The Development of Subject Gateway and Library Operating Model for the Diffusion of Entrepreneurship*

Ok Nam Park (박옥남)**

Contents

ABSTRACT

While the body of cases on startup has grown substantially, there has been a lack of a one-stop gateway of entrepreneurship. The study attempts to build a subject gateway for startup information services based on case studies, users' needs analysis, and literature reviews. The results show that users have difficulty in selecting useful information since the excess of information and the search for the desired information as it is scattered across a wide range of sources. The study designed a subject gateway by a navigation system that enables flexible browsing within the entire gateway through the ontology modeling. The study also presented an example of startup records to display how startup information can be explored. This study is expected to contribute to the understanding of the current status related to business startup services. The business startup digital gateways based on empirical data analysis will contribute to extending library service for startup.

Keywords: Entrepreneurship, Subject Gateway, Ontology, Metadata, Information Service

1. Introduction

With the high rise of unemployment in Republic of Korea, the government has established and implemented various policies to ensure job creation and employment security with the motto of "Creative Economy" Since 2013. However, the employment crisis and high unemployment rates still remain big challenges. To overcome the employment crisis, the government and universities have turned their eyes to business startup beyond creating some slack in the current tight employment market, and the entrepreneurial activities of young people are being actively supported. They use the concept of entrepreneurship as a way to inspire in them an entrepreneurial mindset.

Entrepreneurship is a process, way of thinking and acting, to seek for and seize a chance without being constrained by the limits of currently owned resources or capabilities. Although entrepreneurship has not been previously defined in a uniform way, according to the definitions provided by several sources, the major common factors to entrepreneurship include innovation, opportunity, risk-taking, activities, and proactiveness (Seo et al. 2012). In Republic of Korea, entrepreneurship education has been incorporated into the regular curricula of universities while an entrepreneurship culture has spread in Korean society thanks to non-profit organizations' efforts to promote it. Also, support has been provided to those wishing to start their own businesses to help them secure the needed resources as well as acquire useful information. Social issues related to entrepreneurship do not only pose challenges to young people. As Korean society becomes an aging society, each individual citizen is facing the need to prolong their economically active years, which are related to the issues such as unretirement, the re-employment of women on career breaks, and the employment of the elderly.

As reflecting this trend, various programs related to entrepreneurship have been supported through various government and organizations. However, there are many overlapping policies and programs between ministries. It is insufficient to meet the needs of various target users. Other problems include overlapping of the management scope of prospective entrepreneurs, lack of public relation activities for the services, and the absence of discussion on the criteria for the qualification require-ments for support personnel and their start-up capacities. Therefore, in order for business startup programs to be practically useful, they should be reorganized in a comprehensive and systematic way (Choi and Park 2013; Hwang and Lee 2012).

Libraries have a mission to respond to all the demands for information from users and faithfully perform their functions as institutions that share collected information with the public. Nevertheless, in Korean libraries, services related to business startup operate in a very passive way, primarily

centered on providing collection of books. However, business startup has been supported by libraries in foreign countries since long ago. The National Library of New Zealand and the British Library operate a business center to provide information on business startup. About 48% provide services to support entrepreneurship and small business startup (University of Maryland 2014). In recent years, services related to entrepreneurship and business startup have been actively provided with the use of the position names such as "Entrepreneurship Librarian" and "Librapreneur," which have been further advanced from "Business Librarian". Also, various researches have suggested the necessity to identify user needs, collect various information resources, develop subject guides and programs, and construct a cooperative network for startup support services (Feldmann, Kaylor, Aagaard and Arguello 2015; Feldmann, Kaylor and Feldman 2015; Feldmann, Kaylor, Franks and Johns 2015; Macdonald 2015). In Republic of Korea, librarians are increasingly required to provide startup support services owing to the demand for the relevant information from individuals and companies; however, no comprehensive research and service model has been developed yet in response to the demand. While a small number of studies addressed the need for information services to support business startup (Lee 2013), it was not easy to find the examples of such services actually offered in library settings. The purpose of this study is thus to develop subject gateways for business startup support services suitable for the Korean environment. For this purpose, this study has carried out a relevant literature review, case studies, user demand analysis, and business startup subject gateway development. This study is original and contributive in that it can serve the advancement of the research of library-based startup information services that have remained inadequate compared to the growing recognition of the necessity of such services and that it has developed a comprehensive service model.

2. Entrepreneurship, Creative Economy and Business Startup

The concept of entrepreneurship was defined and popularized by Peter Drucker and Joseph Schumpeter. Drucker defined entrepreneurs as those who lead innovation, bring transformation and create new values, and argued that entrepreneurs are required to overcome all risks that they face during the process. Similarly, Schumpeter regarded entrepreneurs as promoters of innovation and recognized that the economy grows when committed entrepreneurs continue to vigorously engage in business activities, creating innovations for the market, products, organizations and

technologies. He insisted that the concept of creative destruction connotes entrepreneurship. Creative destruction is a combination of two conflicting concepts: creation and destruction. The repetition of creation and destruction leads to the creation of new markets, industries and jobs, and this provides opportunities to many. The repetition of creation and destruction from Sony's Walkman to the CD player, the MP3P, the iPod, and to the iPhone is a good example of creative destruction. Schumpeter, asserting that technological innovation takes place in the process of creative destruction and that it can improve the competences of workers and creates new jobs, identified the characteristics of businesspersons related to creative destruction as entrepreneurship (Lee 2014).

The study of entrepreneurship has focused on the personal characteristics of entrepreneurs so far with approaches based on behavioral science and psychology to identify the human features of successful entrepreneurs and the differences between those engaging in entrepreneurial activities and those not involved in them. Regarding the two key attributes of entrepreneurship, Lee (2014) suggested as follows: First, entrepreneurs are those who seek new opportunities, fixing their interest in seizing such opportunities and making the most of them without being bound by the existing resources or rules. Second, the essence of entrepreneurship lies in the endeavor to overcome the constraints of available resources in the process of seeking for opportunities with creative and innovative approaches.

