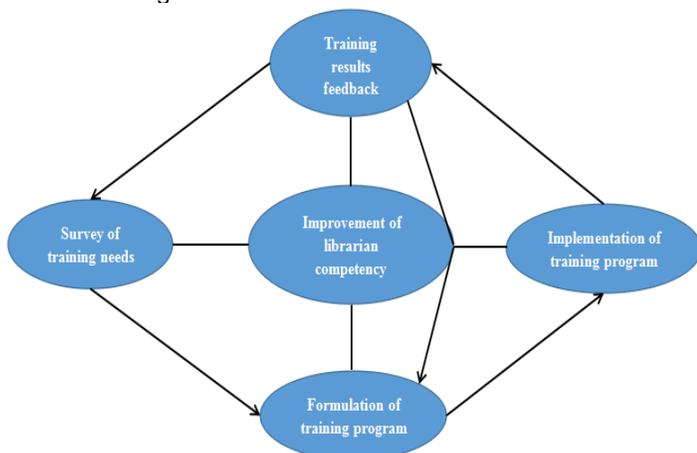
evolving technologies with which potential employers expect job applicants, even in entry-level positions, to be familiar. In short, the majority of library schools will not actually equip their graduates with fundamental competencies to be competent library professionals [22]. The current education forms of LIS discipline in Mainland China mainly include General Full-time Education (from Junior College level to Doctoral Level) and Adults Education (Undergraduate Level or below). Inside the curricula, lots of mismatch exist between the knowledge and skills imparted by LIS institutions and real work environment [23]. The current LIS curricula seem slightly dull and outdated, which could not meet the fast changing demands of society. Therefore LIS curricula need to be structured in such a way that the professional develop necessary abilities and skills to be comfortable in the job market. According to the above analysis of competency required for library professionals in various types of libraries. A necessity is felt to reconstruct the curricula which will cover from full-time education to adults education in Library and Information Science keeping in view of filling the gap of non matching parts between professional competency and LIS course contents. Further more, a more advanced and effective LIS module-based teaching system can be put forward according to the analysis of factions of required competencies.

### 5.2 Establishment of Library Professional Qualification Certification System

The library professionals qualification system and library legislation are the two main pillars of the international library development. UK is one of the first countries to implement library professional qualification certification system. Taking the UK as an example, there are three different types of library qualification certification systems: academic professional education mechanism, library professional registration qualification mechanism and vocational qualification certification system. However, no matter what kind of qualification certification mechanism is, it only recognizes the identity of library professionals at the higher level of requirements and standards [24]. At present, Mainland China only completed the legislation of public libraries at the end of 2017. However, there is currently no specific system for library professional qualification certification. More similar to its function is that the evaluation system of professional titles in Mainland China, which has been implemented for more than 20 years. As an important part of human resource management, it has played an active role in mobilizing librarians' enthusiasm, evaluating library staff's academic level and performance scientifically, and improving the professionalism of library staff. Nevertheless, according to the implementation of the system for more than two decades, the drawbacks were very obvious, whose main problem is that the existing system did not set the enrollment standards for library professionals. Especially in academic library, based on Mainland China's traditional socialist market mechanism, personnel management authority of libraries falls under the jurisdiction of personnel departments of concerned academic institutions, which will lead to recruiting many staff without educational background of LIS or mastery of professional skills into libraries mistakenly. As it should be recognized that individuals may have difficulty evaluating their qualifications in comparison to more subjective requirements [25]. A necessity should be considered to carry out a well designed certification enrolled system for library professionals. If left unchanged, it will cause bad effect for the construction of talents team in various types of libraries.

### 5.3 On-the-job Training and Continuing Education for Library Professionals

In a changing and unpredictable information environment in which LIS professionals need to constantly update and develop their professional competency skills. It is equally important to conduct on-the-job training and re-education for library professionals in addition to updating the LIS curricula of higher education institutions and establishing a comprehensive library career access system [26]. Various types of libraries should train and re-educate professionals through on-the-job training, expert lectures, and distance education to speed up the knowledge updating for themselves, broaden their horizons and improve their professional quality. However, due to the each professional's different educational background and mastery level of professional ability, the training plan should be set up according to the specific case, and it should not be conducted equally [27]. The general specific training process is shown in Figure 6.



