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# The Development of Subject Gateway and Library Operating Model for the Diffusion of Entrepreneurship – Focus on Job and Employment Services

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## ABSTRACT

High unemployment rates repeatedly cause recurring social problems such as fewer employment opportunities and employment insecurity. Following this trend, various programs related to employment have been provided through various government and institutions. However, they have established overlapping policies and programs and there is no one stop gateway to find effective and efficient way to find relevant information. For this purpose, this study aims to provide employment and job search subject gateway development. The study has carried out case studies, literature reviews, and user survey. Based on this study, it suggested a linked metadata model to organize and link scattered information together, and a digital gateway operating diverse information services. It is expected to provide a basis to develop comprehensive information service model for employment.

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## 1. Introduction

According to the Statistics Republic of Korea's data, in February 2016, the country's young generation unemployment rate surpassed 10.5%, a record high since 1996 when the national youth unemployment rate began to be calculated (Statistics Korea, 2019). High unemployment rates repeatedly cause recurring social problems such as fewer employment opportunities and employment insecurity.

Following this trend, various programs related to employment have been provided through various government policies and institutions. However, government departments have established overlapping policies, and the programs operating in accordance with the policies have provided services within a simple, limited scope such as counseling, education and job placement, failing to meet the needs of all program users. There is no one stop gateway to find effective and efficient way to find relevant information.

In many other countries, it has been common for libraries to offer employment and job search support services since long ago. About 99% of US public libraries offer employment and career-related

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services (University of Maryland, 2014). However, in Republic of Korea, employment support centers are operated in most universities. But the program is not led by library centered. Public libraries also have various specializing programs, but there are only few libraries specializing in employment. The study has carried out case studies, literature reviews, and user survey. Based on this study, it suggested a linked metadata model to organize and link scattered information together, and a digital gateway operating diverse information services. It is expected to provide a basis to develop comprehensive information service model for employment and to be utilized as a guide to provide employment information services in libraries.

## 2. Literature Review

### 2.1. Literature Reviews in Republic of Korea

Research on employment services based on libraries in Republic of Korea has been conducted by a few researchers. Literature reviews cover not only library centered information services, but also users' needs, policies and education for careers. For employment services outside libraries, Kim (2012) visited 13 universities and assessed the employment support capacity of each university using indices consisting of the five areas of operation activities, performances, human resource management, customer management, and employment support services. As a result of the evaluation, 2-year colleges earned higher scores in operation activities and performances than 4-year universities, while the latter were a little bit more highly evaluated than the former in human resource management and customer management. Two-year colleges and four-year universities showed the same level of capacity in employment support services. The study pointed out that the employment support capacity of Republic of Korean universities should be enhanced according to a long-term plan through the assessment of the capacity for more universities with improved evaluation indices.

Jang and Go (2010) conducted a need analysis through focus group interviews for 11 employment support personnel. From the results, it was revealed that the workers were required to have a basic attitude as employment support personnel and capacity for project planning, development, implementation and management, as well as the ability to provide counseling to students and link them to jobs. They had a need for case-centered education rather than a theoretical one and a need for a systematic curriculum. Based on the results, the study suggested that employment support personnel need to cultivate their job capacities in all areas for employment support such as education and guidance, counseling, administrative work, and planning.

For studies of information services for employment in libraries, Lee (2013) asserted that public libraries, with a mission to provide lifelong education to the public as a social educational institution, should offer employment and career-related services and expand information services to facilitate the exchange of information on employment and vocational training based on accumulated databases. The researcher suggested that public libraries' major educational services introduce programs for developing new occupations as well as promising jobs in the 21st century and that their information services be expanded for the exchange of information on employment and vocational training.

Kim (2013) pointed out that in most of Republic of Korean university libraries, employment informatio

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n services are not included in their major services. Even with regard to the libraries providing employment information services, they reveal a very passive approach to such services, only building up the collection of books on employment or examination preparation books and assigning employment information services to librarians in charge of other tasks. The study suggested the appointment of dedicated librarians, the accumulation of books on employment, the provision of career search support information, the establishment of a cooperative network with related organizations, and the promotion of employment information services as measures to activate such services.

## *2.2. Literature Reviews Outside Republic of Korea*

Quenoy and Orgeron (2003), in their study on the employment-related services of libraries, conducted a survey on 78 librarians at university libraries and investigated the cooperation between the libraries and the relevant university departments. In particular, this study carried out a comparative analysis of research conducted in 1992, focusing on the location of employment and career information resources in the campus, efforts for cooperation, library collection development, students' accessibility, students' satisfaction, and the availability of information. As a result of the survey, 93% of the libraries had collections of employment-related sources, 85% of them provided seminars on employment and career development, and 78% of them were cooperating with university departments. However, only about 49% and 33% of the total libraries engaged in promotional activities for the services and offered training to university departments, respectively. Compared to the survey in 1992, there was an increase in the proportion of relevant online resource collections and the number of libraries that are primarily responsible for the development of collections.

Dugan, Bergstrom, and Doan (2009) emphasized the importance of cooperation, public relations and marketing, and the improvement of services through constant evaluation as key factors to the successful operation of career centers, based on the analysis of the case of career center operation by the Library of Purdue University. The major findings of their study are as follows. The library used the wiki system to cooperate with other major employment and career-related departments in the campus and share information and programs provided by each department. The cooperation enabled the effective purchase of books and other materials, and the website built based on the wiki system provided students with information on employment and career development. In addition, the library installed its booth during job fairs for the promotion and marketing of its employment and career-related services. It promoted its website and conducted service evaluation and a user survey using Google Analytics.