The term "creative economy" was first used in 2000 by Peter Coy who talked about the advent of the creative economy in which only companies that can create intangible values by using individuals' creativity and ideas as production factors survive (Lee, Chang and Lee 2014). In Korea, the Park Geun-hye administration emphasized the creative economy as an agenda to create economic added value in 2013. With the perception of creativity as a key value of the creative economy, the government sought to create new growth engines and jobs by converging scientific technologies and information and communication technologies; different industries; and industries and culture and by producing new added values. Many policies are currently being implemented to successfully achieve the creative economy, with a focus on the creation of added values through the convergence of imagination, creativity, science and technology, and knowledge, and the promotion of convergence and creative industries. The key driving force of the creative economy is entrepreneurship; in other words, large and small and medium corporations, one-person companies, social enterprises, venture companies, businesses owned by women and the disabled, as economic subjects important in the achievement of the creative economy, all work together and contribute to fostering innovative and creative industries. These concepts need to be paid attention to for the innovative evolution of business startup, especially in the current situation where the chronic high unemployment

rate among the economically active population has become a serious social problem.

Starting a business can be a turning point to break through the current crisis. Business startup is a representative domain where entrepreneurship is put into action. It is an entrepreneurial process in which entrepreneurs seize opportunities, come up with new business ideas, secure necessary resources and manage organizations to actually run their businesses. As business startup is a major area where entrepreneurship is put into practice, entrepreneurship is a main topic of business startup education and training. Entrepreneurship is also extensively interpreted as businessperson spirit and conceptualized as a process of creating something new on the assumption of both rewards and risks (Lee, Chang and Lee 2014). In countries with advanced business startup education, such as the United States, such education has long been carried out in a systematic way in almost all universities.

As Korea has entered the stage of an aging society, more attention is being given to business startup by young people as a way to create economic additional values and solve the problem of unemployment. Government ministries also support young people's entrepreneurial activities based on original ideas in cooperation with universities. For example, the Ministry of Education has selected leading universities in business startup and concentrated its entrepreneurship support budget on entrepreneurial education, the discovery of promising budding entrepreneurs, mentoring programs and commercialization of ideas at these universities. Yonsei University, which has been designated as a leading university in business startup, has operated entrepreneurial courses aimed at cultivating talent with knowledge necessary to companies' R & D personnel and practical job skills. Also, Sookmyung Women's University established the major of Entrepreneurship in the School of Global Service in 2010 and has supported students who start their own businesses and fostered global management leaders who can work for the opening of new businesses in international companies. With advancement into the information society, groundbreaking progress in information and communication technology, the spread of entrepreneurship, and the emergence of cyber space, it has become much easier for individuals to engage in entrepreneurial activities than before, and successful examples of business startup have increased. Therefore, it is necessary to establish entrepreneurship-based business startup policies and education plans and library service policies to support them from a long-term, macroscopic perspective.

3. Literature Review

3.1 Studies in Republic of Korea

Choi and Park (2013) carried out a study on the key success factors to business startup education at US universities. According to the study results, in the US, business startup programs are operated by various entities including the federal government, schools, universities, and private funds. The characteristics of these programs were identified as follows: the establishment of the mission and vision of and strategies for business startup education; entrepreneurship offered as a major or a minor at universities; a phased approach to business startup education; field-based business startup education methods; business startup education through interdisciplinary cooperation; development and provision of various business startup-related contents; provision of infrastructures for research on entrepreneurship and business startup; offering of measures for fostering instructors and enhancing their capacities; establishment and operation of business startup education and training centers; supplementation of business startup education by employing industrial experts as instructors; creation of an ecosystem for business startup education and research. This study, on the other hand, diagnoses that Korean business startup education is still at an elementary level in terms of university culture, faculty and curriculum, as it is carried out only within the framework of business administration, providing a mere introduction to business startup.

Lee and Hwang (2015) presented a chronological consideration of Korean business startup education in their study. According to it, since the establishment of the Entrepreneurship & Small Business Department at Soongsil University in 1995, significant progress has been made in Korean business startup education in that there are 3,924 entrepreneurial courses at 160 universities as of 2013. However, the study pointed out that business startup education is mainly offered at business colleges in Korea and that there is an absolute lack of instructors with expertise in business startup support. Therefore, the study suggested that it is necessary to link the education to different departments and colleges to solve these problems.

Hwang and Lee (2012), in their analytic study on business startup education at graduate schools, pointed that the government's support for young entrepreneurship is more focused on short-term support policies such as financial support to induce the immediate establishment of businesses than long-term policies to promote entrepreneurship among young people. In addition, the study noted that most of the government's business startup support projects are completed in one semester, which leads to various problems such as disconnection with the curriculum, lack of specialized

and professional lectures, and insufficient support for business startup in the areas other than technology. The researchers also pointed out the lack of organic linkage in the entrepreneurial ecosystem. They suggested that business startup education programs should provide content about common basic areas such as motivation for business startup, creativity, organizational development and change management, communication, project implementation process, and administrative proce-dures, along with content about particular areas such as vocational capacity, entrepreneurial capacity and social participation capacity enhancement.

Research on business startup services based on libraries in Korea has rarely been conducted. Lee (2013) proposed measures for public libraries to support users' business activities. It first generally reviewed the cases of such information services in US public libraries and then analyzed the related organizations and services of these libraries, conducting interviews with the directors and librarians. The researcher also interviewed the directors and librarians of Korean public libraries to find ways to promote library business information services that are suitable for domestic conditions. Through this process, this study concluded that libraries can provide more efficient information services through the understanding of the information needed by the local community, consultation and cooperation with the Ministry of Employment and Labor, the Small and Medium Business Administration and other organizations, and the use of local networks.

Lee and Kim (2015) presented examples of corporate social contributions through their report on the support for business startup of the Asan Nanum Foundation, a nonprofit organization. The foundation provides support for the activities at each stage of the establishment of a business—be-fore, during, after the foundation of a business. The pre-startup support is mostly given to educational programs for elementary school and university students that aim at raising the awareness of business startup and the development of a spirit of challenge. The startup process support is provided in connection with the Chung Ju-yung Startup Contest that helps participants actualize their business startup plans. About 83% of the participants maintain their businesses after the completion of the contest. The post-startup support includes helping secure funding, creating an entrepreneurial ecosystem for the sustainable growth of companies, providing the Chung Ju Yung Angel Investment Fund, and operating startup support centers.

