A Study on the Strategy of Resolving Impediments to Use of Digital Resources : The Case of Korean Public Libraries

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ABSTRACT

In this study, users' perceptions and concerns about digital information resources were investigated, focusing on impediments to the use of digital resources, to devise measures for improvement by identifying factors that hinder the use of digital information resources.
To achieve the purpose of the study, the research identifies the inconvenien ce factors and establishes the user inconvenience list based on prior research and the current status survey. Based on the derived list, a survey was conducted on users of public libraries. Through this study, it was found that the use of digital information resources can be enhanced by improving the internal library system. Specifically, it refers to improving search performance and accessibility of digital data, providing one-stop services for digital information resources through the operation of an integrated data management system, conducting customized user education, and establishing a digital information resource preservation system, e.g. web archiving. Also, improving the external environment and system, such as contracting with more libraries for digitized data use agreements, strengthening support, unifying the names and classifications of digital information resources, and simplifying the procedure for using digital information resources, is of great importance.

1. Introduction

The 3rd Comprehensive Library Development Plan has addressed resolving impediments to the use of digital collections as one of the strategies for establishing the basis of sharing library resources; building domestic and international cooperation systems for data sharing, fusion, and linkage among related organizations having various digital contents to establish a foundation for sharing and revitalizing the use of digitized data. Also the plan has reviewed relevant copyright laws and systems to expand Internet services for orphan works.

In 2020, despite an unprecedented epidemic that shook the world, the demands of users who want to use library services to solve their informational needs and problems in academics, research, and

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work in various fields continued. In other words, users' demands for digital information resources increased as the demands for non-face-to-face services increased due to COVID-19 in 2020 (Younghee Noh, 2020). Since the use of the Internet has become common throughout the country with more than 70% of the population subscribed to high-speed Internet and access to digital information resources has increased (Nam & Kim, 2003). It can be said that an environment that can support such users' demands for digital information resources is in place to some extent. However, the types and amount of digital information resources only account for a small fraction of the resources and information provided by the library. According to library statistics information provided by Rinfo, an academic information statistics system, the average numbers of books and electronic data in 460 libraries nationwide are 371,195 and 42,503, respectively (Academic Information Statistics System). Such a discriminatory number for electronic data is mainly due to problems in distribution and perception. Distribution problems arise from the hassle of having to install a different viewer program for a different distribution company because each distribution company has a different viewer for executing digital information resources. For instance, Seoul Metropolitan Library has 4 e-book distributors, and they all use different viewer programs. This lays much burden on both libraries that provide e-books and e-book users (Paik, 2018; Kim, 2020). On the contrary, problems of perceiving library digitization as having insufficient economic potential and validity also exist (Kim, Jo, & Ko, 2003). Consequently, this study investigated users' perceptions and concerns about digital information resources, focusing on impediments to the use of digital resources, in order to devise measures for improvement by identifying factors that hinder the use of digital information resources.

2. Literature Review

Though studies were conducted about digital information resources, only a few were carried out by focusing on obstacles to the use of digital information resource. About 10 years ago, Chang(2010) conducted a case study to understand the importance of each type of information resources which are the most important elements of the digital data room of public libraries. He argued that despite the increase in the number of public libraries and remarkable progress in the advancement of information services based on digital information sources, digital information resources in public libraries are passively managed and bounded by a space called digital data room, pointing out that no service utilizing digital information resources is activated while trying to find the cause in the contents. He examined problems of information resources that have not secured an appropriate status comparable to the facility investment made for the resources and evaluated the importance of each element of contents that form the basis for collecting and managing digital information resources in public libraries in an attempt to provide implications for digital information resource management in public libraries. Before this study, Chang and Seo (2009) investigated the basic model of the National Digital Library's digital collection development policy as a preliminary step in establishing digital library collection development policy at a national level, deriving essential elements of and establishing general guidelines for national digital collection development policy. To this end, they presented the types, scope, and priority of information resources that national digital libraries collect in order to derive purchase