Varalakshmi and Moly (2009) presented a model for providing employment and career services in university libraries. They stressed that librarians need to be responsible for printing and collecting electronic sources, have extensive knowledge of employment trends and access to information, and lead organic cooperation with the relevant departments. It was also emphasized that librarians should continue to make efforts to promote various services such as counseling and information provision and to understand students' needs. This study suggested that libraries should meet the following requirements to play a leading role in employment services: the establishment of a separate center and the employment of dedicated human resources, the provision of relevant information, the hosting

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of seminars, continuous attempts to cooperate with employers, and the securing of financial resources. It was also noted that libraries should design e-learning programs and provide educational and related information.

Swamy, Umesha, and Ramasesh (2014) reviewed the employment-related services provided by the University of Mysore Library. This library opened a center to provide employment and career services as part of its lifelong learning services. The center provides services including the purchase of books and DBs and subscription to a variety of sources, support for resume preparation, and the provision of information on various tests and examinations. In addition, the center, through its online portal, provides subject guides, links to test information and job search websites, information on domestic and overseas educational institutions, and information on preparation for job interviews and self-introduction letters. It was reported that about 2,800 students and professors visit the portal every month. As a result of literature review, we found that information services for employment and career should cover diverse information services as well as information sources such as newspapers, e-books, magazines, counseling, and e-learning programs. Career related research in Republic of Korea still has a long way to go in the construction of subject guide reflecting necessary information services. Today, libraries are considered lifelong educational institutions and are required to function as employment and career partners; thus, they need to establish a method to provide information resources and services to support employment.

### 3. Research Methods

This study, with the aim of presenting a subject gateway for employment and career services suited to Republic of Korea, consisted of a literature review, case studies, user needs analysis, and a linked metadata model. For this, user surveys for 118 people were conducted to find information needs. The questionnaire for the survey on users' needs was structured with reference to the previous studies on employment (Chang, Park, & Jeong, 2016; Noh & Park, 2014). The topics includes difficulties in searching information, preferred information services, preferred information search methods, preferred information sources, needed information sources, needed information services, and so on.

Respondents' personal information for survey is following in **Table 1**. The total of 98 respondents comprised 48 men and 50 women, among whom 97 were in their 20s and 1 was in his/her 30s. As for career plans, 10 of the respondents are already employed, while the remaining respondents answered that they want to be employed in the following timeframes: 31 respondents within 3 months, 21 in 3 to 6 months, 20 in 6 to 12 months, 14 in a year, and 2 respondents reported different plans. 47 respondents (47.96%) were desired to get their jobs in private sectors such as domestic private company and foreign companies. 25 respondents (25.51%) said that they would like to have jobs in public sectors such as public corporation or government affairs.

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**Table 1.** Demography of Respondents

Question	Category	Frequency(%)	Question	Item	Frequency(%)	
Gender	Male	48(48.98)	Career Plan	Already Employed	10(10.20)	
	Female	50(51.02)		Within 3 Months	31(31.63)	
Age	20-29	97(98.98)		3 to 6 Months	21(21.43)	
	Over 30	1(1.02)		6 Months-1 Year	20(20.41)	
Education	In University/College	80(81.63)		More than 1 Year	14(14.29)	
	University/Collage Graduates	18(18.37)		Others	2(2.04)	
Library Usage Frequency	At least Once a Week	39(39.80)		Desired Field of Employment	Private Company	31(31.63)
	At least Once a Month	28(28.57)			Public Corporation	15(15.31)
	Once Every Three Month	10(10.20)			Government Affairs	10(10.20)
	Once in Six Months	9(9.19)	Foreign Companies		16(16.33)	
	About Once a Year	8(8.16)	Finance		8(8.16)	
	Other	4(4.08)	Medical Area		18(18.37)	

#### 4. Case Studies of Employment Support

##### 4.1. Case Studies of Employment Support Outside Library Sectors

###### 4.1.1. Cases of Government Support

The Ministry of Employment and Labor supports employment through the successful Employment Package, the Youth Employment Support Programs, and the Worknet. The successful Employment Package is a package service that combines support for job preparation, education, and employment. The Ministry of Employment and Labor also collects and provides various employment guidelines and employment news through the Youth Employment Support Programs. It has developed and operated various programs such as Hope for Employment, Re-Employment Design for Women on Career Breaks, and CAP (employment guide for young people). The Worknet is an online service that provides job seeking opportunities and offers information by regions and job types along with career counseling. It also introduces the Ministry of Employment and Labor's major policies in an easily accessible manner for different job seeker groups.

The Ministry of Education supports the employment of university students through the Global On-site Learning Programs for University Students. The program seeks to provide various internship opportunities to university students to help them design their future career paths and to nurture global talent. The government (Ministry of Education) supports about KRW 2.5 to 5 million per student (amount differs depending on the nation a student will go to), and the universities that

receive the support will invest more than 50% of the government subsidies in the programs for the students. Applicants are required to have completed at least four semesters and be fluent in the language used in the countries where they will participate in the programs.