3.2 Studies in Other Countries

Lyons and Kirkwood (2009) analyzed the websites of 63 management libraries in university libraries. About 44% of the management libraries were providing subject guides on employment,

career and business startup, and 26% of the university libraries were offering subjects guides on social responsibility. Their research emphasized that subject guides on employment and career become important in management libraries.

Feldmann, Kaylor, Aagaard and Arguello (2015), in their study on the role of libraries as business startup partners, noted that they should identify users' demands and resources needed by them and understand the license issues arising when libraries' electronic sources are used for the purposes related to business startup and profit-seeking activities, in order to provide business startup support services. According to this study, information needed for business startup includes information on benchmarking models, competing companies and their products, consumer demographic statistics, market research and statistics data, and business plans. Therefore, libraries should provide newspapers, magazines, e-books, business plan samples, and market reports.

Feldmann, Kaylor and Feldmann (2015) conducted a survey on the collaboration between the Small Business Development Centers and university and public libraries in the western part of the United States so as to understand the libraries' business startup support services. In this survey, about 52% of public libraries and 36% of university libraries were found to be cooperating with the Small Business Development Centers. Services mainly provided by the libraries included library information resources, business plan preparation support, reference information services, and the provision of presentation and meeting places. However, limited access to online sources and the lack of the latest data, expertise among librarians and the continuity of available programs were identified as problems to be resolved for the improvement of the services.

Feldmann, Kaylor, Franks and Johns (2015) conducted a survey on public library librarians in Florida to analyze the types of information that entrepreneurs or business owners needed and the services provided by the libraries, and suggested ways to improve their services. The types of information most required by users were about financial support, training, their competitors, business plan establishment and market research. The services that users needed included consulting, e-learning, tutorials, workshops, support for business plan formulation, financial support research, and business research support. Meanwhile, for the improvement of the services, the study suggested PR activities and marketing, cooperation with business service organizations, and the construction and amelioration of websites.

Macdonald (2015) carried out a survey on and interviews with 88 public librarians to investigate the role of business centers in public libraries. As a result, 57% of the librarians answered that their libraries needed a business center dedicated to employment and business startup services. Most of the libraries where they worked were providing information, as well as workshops, seminars,

classes and counseling in relation to employment and entrepreneurial activities. About 80% of the libraries were cooperating with relevant local agencies and invested 6 to 20 hours per month in collaborative work with these organizations. The business centers were providing various DBs, website links, market reports, competitor analyses, etc. On the other hand, this study pointed out that the centers should expand the personnel dedicated to the services, financial support, cooperation and available information.

3.3 Implications

The major findings of literature reviews can be summarized as follows. First, in recent years, the role of university and public libraries has expanded to support for business startup and promoting entrepreneurship. Therefore, librarians are required to play the expanded role of connecting various fieldswith business startup. Second, for libraries to provide startup services, it is important to understand the needs of users, offer information resources, develop subject guides, secure personnel dedicated to the services, establish an exclusive center and cooperate with various programs and local relevant organizations. Also, libraries need to provide the latest information and electronic sources including newspapers, e-books and magazines, as well as design e-learning programs. In addition, users need various types of information such as information on competing goods, market research and statistics data, business plans, and market reports. Despite the overseas trends in library services, in South Korea, less emphasis has been put on library-centric business startup support services. As a partner for entrepreneurship, it is necessary to conduct studies with a focus on the identification of users' demands, the investigation of information resources and programs, the development of subject guides and the establishment of measures for cooperation and promotional activities in order to develop an startup support service for libraries.

4. Research Methods

The purpose of this study is to present the subject gateway for start-up services suitable for South Korea. To this end, studies were conducted in the order of literature review, case studies, user needs analysis, startup subject gateway development, and suggested information services. To develop a business startup subject gateway, first, this study intended to identify available startup information resources, organizations, related programs and services that have been provided

across different levels of institutions. Second, cases and literature were analyzed to benchmark for the development of subject gateways. Third, the analysis of users' demands for information was carried out based on users survey and in-depth interviews. A user surveywas conducted on 108 people. The questionnaire consisted of the following topics: difficulties in searching information, currently used information sources, needed information, usability of the information sources, desired information sources, improvements needed regarding information sources, information service utilization status, usability of the information services, and desired services. Next, in-depth interviews with five experts were conducted to drive important services and sources for gateway development. Lastly, this study developed online based startup gateways with suggested services. The details and scope of the research methods are as follows.
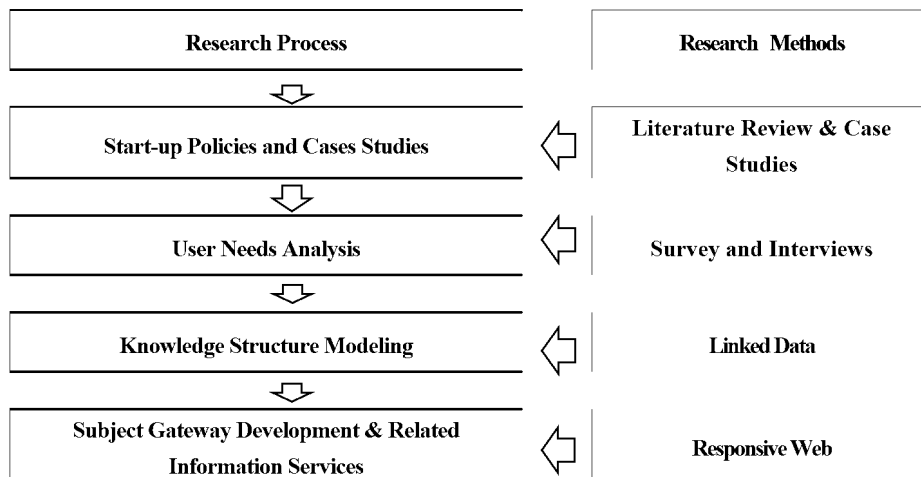
〈Figure 1〉 Research methods

5. Cases of Startup Support

5.1 Startup Support outside Library Sectors

5.1.1 Cases of Government & Non-Profit Support

The Small and Medium Business Administration is an independent organization of the Ministry of Trade, Industry and Energy and implements startup and venture support policies as part of SME support policies. With the aim of supporting startups and venture companies with great

potential for growth, as of 2016, it supports 34 programs and projects, including the global youth business startup project, business startup academy, the Business Incubation Center programs, and entrepreneurial graduate school operation support. Bizinfo is a representative SME support brand of the Small and Medium Business Administration. It collects and provides information on SME support projects that is intricate and hard to find through a single channel and offers various contents for SME owners and employees such as information on training, seminars and exhibitions helpful to SMEs, business operation guidelines, and employment information provided by the Industrial Bank of Korea.