**Figure 6:** Training Process of Working Library Professionals

The library not only need to launch survey of training needs, but also need to develop suitable training programs. Moreover, the training plan should be adjusted in time keeping in view of the specific results of the feedback.

### 6 LIMITATION AND STUDY FORWARD

This study did not select "Archive Science" as one of the key words for retrieval. In the actual library recruitment advertisements, there will be some cases that the "Archive Science" is mentioned separately. Because of low proportion of occurrence, it had a slight influence on the analysis of library recruitment advertisements. Therefore, only "Library Science", "Information Science" and "Library and Information Science" were selected as key words for retrieval finally. In addition, this study only aimed at the analysis of recruitment advertisements, which was limited by the duration of data collection and the lack of source from job advertisements websites. Therefore, in the future research, the necessity shall be considered to take the job descriptions issued by relevant libraries or information centers into concern while doing comprehensive analysis of competencies and skills required for library and information professionals in Mainland China's job market.

### 7 CONCLUSION

This study analyzed the recruitment advertisements of various types of libraries mainly from three dimensions: qualification

requirements of library professionals; categories of job positions in different types of libraries; competencies and skills required by current LIS job market. Finally the social network relationship between items of competency skills has been exposed through content analysis method and social network analysis method along with coming up with relevant suggestions according to the results of analysis of library job advertisements.

### AUTHOR CONTRIBUTION

First author (Chenwei Chen): Selected topic, collected & analyzed data, and wrote article. Second author (Moses M. Naga): Language structure modification.

### CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this article.

### ACKNOWLEDGMENT

There is no financial support for this study.

### REFERENCES

- [1] X.M. Xiao, "The Interaction between Library Science Education and the Society in China over the Past Century," *Journal of Library Science in China*, vol. 9, pp. 52-71, 2017.
- [2] A. Oliver and E. Prosser, "Academic Librarianship Without the Degree: Examining the Characteristics and Motivations of Academic Library Professionals," *The Journal of Academic Librarianship*, vol. 44, no. 5, pp. 613-619, 2018.
- [3] J. Raju, "Knowledge and Skills for the Digital Era Academic Library," *The Journal of Academic Librarianship*, vol. 40, no. 2, pp. 163-170, 2014.
- [4] C. Cote, "What Qualifications and Skills are Important for Digital Librarian Positions in Academic Libraries? A Job Advertisement Analysis," *The Journal of Academic Librarianship*, vol. 35, no. 5, pp. 457-467, 1989.
- [5] P.M. Beile and M.M. Adam, "Other Duties as Assigned: Emerging Trends in the Academic Library Job Market," *College & Research Libraries*, vol. 61, pp. 337-347, 2000.
- [6] Y.F. Du, B. Stein and R.S. Martin, "Content Analysis of an LIS job Database: A Regional Prototype for a Collaborative Model," *Libri*, vol. 57, no. 2, pp. 17-26, 2007.
- [7] D. Ocholla and M. Shongwe, "An Analysis of the Library and Information Science (LIS) Job Market in South Africa," *The South Africa Journal of Libraries & Information Science*, vol. 79, no. 1, pp. 35-43, 2013.
- [8] M.K. Sinha and B.K. Pandey, "Status of Job Opportunities and Employment of Library and Information Science Professionals in India: An Analysis of Job Advertisements," *Journal of Humanities And Social Science*, vol. 19, no. 1, pp. 79-93, 2014.
- [9] R. Shahbazi and R. Hedayati, "Identifying Digital Librarian Competencies according to the Analysis of Newly Emerging IT-based LIS Jobs in 2013," *The journal of Academic Librarianship*, vol. 42, no. 5, pp. 691-699, 2016.
- [10] H.R. Khan and Y.F. Du, "What is a Data Librarian?: A content analysis of job advertisements for data librarians in the United States academic libraries," [online], 2018. <http://library.ifla.org/2255/1/139-khan-en.pdf> (Accessed 11 October 2019)