The Ministry of Gender Equality and Family supports women's vocational capacity development through the Reemployment Support Centers for Women, the Career Development Centers for Woman's University Students, and the Career-Up services. The Reemployment Support Centers for Women aim to provide comprehensive employment support services to women on career breaks due to child rearing or housework. The Career Development Centers for Woman University Students support the continuous participation of young women in economic activities without interruption by cultivating their basic competence for their adaptation to work and career development and laying the foundation for a gender-equal workplace culture. "Career-Up" is a channel within the Women-Net ([www.women.go.kr](http://www.women.go.kr)) that provides specialized information (professional coaching, information on education and various forms, etc.) useful in all stages of employment from preparation to the actualization of plans and success. It also operates the "Employment Clinic" (support for the preparation of self-introduction letter in Republic of Republic of Korean and English), providing employment guides, information on the employment of women, labor systems, counseling, and educational events for women.

#### *4.1.2. Cases of University Support*

Each university has its own employment and career-related program, and has also established and operated an employment support system in accordance with the policies of the government departments such as the Ministry of Employment and Labor, the Ministry of Education, the Ministry of Gender Equality and Family, and the Small and Medium Business Administration. The two major support systems are based on the Career Development Centers for the Creative Economy and the Business Incubation Centers, respectively. These institutions have been established in university campuses as their affiliated organizations with the aim of contributing to the quantitative and qualitative improvement of the universities' extra-curricular activities and employment support. The Career Development Centers for the Creative Economy seek to strengthen the linkage among the functions of universities' employment support services so that current students, graduates, students from other universities, and the local youth can easily access them. Moreover, the centers aim to construct a one-stop employment support service delivery system in cooperation with the Ministry of Employment and Labor, universities, local governments, and the Centers for Creative Economy and Innovation. On October 5, 2015, the Ministry of Employment and Labor designated many universities as the recipients of support from the Career Development Centers for the Creative Economy. Each center links and integrates the functions of universities' employment support services, helping the youth obtain information on the successful Employment Package services and the Youth Internship system without having to visit local employment centers. The Career Development Centers for the creative Economy receive funding of KRW 5 billion to finance annual project expenses per center for five years through the matching among the government, university, and the local government. After two years of project implementation, each center's performance is evaluated, which determines whether it can continue to receive the subsidy (for the remaining three years). More specifically, the centers

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operate career guidance programs, provide information on events and projects for young people such as meetings between employers and job seekers, job fairs and recruitment events, and offer training on how to use the Worknet and vocational psychological tests and group counseling leader programs. The centers plan to strengthen their cooperation with the Centers for creative Economy and Innovation in 18 cities and provinces across the country. The Centers for Creative Economy and Innovation play the role of identifying the demands for workforce and training from companies that are specific to each region. The Career Development Centers for the creative Economy serve the role of supporting employment, and capacity development based on the information.

#### *4.2. Case Studies of Employment Support in Library Sectors*

##### *4.2.1. Cases of Library Support in Republic of Korea*

Overseas, public and university libraries play a major role in providing programs and information related to employment. Also, dedicated librarians assigned to these programs take the lead in collecting books and information on employment and cooperating with relevant organizations. In Republic of Republic of Korea, however, libraries rarely run programs supporting employment or have dedicated librarians to administer these programs. As these services are not included in the libraries' main services, it is particularly difficult to ascertain whether they are available by checking the library websites. According to previous studies, even those libraries that do operate employment programs remain at a passive level, and are confined to the collection of books for examination preparation or as corporate information resources.

Some of the cases of libraries' support for employment presented in recent studies (Kim, 2013; Lee, 2013) also expose the following limitations. Only a small number of libraries provide employment information services, and these services mainly consist of the collection of books that help in preparation for employment, examinations, certification examinations and civil service examinations, and the operation of a separate employment data section. The domestic libraries that provide strategically designed job information services compared to other libraries in Republic of Republic of Korea include the Gyeongsang National University Library, and the Pusan National University Library. The Ajou University Central Library operates a separate employment data section which mainly consists of job interview reference data, company and public organization introduction materials, and self-development books for designing career paths. Although there are books on aptitude and personality tests that are adopted by some companies, in principle, the library does not purchase books on job aptitude tests in the form of a workbook. Instead, individual users are given recommendations to buy such books for themselves if necessary. However, as the acquisition of information on employment is one of the most common reasons why users visit libraries, the university library plans to expand their purchase portfolio to include such books by classifying them as consumables, not as DBs, and to continuously operate and maintain the employment data section. The library also plans to provide space for mock job interviews, negotiations, and debates in linkage with the university's departments that are related to employment. The Gyeongsang National University Library also has dedicated book stacks for books that help in preparation for various examinations

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such as language tests, civil-service examinations, and other various tests required in the job seeking process, along with reference materials for certifications exams related to majors. The Window on America section provides guides on how to study in and travel to the US, as well as information on American Studies and English teaching methods provided by the US Embassy Public Information Office in Seoul. The library also offers online civil service exam preparation courses through the "Amor Exam" service.