The Korean Institute of Startup and Entrepreneurship Development, an affiliate of the Small and Medium Business Administration, strives to expand the base of entrepreneurial activities and an environment favorable to entrepreneurs and to provide customized support to them, by applying strategies fit for each stage of business startup including preparation, plan actualization, growth, re-start, etc. With the aim of nurturing competent entrepreneurs and creating new jobs, the institute has set up the following strategic goals: entrepreneurship education, entrepreneurial infrastructure establishment and expansion, creation of an entrepreneurial atmosphere, customized business startup support suited to recipients, fostering knowledge service companies, and linkage support system establishment based on mentoring. In addition, K-Startup, a business startup portal operated by the institute, offers a variety of contents such as business startup news, online entrepreneurial lectures, business startup guides, the Startup Product Promotion Center, entrepreneurial competency self-evaluation kit, successful business startup cases, the Idea Audition, comprehensive startup information management system, prototype manufacturing company search, the Venture Location 114, and the One-Person Creative Enterprise Business Center.

Operating the Youth Entrepreneurship Schools, the Korea SMEs and Startups Agency provides young entrepreneurs with one-stop support for all stages of business startup from technology development, prototype production, test production, and market pioneering to promote entrepreneurial activities among the youth and nurture young CEOs. In addition, it offers financial support to improve the capacity of SMEs and their global competitiveness that will form Korea's industrial base and play a leading role in national development using its startup support funds. SME Promotion Corporation.

The Seoul Business Agency, which is funded by the Seoul Metropolitan Government, seeks to intensively foster excellent startups, reinforce its publicness by supporting less favored areas in terms of business startup, create an entrepreneurial ecosystem through business startup networks and the strengthening of the networks, in order to nurture global startups and create new jobs.

The agency has accelerated the growth of newly established companies into promising small hidden champions through entrepreneurial capacity reinforcement (basic business startup training and entrepreneurial education in campuses), business startup space and incubation service provision (incubation of newly established startups), growth acceleration for promising companies, corporate competitiveness strengthening, and certification as small hidden champions. Operating the Startup Schools, the agency helps budding entrepreneurs open their businesses in a short period of time through practical training, intensive mentoring, and networking. The Successful Business Startup Academy run by the agency provides theoretical and practical education and training for prospective entrepreneurs.

As non-profit organization support, the Asan Nanum Foundation has pushed forward with projects that support the practice of entrepreneurship in various ways and in all areas of society to preserve, promote and pass on Asan Chung Ju-yung's spirit of challenge and creative thinking and encourage the spread of entrepreneurship. The foundation has expanded opportunities for education and communication by carrying out entrepreneurship education for both adolescents and adults, academy projects to foster social innovators, partnership projects to support nonprofit organizations, and youth business startup support projects to discover promising budding en-trepreneurs and provide them with infrastructures. Also, through programs such as the Chung Ju-yung Startup Contest, Maru 180, and Chung Ju Yung Angel Investment Funds, the foundation has supported entrepreneurs.

5.1.2 Cases of University Support

The major support systems from Universities are based on the Business Incubation Centers. The Business Incubation Centers are business startup support organizations installed in nearly every university across the country as part of the Business Incubation Center Support project of the Small and Medium Business Administration. The centers mainly provide business management support, marketing support, education and consulting support, and facility and equipment support. The names of the centers established in some universities and their major support services are followings. For the Business Incubation Center at Sung kyun kwan university, the center provides technical consulting support, management/accounting consulting support, interllectual property, exhibition support, design & prototype production support, and education & training. For Yonsei University, the center provides management and marketing support, technology related education, government policies introductions, facility and equipment support, and education & consulting support.

5.2 Startup Support in Library Sectors

5.2.1 Startup Support in Republic of Korea

In Republic of Korea, it is rare that libraries have special space or librarian to support start-up. The exemplar by libraries are following. Yonsei University Library provides A start-up space, "Y-Valley". It was implemented on the first floor of the library for creative future-oriented education and cultural spread of entrepreneurship. In addition, in connection with the startup support group, various education and startup preparation programs are operated along with curated collections. Kyeong Nam public library opened Start-up information center on the 2nd floor in 2018. It operates a consultation counter in cooperation with Changwon university's business center. Main consulting programs nclude start-up consulting, start-up information sources, and business plan writing.

5.2.2 Startup Support in Other Countries

Overseas, startup support services have been systemized and centered on university and public libraries,. This study primarily selected and analyzed the foreign cases of library support services that can provide a benchmark model. As a national library, the British Library as a national library of United Kingdom operates a separate business and intellectual property center (Business & IP Center) where dedicated librarians provide specialized information within the library building. The library's major services related to employment and business startup include the provision of information on business foundation and idea protection (trademark law, copyright, trademark search, patent application, design application, intellectual property rights, etc.) and the operation of various educational programs on the use of social media for business activities, business expansion using Google Analytics, and other subjects. The library also runs the Innovation for Growth program, which provides participants with an opportunity to receive counseling sessions valued at about £10,000 from business experts. Consulting is provided by librarians with expertise in each subject and through the cooperation with a consulting firm that connects library users with specialists.

As a special library, the London City Business Library as a special library has business book stacks divided by sub-topics such as market research, investment, and marketing, with newly published books and periodicals that are regularly added to the collections. The library room is equipped with space for educational activities, search kiosks, and reference service desks as shown in the figure, to maximize users' utilization of information. The major services offered

by the library include online lectures, information provision, free business startup consulting, seminars, space rentals, and database provision. In particular, through subject gateways, the library also provides information on electronic resources, business startup, early-stage entrepreneurial activities, company information, market research, overseas businesses, statistics, social enterprises, and job market information. The library's e-Learning Center operates online courses on digital marketing, project management, etc. and Microsoft Excel tutorials. Business startup consulting is provided through online chatting in real time and is free of charge. As for seminars and lecture programs, there are a total of 22 programs available as of January to April 2018, which include business startup consulting, small business marketing, and the use of social media, investment attraction, resume preparation, networking, blog management, and branding.