- [11] J.L. Zhao, Q. Li and J.K. Wang, "A Study on the Demand of Library Science Professionals: A Content Analysis of Recruitment Information," *Hebei Sci-Tech Library Journal*, no. 1, pp. 38-41, 2011.
- [12] Y.Q. Huang and X.L. Yao, "Library Deprofessionalization Research based on Recruitment Data," *Library and Information Service*, vol. 57, no. 14, pp. 82-86, 2013.
- [13] W.Q. Fu and Y.M. Zuo, "Investigation and Analysis of the Employment Situation of Undergraduate Library Science Graduates in China," *Library Science Research*, no. 21, pp. 22-25, 2015.
- [14] J. Cullen, "LIS Labor Market Research: Implications for Management Development," *Library Management*, vol. 25, no. 3, pp. 138-145, 2004.
- [15] G.C. Deka, "LIS Chapter Three - NoSQL Web Crawler Application," *Advances in Computers*, vol. 109, pp. 77-100, 2018.
- [16] Y. Tang, "Distance Education Librarians in the United States: A Study of Job Announcements," *The journal of Academic Librarianship*, vol. 39, no. 6, pp. 500-505, 2013.
- [17] Y. Choi and E. Rasmussen, "What Qualifications and Skills are Important for Digital Librarian Positions in Academic Libraries? A Job Advertisement Analysis," *The journal of Academic Librarianship*, vol. 35, no. 5, pp. 457-467, 2009.
- [18] ALA, "ALA's Core Competences of Librarianship," American Library Association, 2008.  
<http://www.ala.org/educationcareers/sites/ala.org/educationcareers/files/content/careers/corecomp/corecompetence/finalcorecompstat09.pdf> (Accessed 15 September 2019)
- [19] FLICC, "FLICC Competencies for Federal Librarians. Resource document. Library of Congress," Library of Congress, 2018.  
[http://www.loc.gov/flicc/publications/Lib\\_Compt/2011/2011\\_Competencies.pdf](http://www.loc.gov/flicc/publications/Lib_Compt/2011/2011_Competencies.pdf) (Accessed 15 September 2019)
- [20] L.C. Freeman, "Centrality in Social Networks: Conceptual Clarification," *Social Network*, vol. 1, no. 1, pp. 215-239, 1979.
- [21] S.B. Seidman and B.L. Foster, "A Note on the Potential for Genuine Cross-fertilization between Anthropology and Mathematics," *Social Network*, vol. 1, no. 1, pp. 65-72, 1979.
- [22] C. Laskowski, "Reaching the baseline: A Professional's Perspective on Technological Competencies for Library Students," *The journal of Academic Librarianship*, vol. 44, no. 4, pp. 541-543, 2018.
- [23] C.W. Chen and M.M. Naga, "Reform on the Model of Library and Information Science Adults Education in Mainland China," *Proceedings of the 2019 3rd International Seminar on Education, Management and Social Sciences*, pp. 583-586, 2019.
- [24] J. Raju, "A Comparative Study on the Path of Professional Library," *South African Journal of Library & Information Science*, no. 7, pp. 58-61, 1998.
- [25] C. Womack, "Applying for Professional Positions in Academic Libraries: Meeting Minimum Requirements," *The journal of Academic Librarianship*, vol. 23, no. 3, pp. 205-209, 1997.
- [26] J. Bronstein, "An Exploration of the Library and Information Science Professional Skills and Personal Competencies: An Israeli perspective," *The journal of Academic Librarianship*, vol. 37, no. 2, pp. 130-138, 2015.
- [27] C.N. Li, "Research on the Construction of Librarians' Professional Ability in the Era of Big Data," *Journal of the Library Science Society of Sichuan*, no. 1, pp. 31-33, 2018.