The Pusan National University Library has established the Employment Support Resource Room as part of its education capacity enhancement project in 2009. The library has assigned librarians who are responsible for employment support as well as other services to the room. The library plans to provide company information via its website and expand reference materials on improving the basic writing skills needed in the job seeking process, and the preparation of resumes, theses, and dissertations. As of 2013, the library website has included the category of Employment Support Resources and Job Information (linked to the official blog). The library also hosts an employment and recruitment briefing session twice a month. Although the employment support services of domestic public libraries still remain at the beginning stage, various programs are being developed with the implementation of the free semester system. The Gumi City Central Library is planning to run a variety of programs such as the Career Development Program, Special Lectures of Invited Experts, Career and Occupation Exhibition, and the Career and Occupation Section in cooperation with local schools and communities. It will also operate the Reading Academy, the Reading Instructor Certification Preparation Course, and the Storytelling Teacher Certification Preparation Course for Seniors to cultivate reading experts. The Andong City Library hosts the Youth Academy with Reading for young people who are having difficulty finding jobs and designing their career paths. The libraries and lifelong learning centers affiliated with the Seoul Metropolitan Office of Education provide lectures that are useful to those preparing for certification exams along with the Seoul Metropolitan Office of Education's Ever-learning programs. Some of the libraries, including the Gwangjin District Public Library, have established collection development policies for employment, and have begun to procure materials that will help users in their job seeking and preparing activities. In addition, more libraries are planning to provide useful databases and information resources related to employment.

#### *4.2.2. Case of Library Support in Other Countries*

Overseas, employment support services have been provided continuously on university and public libraries for a long time, which have supported job seeking and preparing activities through dedicated departments or centers. Therefore, this study selected libraries that can be used as best practices for employment services.

The San Francisco Public Library runs the Job & Career Center on the fourth floor under the auspices of the Bank of America, and provides services focused on offering information resources. The Job & Career Center is equipped with a separate Reference Desk, subject-specific collections, diverse newsletters, as well as a reading and discussion space for users. The library provides relevant databases, online links, and information on prospects for various occupations, job fairs, and its e-learning center via its online portal. The most notable feature of this library is the operation

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of this e-learning center. By signing up as library members, users can benefit from services such as one-on-one online tutorials on self-introduction letters, resume and job interview preparation, and other Online Courses on Job Search, computer skills, etc.

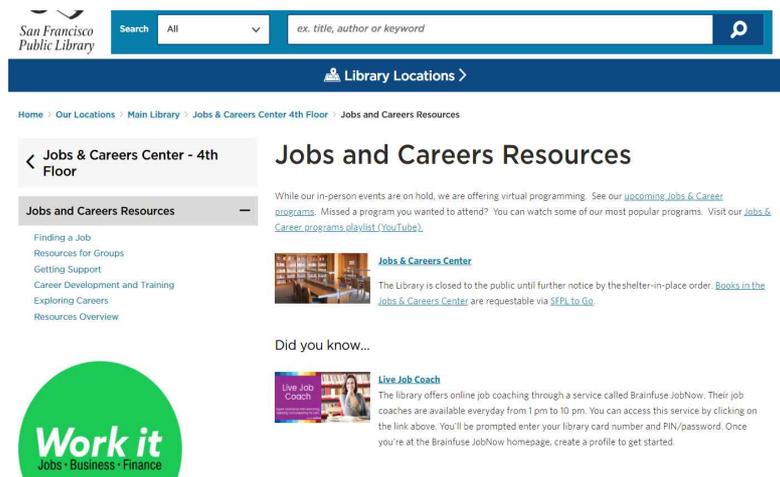


Fig. 1. San Francisco Public Library Job and Career Services

The Los Angeles Public Library is a representative public library in the Los Angeles area. As it is located in a highly populated area, it is relatively larger compared to other libraries. The most distinguishing feature of this library is that it operates a separate Job & Career Center where both experts in this field and dedicated librarians work and provide one-on-one education services and consulting on employment. The curated book stacks are available as seen in the figure, with collections specific to the subjects "IT Certificate" and "Resume Writing" displayed on the front.



Fig. 2. Brooklyn Public Library Job and Career Services

The Brooklyn Public Library has operated a business and employment library since 2011 with

the addition of the categories of employment and business information to its website and the provision of various relevant services. The library provides a company search function and information on investment and market search and other topics through subject guides, along with one-on-one counseling and resume preparation support.

Delaware Libraries have been organized by a consortium of 33 public libraries, 8 university libraries, and 7 specialized libraries. Its website provides employment and career development support guides that introduce relevant information resources and programs that are operating in partner libraries. Among the partner libraries, the Georgetown, Wilmington, and Dover Public Libraries have the Inspiration Space to provide specialized employment services. The most important feature of these libraries is that they offer a variety of information on employment information search, resume and job interview preparation materials, extended education and training, and company search through employment subject guides. They also provide a list of websites of relevant organizations as well as information on lectures provided by other organizations through extended education and training.

The following implications have been drawn from the analysis of the above-presented cases. First, employment was supported on diverse levels such as government, university, and libraries. They provide lots of different services, funding, and projects for tiered targets. Scattered information should be systematically organized. Second, As the role of public and university libraries has become more important in lifelong education, greater emphasis has been put on libraries' services to support employment and career development. Libraries in foreign countries had made diverse efforts to provide efficient and effective information services for employment and job careers. On the other hand, there are few cases of library-centric support in Republic of Korea while some universities and public libraries have provided relevant services in a passive way. Following this trend, collected information sources based required information needs should be provided. It is required to construct a subject gateway that can provide scattered information in one place.