As a public library, the Kansas City Public Library as a public library provides business startup support services by operating a business and career center in the library building, assigning dedicated business support librarians to the services, and adding categories that are related to business startup on its website. The library provides information on websites for financial support for business startup with little capital, real estate transactions, and business plan formation is offered as part of the business startup support services. The library also provides training in IT, business plan preparation, and the utilization of social media to support users' start-up search and entrepreneurial activities.

University libraries support services through its dedicated librarians and subject guides or business consulting services and workshops. In Stanford libraries, most of the individual libraries that belong to the Stanford Libraries network are management-specialized libraries and offer a variety of programs to support students' business startup activities. The library provides various newspaper and magazine titles on business startup. The libraries also invite successful entrepreneurs to provide special lectures, and operate educational services to support students' search for employment and information sources. Purdue University library has built the Career Wiki in collaboration with other major startup-related departments of the university. The library provides students with major guides and a variety of information on diverse startup-related subjects, such as business plan, and marketing analysis.

5.3 Implications

The following implications from case studies have been drawn. First, the creation of subject guides is a prerequisite for providing business startup services. Most of the libraries in cases

studies have created a separate subject guide on its website and through it, have provided relevant information resources and program information. Second, a comprehensive collection of information resources for startup needs to be developed so that it includes books, databases, up-to-date newspapers, magazines, statistical data, and website lists of related organizations. Third, business startup support can be provided in various ways such as information resource provision, online and offline education programs, workshops, and one-on-one consulting. In addition, libraries are also required to operate programs that cover various topics such as financial consulting, and market research.

6. Users' Needs Analysis

User surveys and in-deptht interviews were conducted for user needs analysis. A user survey was conducted on 108 people. The survey was done for those who participated in the start-up fairs and those who took training courses in startup institutions. The survey was collected between November 2018 and February 2019. The in-depth interview was conducted based on user survey. Interviews were conducted with five information service experts and university startup managers on June 2019 to drive essential components for the digital gateway.

6.1 A Survey on Users' Needs

6.1.1 Demography of Respondents

Of the 108 respondents, 103 responses were analyzed excluding the surveys with missing required questions or errors in responses. Of all respondents, 27% (28 respondents) have already established their own businesses, 29% (30 respondents) are planning to start their businesses within one year, and the others are within 3 years. The most desired business category was IT (Artificial Intelligence, IoT, Platform), which was selected by 35.92% (37 respondents) of respondents, followed by wholesale and retail business selected by 28.15% of the respondents (29 respondents), and publications and information services such as social media and game publishing (18 respondents, 17.48%). As for the frequency of library utilization, the largest portion of the respondents (34 respondents, 33.01%) answered that they use libraries once or more a month as following <Table 1>.

<Table 1> Demography of Respondents

Question	Category	Frequency (%)	Question	Item	Frequency (%)
Gender	Male	65 (63.1)	Start-up Plan	Already Started	28 (27.19)
	Female	38 (36.9)		Within 3 months	12 (11.65)
Age	20-29	41 (39.81)		3 to 6 months	6 (5.83)
	30-39	29 (28.15)		6 months-1year	11 (11.65)
	40-49	20 (19.42)		More than 1 year	14 (13.59)
	Over 50	13 (12.62)		1 year to 3 Year	15 (14.56)
Education	High School	9 (8.74)		Others	16 (15.53)
	In University/College	21 (20.39)	Desired Startup Field	IT (AI, IoT, Platform)	37 (35.92)
	University/Collage Graduates	55 (53.40)		Wholesale and Retail (Catering, cafes, etc.)	29 (28.15)
	In Graduate School	10 (9.71)		Game, Publishing, Design, and other Information Services (Social Media, YouTube, Applications)	18 (17.48)
	More than Master	8 (7.76)		Health and Social Services	8 (7.77)
Library Usage Frequency	At least Once a Week	21 (20.39)		Arts and Leisure, Interior Related	7 (6.8)
	At least once a Month	34 (33.01)		Agriculture, forestry, fishing	1 (0.97)
	Once every three Month	8 (7.77)		Others	3 (2.91)
	Once in six Months	14 (13.59)			
	About once a Year	20 (19.42)			
	Other	6 (5.82)			

6.1.2 Information Behavior on Start-Up

About 45.63% of the respondents (47 respodents) search for business startup information once or more a day and about 76.69% of the respondents search for the information once or more a week.

<Table 2> Information Search Frequency

	More than 3 /day	1-3 /day	2-3 /week	Once /Week	Once /Month	Other	Sum
Frequency (%)	**25 (24.27)**	**22 (21.36)**	15 (15.53)	15 (15.53)	20 (20.39)	3 (2.92%)	103 (100%)

The most common types of information regarding business startup that are primarily searched are those on the latest business startup trends (69 respondents) and prospects for the business

categories of the users' interests (61 respondents), followed by those on relevant startup events and fairs (50 respondents).

<Table 3> Primarily Searched Information Types

Latest Startup Trends	Prospects for Business	Startup Reviews	Related Education and Training	Startup Preparation Information (Business Plan Writing)	Certificate	Startup Fair and Events	Other
69	**61**	27	37	23	15	**50**	3

Regarding challenges in business startup information search, the most common response was that it is difficultfor the users to separate information that is useful to them from all the information available. The secondary response was that it is difficult for users to search for the desired information due to the enormous volume of business startup information. The top responses when weights were applied and when they were not applied were similar. In sum, most users frequently look up information for startup and even if they know where they can search it, they still have difficulty in determining what information is needed and what is the usefulness of information due to the scattering of information.