level, principles for licenses, and essential elements for systematic implementation of national digital information resource development. Later, Chang (2013) derived components of electronic resource management policy in a study proposing an electronic resource management policy model by selecting and compiling the components found in electronic resource management policies and related studies that were established and disclosed by university libraries in the United States and recommended by the International Federation of Libraries Association (IFLA)'s Guidelines for Electronic Resource Development Policy. By combining the results, he determined the priority of each component of electronic resource management policy and proposed an electronic resource management policy model for virtual universities. Subsequently, Kim and Lee (2016) collected library usage statistics and interviewed librarians in charge of e-books in order to understand the status of e-book management and services in university libraries. As a result, they found that the utilization rate of e-books in university libraries, which continued to decrease with time, was relatively low compared to that of paper books. Furthermore, Kim (2020) collected and analyzed 61,433 data on the use of e-books, audio-books, and video lecture materials and 1,595 user data from a university library for three years to understand user behaviors for electronic materials at university libraries in a smart mobile environment. Based on the results of the analysis, he insisted on securing various video contents and reducing audio-books, of which popularity declined among university students, and suggested ways to continue efforts to purchase and secure new electronic materials and increase the utilization rate of purchased electronic materials. Moreover, in order to change students' perceptions of the use of electronic materials, he proposed ways of improving awareness, such as actively promoting electronic resources in the library and conducting education on the use of electronic materials, and specifically presented measures to increase the utilization rate of electronic resources in university libraries. In particular, he argued that the library should autonomously advertise and provide curation services for electronic materials, which are serviced mainly through publishers' platforms, and initiate active user education in connection with the university's institutional systems. In addition, Kim and Kim (2014) studied the usage behavior and satisfaction of audio-book services among a group of college students. As a result, they found that college students' overall satisfaction with audio-book services was satisfactory with an average of 2.33. However, only 81 of the college students were audio-book users, showing a slightly less number compared to their counterparts. Based on the findings, they suggested that, though not many students use audio-books, since many of the users of audio-books are generally satisfied, it is important to devise and implement measures to increase the use of audio-books. In particular, they emphasized the need for innovative alternatives that could induce or promote students' participation in the use of audio-books as many students did not even know the fact that audio-books are provided in their university library.

3. Methodology

3.1 Research Question

It has been more than 20 years since the development of digital technology first introduced the medium of e-books to the publishing industry and the library sector. E-book services, which

are relatively free from the constraints of time and space, face various challenges such as rapid changes in subscription methods and copyright issues (National Central Library, 2019). According to Dong-A Business Review (2018), the number of subscribers to ReadiBooks, an e-book service giant in Korea, exceeded 2.5 million in 2018. By 2018, more than 2000 publishers entered into a contract with ReadiBooks, providing about 2.12 million e-books as of June 2019 (Kim, 2019). Cho, Jang, and Ryu (2010) also demonstrated a notably increasing trend in e-books in Korea with a 32.3% average annual growth rate from 2006 to 2013, and 273% increase in the number of e-book publishers from 2007 to 2009 — 34 in 2007 to 127 in 2009. However, despite such changes of time, digital information resources in libraries in Korea increased only by 16.7% in 2019 compared to 2018(Academic Information Statistics System, 2020). Therefore, this study attempted to identify and analyze impediments to the use of digital information resources, assuming that one of the reasons for poor use of digital information resources in the library is such impediments. In doing so, the study raised the following research questions.

Question 1: What is the current status of digital information resources provided by the library?
Question 2: What factors do users find to impede the use of digital information resources?

3.2 Research Method and Procedure

In this study, it was sought to derive impediments to and improvement measures for the use of digital information resources in line with the research methods and procedures described below.

First, before the study, the digital information resources were defined and the types of resources were classified. More specifically, based on previous studies on digital information resources, the definition of digital information resources was clarified, and the methods of classifying digital informatio n resources in different libraries were investigated.