## 5. Results of Users' Need Survey

### *5.1. Background Characteristics of the Research Scientists*

The user survey was conducted to investigate user needs. The survey was conducted from November 2018 to February 2019. The subjects of the survey were those who wish to search employment. They included participants in job fairs and those who are expecting to graduate from university. Total 114 was collected, but the analysis was performed on 98 surveys excluding the questionnaire not answering required answers. User needs survey questionnaire consisted of difficulty in information search, source of information used, information services used, information source usefulness, information service usefulness, desired information source, and desired information services.

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### 5.2. Information Behavior on Employment

For search frequency for employment information, about 26% of the respondents search for employment information once or more a day and about 74% of the respondents search for the information once or more a week.

**Table 2.** Employment Information Search Frequency

	More than 3 /Day	1-3 /Day	2-3 /Week	Once /Week	Once /Month	Other	Sum
Frequency(%)	6(6.12)	19(19.39)	<b>26(26.53)</b>	18(18.37)	<b>26(26.53)</b>	3(3.06%)	100(100%)

For types of information regarding employment that are primarily searched, the most common types of information regarding employment that are primarily searched pertain to the latest job offers (67 respondents), job information (61 respondents) such as average annual salaries and prospects for occupations, followed by information on certifications (38 respondents) and the company information (34 respondents) that the respondents want to work for.

**Table 3.** Types of Information Regarding Employment that are Primarily Searched

Up-to-date Job Offers	Occupational Information	Interview Review	Related Education and Training	Job Preparation Information	Certificate	Company Information	Job Fair and Exhibit
<b>67</b>	<b>61</b>	22	19	40	<b>38</b>	<b>34</b>	19

Regarding challenges in employment information search, each respondent chose three main reasons based on priority. The most frequent response was that it is difficult for the users to distinguish useful information to them from all available information. Other responses included the users' uncertainty about the type of information they need, and that it is difficult for them to search for the needed information due to the tremendous amount of employment information scattered across various sources.

**Table 4.** Challenges in Employment Information Search

	Scattered Information	Lack of Information	Do not know Where to find	Do not know Which Information is Needed	Too much Information to sort out useful Information
1st	16	22	19	14	<b>29</b>
2nd	<b>23</b>	12	20	31	14
3rd	20	18	16	<b>23</b>	<b>23</b>
Sum	59	52	55	<b>68</b>	<b>66</b>
Weighted Sum	<b>114</b>	108	113	<b>127</b>	<b>138</b>

For information sources primarily used to obtain employment information, respondents are allowed to choose multiple responses. The most frequently used information sources are Internet portals such as Naver.com or Daum.net (64 respondents), followed by individual websites (e.g. Job Planet) (53 respondents), online communities (e.g. blogs & Internet cafes) (50 respondents), and employment-related organizations (57 respondents) such as schools and employment support centers. To be concise, the respondents mainly obtain employment information mainly via Internet, and academic information sources, primary and secondary sources are not used much.

**Table 5.** Information Sources primarily used to Obtain Employment Information

Library	Employment Agencies	Book	Academic Journal	Magazine	News paper	Academic DB	Website	Internet Portal	Online Community	Expositions and Job Fairs	Friends and Acquaintances
4	<b>57</b>	4	2	3	9	3	<b>53</b>	<b>64</b>	<b>50</b>	26	25

When questioned whether users are confident in their employment information search skills on five Likert scale, a higher percentage of respondents chose the answers "Neutral" (32 respondents, 32.65%) or "Not very Confident/Not Confident" (37 respondents, 37.78%) while fewer respondents selected "Confident/Very Confident" (30 respondents, 30.61%). The results suggest that they generally have a low level of confidence (2.89) in their search skills and many respondents are not sure their level of confidence on job search skills.

**Table 6.** Confidence in Users' Employment Information Search Skills

	Not very Confident	Not Confident	Average	Confident	Very Confident	Average
<b>Number(%)</b>	<b>9(9.18)</b>	<b>28(28.57)</b>	32(32.65)	22(22.45)	8(8.16)	<b>2.89</b>

### 5.3. Information Satisfaction and Information Needs on Employment

The users' satisfaction is high with individual websites, Internet portals, online communities, and employment-related organizations. Satisfaction is relatively higher with job fairs and other employment events in particular. This suggests that though these events are not the primarily used information sources, the users derive from them relatively higher satisfaction. The satisfaction of academic information sources, primary and secondary sources are low. The more sources of information that are mainly used, the higher the satisfaction level is. However, the average of the overall satisfaction is around 3.23, indicating that users' satisfaction with the information source is not high overall, and needs to be improved.

**Table 7.** Satisfaction with the Employment Information Sources

Library	Employment Agencies	Book	Academic Journal	Magazine	News paper	Academic DB	Website	Internet Portal	Online Community	Expositions and Job Fairs	Friends and Acquaintances	Average
2.66	<b>3.64</b>	2.8	2.62	2.62	2.8	2.83	<b>4</b>	<b>3.82</b>	<b>3.68</b>	3.76	3.55	3.23

For employment support information services needed, the most needed employment support information services are employment counseling and support for resume and curriculum vitae writing. There are also high demands for training in job interviews and employment information search skills.