<Table 4> Challenges in Startup 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	**20**	18	17	13	**32**
2nd	**21**	18	19	**23**	19
3rd	**27**	18	17	**17**	21
Sum	**129**	108	106	102	**155**
Weighted Sum	**114**	108	113	**127**	**138**

The most frequently used information sources are business startup related organizations (53 respondents), internet portals (62 respondents), and online communities, followed by entrepreneurship fairs and events (52 respondents). The use of libraries, books, journals, and academic databases is relatively low. In addition, individual startup agencies and start-up fairs are used more than online communities.

<Table 5> Information Sources Primarily Used

Library	Startup Agencies	Book	Academic Journal	Magazine	Newspaper	Academic DB	Website	Internet Portal	Online Community	Expositions and Job fairs	Friends and Acquaintances
6	**53**	10	5	12	11	12	32	**62**	32	**52**	16

6.1.3 Information Needs and Users' Satisfaction

User satisfaction with information sources was surveyed on five point Likert scale. The users' satisfaction is reported in descending order as follows. The respondents indicated the highest satisfaction with business startup fairs and other events (3.89), Internet portals (3.71), and individual websites (3.68). The satisfaction levels of libraries, books, journals, and academic databases are relatively low. Satisfaction with start-up information sources averaged 3.33, indicating that satisfaction with start-up information sources is not high.

<Table 6> Information Satisfaction

Library	Employment Agencies	Book	Academic Journal	Magazine	Newspaper	Academic DB	Website	Internet Portal	Online Community	Expositions and Job fairs	Friends and Acquaintances	Average
2.69	**3.58**	3.16	2.9	3.23	3.11	3.14	**3.68**	**3.71**	**3.59**	**3.89**	3.27	3.33

The required service for startup was requested to be selected by applying a ranking. The most commonly mentioned services that are needed to obtain business startup information include market research and analysis, business startup counseling and consulting, and financial support. There was no difference between when weights were applied and when weights were not applied.

<Table 7> Information Services Needed

	Training on information Search	Latest Cases	Market Research	Business Plan	Books and DBs	IT Lectures	Space	Consulting	Marketing	Financial Support	Fair
1st	13	9	**33**	4	0	4	1	**14**	3	**16**	3
2nd	7	3	**15**	12	4	3	7	**18**	9	**15**	7
3rd	7	13	**17**	5	3	4	4	**17**	11	**14**	5
Sum	27	25	**65**	21	7	11	12	**49**	23	**45**	15
Weighted Sum	60	46	**146**	41	11	22	21	**95**	38	**92**	28

The importance of information service was surveyed on a five-point Likert scale. Among the services that users reported, the users put the greatest importance on market research and analysis (4.58), and financial support (4.43), business startup counseling and consulting (4.23). They also considered education on marketing and PR strategies (4.21) relatively more important. The importance for information service needed for startup is averaged 4.03, which is high compared to the satisfaction level of 3.33.

〈Table 8〉 Importance of Services Needed

Training on Startup information Search	Latest Startup Cases	Market Research	Business Plan	Books and DBs	IT Lectures	Space	Consulting	Marketing	Financial Support	Fair	Average
4.13	3.98	**4.58**	4.08	3.57	3.59	3.73	**4.23**	**4.21**	**4.43**	3.90	4.03

Other opinions on the areas to be improved for startup information services can be classified into services, information sources, and system. The respondents reported the necessity of customized information services, professional counseling and consulting, and the provision of information on financial support. In terms of information sources, most of the respondents emphasized that the information provided should be reliable. As there is much false or incorrect data on revenue models, systems, and sales, it was recommended that users need to destinguish reliable data. In addition, many respondents suggested that mixed startup information should be re-classified from the perspective of entrepreneurs, which stresses the importance of systematic organization of information. In terms of systems, most of the respondents emphasized the necessity of an integrated service that enables them to search for scattered information based on a single system as well as support for information search on mobile devices.

〈Table 9〉 Opinions on Improvement of StartUp Information Services

Category	Subcategory	Frequency	Category	Subcategory	Frequency
Information Service	Customized information service	7	Information Source	Specificity of Information	1
	Expert consulting	5		Comprehensiveness of Information	0
	Promotion	1		Reliability of Information	8
	Startup Process and Required documents	1		System of Information	6
	Information sharing and communities between prospective entrepreneurs	3		Uptodate Information	4
	Professional & Practical Startup Training	3	Information System	Information Integration System	20
	Charateristics of startup insitutions	1			
	Government/Local Government Support Status	1		Mobile Service	9
	Accounting & Tax Information	1			
	Exact Revenue structure and model	1			
	Mock Startup	1			
	Success, Failure Case Sharing and Mentoring	4			

6.2 In-depth Interviews on Startup Service

The in-depth Interviews were conducted targeting information service experts and univeristy startup center managers. The topics of the interviews were asked to identify the main elements for contents, the organization of subject cateway (ontology and metadata), information services, and information systems to be included in the subject gateway.

First, for content, the detailed description of the institution and the up-to-dat the information were emphasized. In relation to agencies, respondents suggested that a detailed description of the institutionshould be provided. It was also emphasized that the latest start-up support business notice, latest news, market analysis, and trend reports should be updated in a timely manner.

Second, for the organization of information, education categories such as special lectures, re-education, and online education as well as regional classifications were pointed out. In addition, seamless connections between contents using facets are essential for effective browsing. Target categories should be included because startup proejcts vary depending on the target.

Third, for information services, user-participatory services and customized services were commonly suggested. User participation was vital in that users can create their own communities and spread&share start-up information through it. SNS share, reviews, evaluation, mentor-mentee and consulting by users should be presented. Curation services were emphasized for customized services, which requires the establishment of profiles of people or institutions first.

Last, for system, mobile services were mentioned. Information provided by subject gateway should be enqually available through mobile as well as website.

6.3 Implications

The implications of the results of the user need surveys and in-depth interviews are as follows. First, it was found that users have difficulty in selecting useful information. The reasons cited include the excess of information and the search for the desired information as it is scattered across a wide range of sources. Second, it was found that most of the users of startup support services obtain the needed information from Internet information sources even though there was a need for users' communities. Third, it was indicated that there is a need for more specific services such as market research and analysis and counseling. Lastly, with all these elements considered, many of the respondents suggested that they need a one-stop integrated information service, along with communication channels for mentoring, counseling, feedback, and review sharing, and should seek measures to ensure the reliability of the provided information (indication of the sources of information and users' evaluation of the reliability of information). In addition, there were demands for the organization of business startup information by re-classifying mixed information from users' perspectives. The information should be accessed by mobile as well.