Second, the current status of digital information resources of representative libraries of metropolitan cities in Korea was analyzed. Currently, due to insufficient budget and manpower, the library is operating systematic mutual loans through planning and coordination among regional representative libraries (Nam, 2008). Therefore, the names and classification methods of digital information resources, information resource providers, and usage methods were investigated by analyzing the current status of digital information resources of representative libraries that take a leading part in the mutual loan system.

Third, based on prior research and current status survey, inconvenience factors that users experienced while using digital information resources were derived. Park and Jeong (2010) conceptualized and defined the anxiety that users get when using a digital library based on the Digital Library Anxiety Scale. In addition, Kim (2011) studied the psychological stability of library users in a digital environmen t, and Suh (2019) and Yang (2018) evaluated the service quality and electronic resources of libraries. Based on the previous studies described above, inconvenience factors and impediments that users face when using digital information resources were derived.

Fourth, centering on the factors derived, questionnaires were developed and distributed in order

to understand practical difficulties that users face in using digital information resources and suggest corresponding improvement measures.

Table 1. Research Procedure

Step		Description
Step 1	Investigation of previous studies	Definition and classification of digital information resources.
Step 2	Survey on the use status of digital information resources	Investigation of the current status by dividing into classification method, information resource provider, and usage method
Step 3	Identification of obstacles to digital information resources	Identification of inconvenience factors and establishment of user inconvenience list based on prior research and current status survey
Step 4	Survey	Survey-based on the user inconvenience list
Step 5	Proposal of improvement measures for the use of digital information resources	Derivation of improvement measures based on the current status survey and survey data

3.3 Survey Structure

The survey in this study was conducted online among users of public libraries in different regions to identify difficulties experienced by users when using digital information resources and the problems of digital information resources provided by libraries.

The survey was conducted for about 14 days from March 1, 2021 to March 14, 2021. Considering the low number of library visitors amid of COVID-19, the questionnaires were distributed to various online communities, including all age groups and communities for specific age groups: two cafes for all age groups on Naver and Daum, two mom cafes on Naver, one community for university students, and two communities for students.

Table 2. Survey Research Design

Type	Description
Survey target	Users of digital information resources
Survey period	2021.03.01.-2021.03.14.(about 2 weeks)
Survey method	Online survey request to communities for specific age groups, such as college student community and mom cafe

In this study, previous studies conducted by Park and Jeong (2010), Yoon (2009), Kim (2011), Seo (2019), and Yang (2018) were referenced to develop questionnaire items.

The questionnaire is largely composed of general questions to identifying demographic characteristics and frequency of library use, questions on usage status of digital information resources to see if a respondent uses digital information resources and the cause of non-use, if not, questions on difficulties

of the library's digital information resources to derive difficulties encountered while using digital information resources, and questions on the improvement of digital information resources in the library. Details of question items for each area are as follows.

Table 3. Questionnaire Structure

Area	Details	No. of questions
General characteristics	Gender, age, and frequency of library use	3
Use or non-use of digital information resources	Use or non-use of digital information resources, and causes of non-use	2
Problems of the library's digital resources	Difficulty in using digital information sources in terms of search, use, security, and psychology.	16
Improvement measures for digital information resources of the library	Improvement measures for the digital information resources of the library	1
Total		22

4. Definition and Status of Digital Information Resources

4.1 Definition and Classification of Digital Information Resources

A digital information resource, also known as an electronic resource, refers to an information source that is produced, sold, purchased, or subscribed to for easy access through a computer. Also, it is freely available through the Internet and includes files that are paid by libraries for remote access by the library users and files that exist in various forms of storage medium (Chang, 2010).