**Table 8.** Employment Support Information Services Needed

	Training on Job Information Search	Resume and CV Writing	Job Interview Training	Providing Books and Databases	IT Lectures	Successful Job Search Cases	Employment Preparation Place	Job Counseling	Information on Job Events and Fairs
1st	<b>20</b>	<b>20</b>	13	0	5	5	2	<b>24</b>	11
2nd	11	<b>22</b>	<b>20</b>	7	1	12	3	<b>13</b>	11
3rd	<b>14</b>	8	<b>25</b>	3	6	5	8	<b>20</b>	11
Sum	<b>45</b>	<b>50</b>	<b>58</b>	10	12	22	13	<b>57</b>	33
Weighted Sum	<b>96</b>	<b>112</b>	<b>104</b>	17	23	44	20	<b>118</b>	66

For importance of services needed regarding employment information, among the services users reported needing regarding employment information, the users put greater importance on Training in Employment Information Search Skills (4.06) and Resume and Self-introduction Letter Preparation (4.32), as well as Employment Counseling (4.34) and Job Interview Training (4.44). They also consider Employment-related Events and Job Fairs Information (4.03). The more information services are needed, the more respondents think the information services are important. The average of the overall importance of information services for employment information is 3.89, which is relatively higher than the satisfaction level (3.23), indicating that even though respondents think information services regarding job search is important, current level of services are not enough to meet users' needs.

**Table 9.** Importance of Services Needed Regarding Employment Information

Training on Job Information Search	Resume and CV Writing	Job Interview Training	Providing Books and Databases	IT Lectures	Successful Job Search Cases	Employment Preparation Place	Job Counseling	Information on Job Events and Fairs	Average
<b>4.06</b>	<b>4.32</b>	<b>4.44</b>	3.41	3.36	3.66	3.41	<b>4.34</b>	<b>4.03</b>	<b>3.89</b>

The users' opinions on the needed improvement of employment information were divided into those related to services, information sources, and system operation. In terms of services, the majority of the respondents said that they need customized employment information services suited to their majors or certification types and feedback on their resumes. In terms of information sources, it was indicated that more specific and systematic information on companies, job opportunities, and preparation for employment is needed as these types of information are currently provided in a fragmented way. Moreover, most of the respondents said that it is necessary to provide inclusive information for various majors such as humanities or engineering, as well as reliable information that is free of advertisements. Regarding system operation, most of the users mentioned the necessity of an integrated employment information service that provides an aggregate variety of employment information.

**Table 10.** Opinions on the Needed Improvement of Employment Information

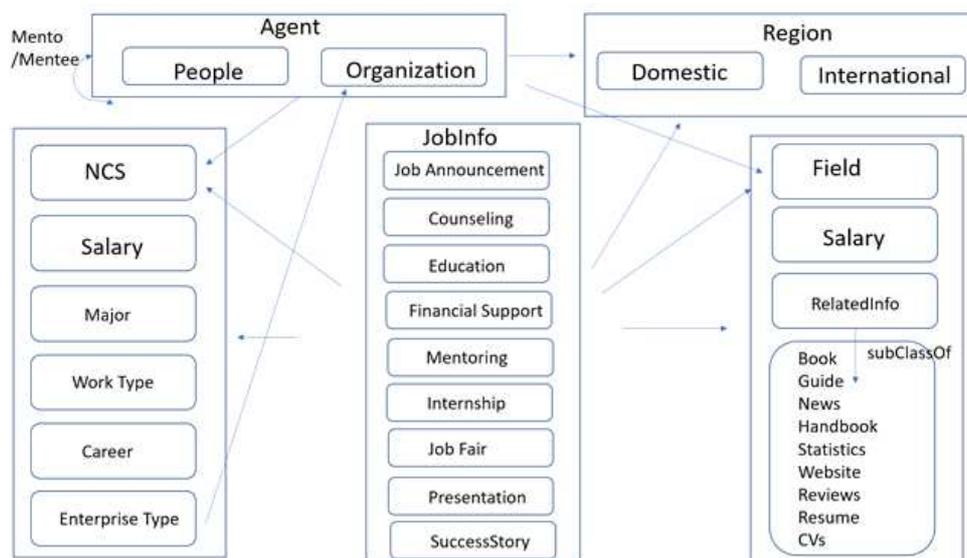
Category	Sub-Category	Frequency	Category	Sub-Category	Frequency
<b>Information Service</b>	Customized Information Service	8	<b>Information Source</b>	Specificity of Information	5
	Consultation and Feedback	7		Comprehensiveness of Information	4
	Promotion	5		Reliability of Information	4
	Mentoring	4		Organization of Information	3
	Online Education	3	<b>System</b>	Up-to-date Information	1
	Employment Review	3		Integrated Service	7
	Certification Information	3		Unnecessary membership Registration or Upgrade	4
	Mailing/Text Service	2		Mobile Application	3
	Information on Employment related Sites	1			
	Employment Information Guide by Major	1			

The implications of the results of the user need surveys are as follows. Regarding employment, there were high demands for specific employment information such as the latest job offer information, annual salaries, and prospects for occupations. To search for these types of information, most of the respondents used the Internet. However, users feel difficulties to find information and are not confident in searching information effectively. Also users pointed out that they needed one source to find scattered information in one place. The gateway should include not only formal information such as news, job postings, and databases as well as information services such as mentoring, counseling, feedback, and job interviews review.