7. Construction of a Subject Gateway for Startup

This study designed a subject gateway for startup based on the elements derived from literature review, case studies, and user surveys. The subject gateway was constructed in the following process. First, through the construction of an ontology, a startup information structure model was developed. Second, information service for startup support was derived from the model. Finally, a subject gateway was constructed based on the information service and information

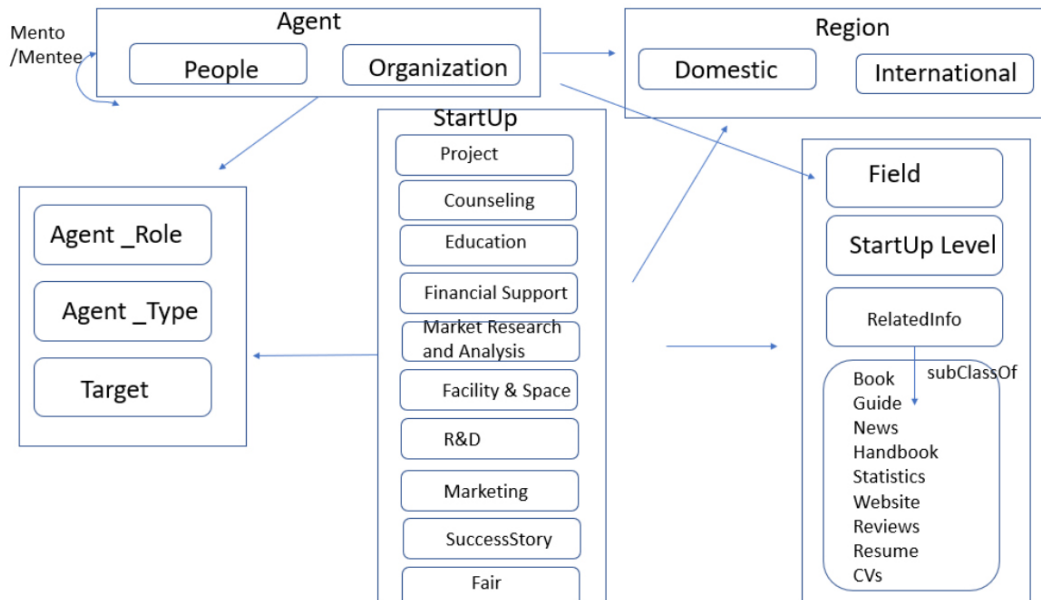structure model.

7.1 An Ontology Modeling for Start-up

The main classes of the startup ontology are following. The Sart-up class is the most important class that provides start-up information, and includes announcements, counseling, education, market research and analysis, facilities/space, R&D, financial support, fairs, presentations, and success stories. Start-up classes are described with class-specific restrictions. Common elements for the Start-up class and sub-classes, and metadata elements that are applied to each class are extracted. For example, in the case of the start-up business class, common elements such as name, type, participating institutions, target, content, Q&A, budget provided, application procedures, application period, and required documents were provided.

Agent-related classes are largely divided into People and Institutions, which play various roles, including producers of start-up information, prospective or current start-ups, organizers of start-up projects, and mentor-mentee. The Role class is to describe various roles for the agent. The Type class is related to agent class to describe a group of beneficiaries or providers such as young people, women with career breaks, middle-aged, high-school graduates, one-person companies, small businesses, government, non-profit organization, and midsize companies.

The Fields class refers to start-up-related topics such as wholesales, IT, services, health, social service, production/manufacturing, construction, distribution/trade, media and education. It consists of subclasses and instances according to the hierarchy. The fields are to indicate the area of of start-up support announcmenet and the areas of interest of agents.

The Information class is a class that provides relevant information related to a start-up, consisting of subclasses such as guides, statistics, reports, white papers, news articles, partner organization and associated agency websites, reviews, etc.

The Phases class consists of preliminary stages of start-up (1-3 years), settlement (more than 3 years), and stabilization (more than 7 years) so that appropriate start-up support information could be found in stages. The modeling of knoweldge structure and description for each classes and attributes are shown in <Figure 2> and <Table 10>.

〈Figure 2〉 Information Modeling of Startup

〈Table 10〉 Ontology Description for StartUp

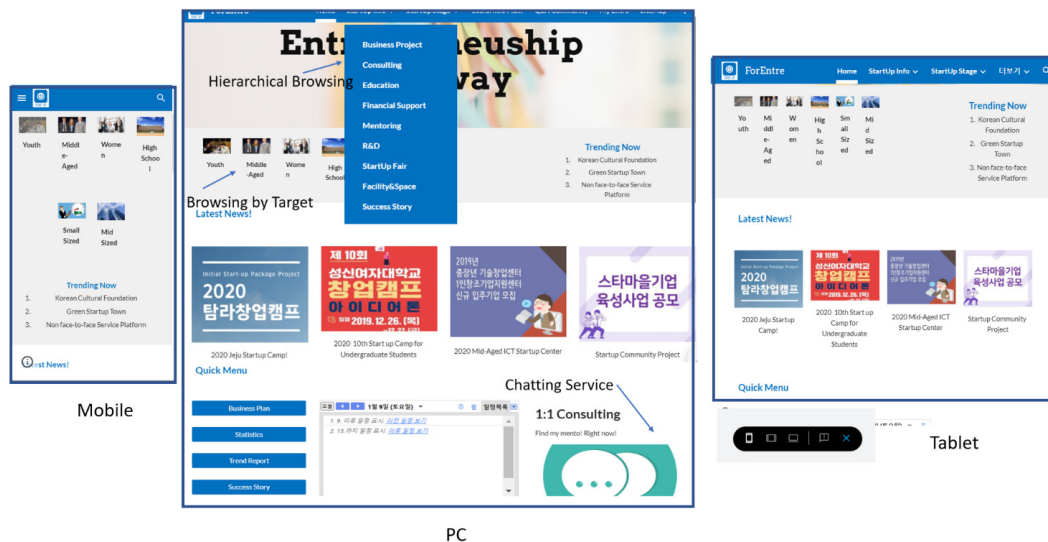| Class	SubClasses	Description
Startup	Project, Counseling, Education, Market Research and Analysis, Facility&Space, R&D, Marketing, Financial Support, Fairs, Success Stories, etc.	Each class is associated with related metadata (Common properties and restrictions applied to a specific class)
		Object Properties: Type, Institution, Target Datatype Properties: name, contents, Q&A, budget, application procedure, application method, application period, documents to be submitted, review (Common Type)
		Startup Fair Class Restriction Properties Object Properties: Host, Sponsor, Participating agencies, Participating Target (Link to Agent and Role Class)
Agent	People&Organization	Type of producer or user of startup information
	People	Metadata for building the profile of startup 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 Startup Area, Portfolio)
	Organization	Metadata for building the profile of organization Organization name, type, homepage, address, phone number, number of employees, establishment date, company introduction, contact, related startup information