## 6. Construction of Subject Gateway for Employment

### 6.1. Modeling of Knowledge Structure on Employment

A linked metadata for job and career based on the components derived from literature review, case analysis, user need surveys and library status investigation is constructed. For subject gateway, the study presented the modeling for knowledge structure of job information as followed. Classes related to job announcement, counseling, education, financial support, mentoring, internships, fairs, presentations, and success stories were presented as subclasses for job information. Metadata elements applied to classes were extracted and presented so that detailed description for each class could be made. Agent-related classes are largely divided into people and organizations, which they play the role of information users while being producers of job information. Classes associated with the employment class are fields, subjects, and related information classes. The fields refer to employment-related topics such as management/office, civil servants, public institutions, IT, health care and education, which are composed of subclasses and instances according to hierarchy. The target class is a group that is a beneficiary of employment information, consisting of low-income, youth, women with career interruption, middle-aged and high-school graduates. The relevant information class is a class that provides relevant information related to employment, consisting of subclasses such as guides, statistics, reports, white papers, news articles, partner and related agency websites, reviews, etc. Within the agent class, classes that apply only to human classes are task, salary, and major classes, which are for mapping job seekers with job information. Each task is classified based on NCS and additional information is provided. The modeling of employment knowledge information constructed is shown in the following **Fig. 3**.



**Fig. 3.** Information Modeling for Employment

The job announcement class, which provides information on job openings, is associated with various classes. The job announcement class is represented by metadata of company, annual salary, qualification, experience, occupation, major, contents, preferential conditions, work type, working days, welfare benefits, application method, contact information, e-mail, post-employment review, and corporate review. Among these metadata, company, annual salary, qualification, experience, occupation, major, preferential conditions, corporate review, and recruitment review are object properties associated with other classes. Other remaining metadata including work type, working days, benefits, application methods, contents, contact information, e-mail are data properties.

The metadata elements of the job fair class consist of attributes such as name, type, schedule, location, host, sponsorship, participating organizations, target audience, content, inquiries, and related information.

To build a profile for agents, agents consist of two subclasses-people and organization, for people, name, date of birth, e-mail, gender, mobile phone number, address, academic background, graduation year, major, language, technology, external activities, current salary, current job, desired job, desired position, resume, CV, portfolio, preference, interest keywords are presented. Among them, salary, industry, type of jobs, work area, and position are object properties for connecting with other classes, while the rest consist of data properties. Profiles for people are used to provide customized services, consulting, and mentor-mentee services that can recommend turnover and employment information through their profile analysis. Metadata for organization class include corporate name, business type, sales, homepage, address, CEO name, number of employees, establishment date, company introduction, financial information, annual salary information, corporate news, welfare, related recruitment. Among them, business type, sales, and related job information are composed of object properties. The remaining elements are data properties. Other classes and properties are shown in **Table 11**.

**Table 11.** Ontology Description for Employment Information

Class	Sub Classes	Description
JobInfo	Job Announcement, Counseling, Education, Financial support, Mentoring, Internships, Fairs, Success Stories, etc.	Each class is connected with related metadata (Divided into common properties and restricted classes that apply to a specific class)  Object Properties: Company, Annual Salary, Certificate, Career, Position, Job, Major, preferential Condition Class  Datatype Properties: Application Method, Work Type, Working Days, Welfare Benefits, Inquiries, E-mail, Contents, etc.
Agent	People and Organization	Type of producer or user of employment information
	People	Metadata for building the profile of job seekers (Person's name, Date of Birth, E-mail, Gender, Mobile Phone, Address, Education, Career, Certificate, Skill, Language, Graduation Year, Current Work Area, Current Salary, Current Job Type, Current Industry, Current Position, Qualification, Major, Special Issues, Area of Interest, Desired Salary, Desired Work Area, Desired Job Type, Desired Type of Business, Desired Position, Preferred Information, External Activities, Portfolio, Resume, Self-Introduction)
	Organization	Metadata for building the profile of organization

		Company Name, Company Type, Business Type, Sales, Homepage, Address, Phone Number, Representative Name, Number of Employees, Establishment Date, Company Introduction, Financial Information, Annual Salary Information, Company News, Welfare Benefits, Related Employment.
Role		Agent's role by linking it with the agent class Instance: Job Seekers, Recruitment Announcement Providers, Education Institutions, etc.
Region	Domestic/International	Job Posting Locations or Agent Locations Domestic (Instances by region) International (Instance by country)
Field	Business, IT, Education, Government, etc.	Field for Job or Agent Areas
Related Information	Book, Handbook, Website, Statistics, Review, Articles, etc.	Metadata for Related Information (Title, Date, URL, Description, Keyword, etc.)
NCS	NCS Category Mapping	Related to Job Competency and Field of Agents mapped by NCS
Salary		Instance added according to the range of annual salary Linked with person, Job Announcement, and Organization Class (Current Salary, Desired Salary for Person Class, Salary for Job Posting, Salary for Organization)
Major		Link to Person and Job Announcement
Work Type		Link to Job Announcement and Person Class Instances (Contract, Part-time, Full-time, Intern, etc.)
Experience		Link to Job Post and person Class Instance (Less than 3 years, 3-5 years, No Experience, etc.)
Organization Type		Link to Job Post and Person Class Instance (Small Business, Mid-size Business, Single Person Company, Foreign Companies, etc. )
Target		Link to Job Information Class (Income, Young adult, Midwife, etc.)
Education		Link to Job Information Instance (Regardless, Undergraduate, Master, PhD)

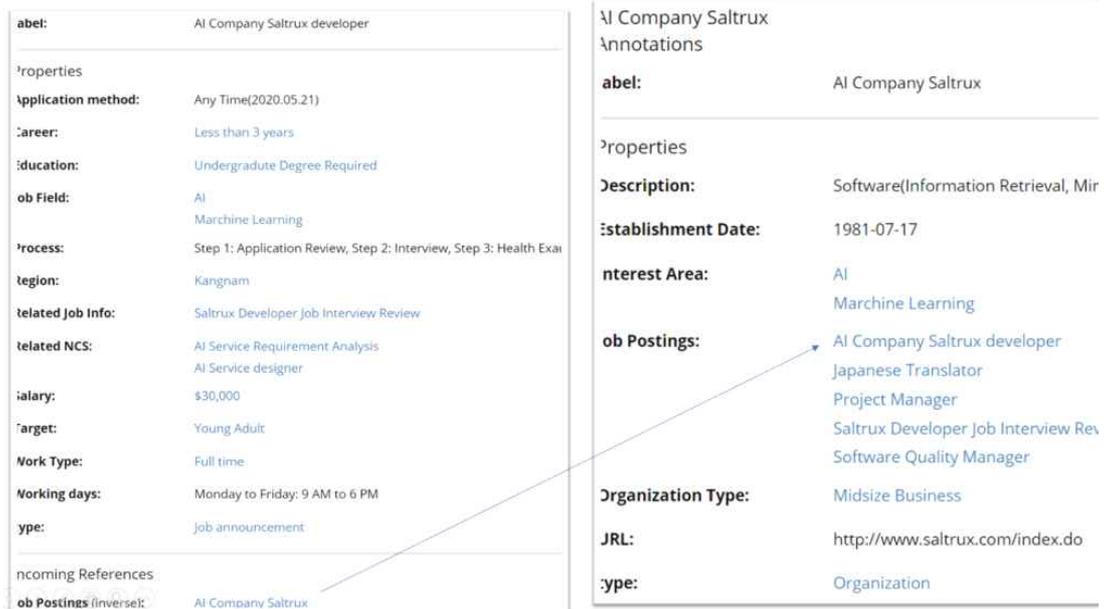
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## 6.2. Subject Gateway for Employment

The gateway for employment and job search is implemented to ensure that a browsing and search system is performed on a hierarchy of knowledge structure modeling. If users click on a particular recruitment announcement (Saltlux developer, an artificial intelligence company) as follows in **Fig. 4**, they can view detailed recruitment information, as well as work type, career details, NCS job, region, target of application, employment field, academic background, job posting agency, etc. If users click the name of company, they can also see the detailed class and instance information (Saltlux) as shown on the right side of the screen. This would provide cross-references from job

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openings to enterprise information, and other employment announcements issued by the same entity. Each metadata record was implemented as rdf/xml as shown in the **Fig. 4.** below.



**Fig. 4.** Job Posting and Organization Example

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jobsearch:SaltruxDeveloper
rdf:type jobsearch:JobAnnouncement ;
jobsearch:ApplicationMethod "Any Time(2020.05.21)" ;
jobsearch:Process "Step 1: Application Review, Step 2: Interview, Step 3: Health Examination, Step 4: Final Review and Salary Negotiation " ;
jobsearch:WorkingDays "Monday to Friday: 9 AM to 6 PM" ;
jobsearch:hasCareer jobsearch:Lessthan3 ;
jobsearch:hasEducation jobsearch:UndergraduateDegree ;
jobsearch:hasJobField jobsearch:AI ;
jobsearch:hasJobField jobsearch:MachineLearning ;
jobsearch:hasNCS jobsearch:AIAnalysis ;
jobsearch:hasNCS jobsearch:AIServiceDesigner ;
jobsearch:hasRegion jobsearch:Kangnam ;
jobsearch:hasSalary jobsearch:thirtythousands ;
    
```

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## 7. Conclusion

The study purported to develop subject gateway for career and employment. Literature review, case studies, user needs analysis were studies. Based on this study, a subject gateway was presented based on a linked data model. The case studies and literature reviews found that employment is supported on diverse levels such as government, university, and libraries. Diverse agents provide lots of different services, funding, and projects for tiered targets. As the role of public and university libraries has become more important in lifelong education, greater emphasis has been put on libraries' services to support employment and career development. However, there are few cases and research of library-centric support in Republic of Korea. Therefore, the implication was drawn that it is required to construct a subject gateway that can provide scattered information in one place. The user survey presented following findings. There were high demands for specific employment information such as the latest job offer information, annual salaries, and prospects for occupations. However, it was found that the users have difficulty in selecting useful information. Finally, the study also presented a knowledge structure and subject gateway for employment. Job Information class was drawn as a main class. Job announcement, counseling, education, financial support, mentoring, internships, fairs, presentations, and success stories were presented as subclasses for job information. Metadata elements applied to each class were extracted and presented so that detailed description for each class could be made. Agent-related classes were largely divided into people and organizations, which they play the important role of users while being producers of job information. Other classes associated with the employment class were fields, subjects, and related information classes, target, NCS, and regions along with relevant metadata. It is expected to provide a basis to develop comprehensive information service model for employment and to be utilized as a guide to provide employment information services in libraries.

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