Class	SubClasses	Description
Role		Agent's role by linking it with the agent class Instance: startup seekers, startup information providers, startup educators, etc, mento, mentee, etc.
Region	Domestic/International	Startup Posting locations or Agent Locations Domestic (Instances by region) International (Instance by country)
Field	IT, Wholesale and Retail, Information Service, Health, Social Welfare, Education, Art and Leisure, Agriculture and Fishing, etc..	Field for Startup or Agent Interest Areas
Related Information	Book, Website, Statistics, Law, Report, Handbook, News, Statistics, Review, Articles, etc.	Metadata for Related Information (Title, Date, URL, Description, Keyword, etc.)
Aent Type		Link to startup post and agent class Instance (Government, Small Business, Mid-size Business, Single person company, foreign companies, etc.)
Target		Link to Startup Information Class (young adult, Senior, midwife, Small Business, Midsize Business, etc.)
StartUp Level		Level of Start Up (Pre, Beginning, Stabilized)

7.2 A Design of a Subject Gateway for Business Startup

The subject gateway was implemented by a navigation system that enables flexible browsing within the entire subject gatewaythrough the ontology modeling. The following <Figure 3> is the main gateway screen. Main menu (start-up, data room, Q&A, My Start-up, site map, etc.) is placed at the top, and by clicking the upper menu, the hierarchical structure of the knowledge structure can be browsed. The search box was placed at the top to allow keyword search within the site. In the main section of the page, notices of start-up business that were deemed to be of the highest importance in user needs and in-depth interviews were arranged.Quick Link to place key content menus (business plan, trend information, start-up success story, education, websites of related institutions) that were considered important in the knowledge structure were presented. Finally, using the chat service, the gateway is able to match experts and users for mentoring and consulting services.

Many users who use entrepreneurship information search for information in a mobile environment, and it is essential to present the similar interface in an N-Device environment. A gateway was

implemented as a responsive web in order to be automatically adapted to the user's screen size in personal PC, tablet, and smartphone environments. The following <Figure 3> is an interface screen in which the start-up announcement page in the gateway is adjusted to an N-Device environment.

〈Figure 3〉 StartUp Interface on N-Device Environment

The each startup record was implemented in rdf/xml based on ontology modeling. The following <figure 4> is an example of startup records. If users click on a specific support project ("Revitalization of One Person Creative Enterprise") as follows, users can browse the type of support ("Facility and Space"), related news, application method, procedure, support area, support target, support agency, and related information. Also by clicking a support agency ("Korea Institue of Startup & Entrepreneurship"), users are able to browse a variety of startup-related support programs supported by this institution. Clicking the target ("Youth") allows users to view various startup programs that are provided for young people. The example below is the turtle version of the rdf/xml file.

```
StartUp:OnePerson1
  rdf:type StartUp:FacilitiesSpace ;
  StartUp:applicationMethod """Any Time
1) Office space, conference room, consultation room, relaxation room, etc.
2) Project linkage and implementation opportunities provided
3) Facility use fax, copy machine""" ;
  StartUp:applicationProcess """Step 1: Apply and receive (k startup)
Step 2: Selection evaluation
Step 3: Support for owner space, etc.""" ;
  StartUp:hasInformation StartUp:ActOnFostering ;
  StartUp:hasInformation StartUp:KyungbookTP1 ;
  StartUp:hasInformation StartUp:PerformanceReport;
  StartUp:hasPublications StartUp:Korea_Startup_Development ;
  StartUp:hasRegion StartUp:AnyPlace ;
  StartUp:hasTarget StartUp:Youth ;
  StartUp:hasTarget StartUp:a_prospective_entrepreneur ;
  rdfs:label "Revitalization of One Person Creative Enterprise" ;
```

〈Figure 4〉 StartUp Record Browsing

8. Conclusion

Entrepreneurship has been emphasized and systematized centered on government departments, non-profit organization, and universities. However, there are scattered information and duplications among insituttions. The study purports to develop a subject gateways for business startup support

services suitable for the Korean environment. For this purpose, this study has carried out a relevant literature review, case studies, user demand analysis, and business startup subject gateway development. From literature reviews and case studies, the study identified that business startup support should be provided in various ways such as information resource provision, online and offline education programs, workshops, and one-on-one consulting. In addition, startup support are also required to operate programs that cover various topics such as financial consulting, and market research. For users' survey and interviews, the study found that users have difficulty in selecting useful information since the excess of information and the search for the desired information as it is scattered across a wide range of sources. It also was indicated that there is a need for more specific services such as market research and analysis and counseling. Based on these analysis, the study emphasized that a one-stop integrated information service, along with communication channels for mentoring, counseling, feedback, and review sharing, is required. There are demands for the organization of business startup information by re-classifying mixed information from users' perspectives.

The study designed a subject gateway for startup. A startup information structure model was developed. The subject gateway structure system was implemented by a navigation system that enables flexible browsing within the entire subject gatewaythrough the ontology modeling. The study also presented an example of startup records to display how startup search can be explored. This study is expected to contribute to the understanding of the current conditions related to business startup services. The subject gateway developed in this study can be used as a source of subject special services for the library's start-up subject service.The business startup digital gateways based on empirical data analysis that this study presents will contribute to extending library service for startup.

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