Chang(2010) categorizes the types of digital information resources of libraries into DVDs, CD-ROM s, VCRs, VTRs, audio-books, e-Books, and software, though it is somewhat less appropriate for modern digital information resources. Not so much before the categorization, Moon et al. (2009) also divide the types of digital information resources into character types, picture types, voice types, and video types by referring to the types of information resources found in the research of Chang and Seo (2009). Subsequently, Chang (2013) classifies the scope of electronic resources into electronic journals, e-books, bibliographic databases, CD-ROMs, multimedia, and websites in his study on electronic resource management policy models.

The National Library of Korea (2020) collectively refers to library's digital information resources as online materials and divide them into digitized materials, e-journals, e-books, websites, audio/sound, alternative materials for the disabled, images, overseas records, videos, foreign documents, and electroni c newspapers. In addition, the National Library of Korea classifies knowledge and culture resources that are considered valuable into newspapers, official gazettes, separate volumes, old books, old maps, and web contents, and directly digitizes and possesses them under the name of the digital

collection.

Meanwhile, various types of digital collections appear in the digital collection development policies of various countries. The British Library categorizes digital collections into digitized materials through legal deposit, digitized library collections, electronic journals, map data, music CDs and other sound items, and web archiving resources. Similarly, digital collections are classified into websites, online databases, e-journals, e-books, integrated electronic resources, CD-ROMs and DVD-ROMs by the Library of Congress, physical electronic resources, online resources, and digitized resources by the National Library of Australia, e-journals, academic papers, reports, articles, databases, digital books, images and videos, sound resources, and interactive resources by the National Library of Medicine, and bibliographic files, professional/numerical/graphic files, educational or modeling software, and application software by the National Agricultural Library. As such, making a consolidated table for comparison is virtually meaningless.

In addition, DCMI's Dublin Core developed to describe electronic resources, divides resource types into collections, datasets, information encoded in a defined structure (e.g., lists, tables, databases), and events (e.g. exhibitions, conferences, workshops, performances, trials, fires), images, interactive resources, moving images, physical objects, services (e.g. bank services, authentication services, library mutual loan services, web services), software, sounds, still images, and texts. Moreover, in the metadata used in digital libraries, MODS, types of resources and genre elements are divided into texts, cartographic, notated music, sounds recording-musical, sounds recording-nonmusical, sounds recording, still image, moving images, three-dimensional objects, software, multimedia, and mixed materials.

4.2 Digital Information Resources in Korea

The current status of digital information resources centering on the representative libraries in Korea was examined including its types, classification, and the providers and methods of such sources.

4.2.1 Name of Digital Information Resources

It was found that each of the representative libraries in 7 metropolitan cities differently names digital information resources. Seoul Metropolitan Library provides digital information resources to users under the name of 'Digital Data' whereas Incheon Metropolitan City Michuhol Library uses the name 'Online Data.' Daegu Metropolitan Jungang Library, Daejeon Metropolitan City Hanbat Library, Ulsan Metropolitan Library, and Gwangju Metropolitan Library use the name 'Electronic Material', and Busan Metropolitan Simin Municipal Library uses the name 'Non-Book' for digital information resources.

4.2.2 Classification of Digital Information Resources

The classification of digital information resources also differed from library to library. Seoul

Metropolitan Library classifies digital information resources into possession-type e-books, subscription-type e-books, audio-books, academic DBs, and cooperation institution DBs. Similarly, digital informatio n resources are classified into e-books, audio-books, and full-texts by Incheon Metropolitan City Michuhol Library, e-books, audio-books, VODs, and original DBs by Daegu Metropolitan Jungang Library, e-books, e-magazines, web DBs, audio-books, and book learning by Daejeon Metropolitan City Hanbat Library, possession-type e-books, subscription-type e-books, Poetry Day, Book Digest, and audio-books by Ulsan Metropolitan Library, e-books, audio-books, e-learning, e-magazines, and web DBs by Gwangju Metropolitan Library, and e-books and audio-books by Busan Metropolitan Simin Municipal Library.

4.2.3 Digital Information Resource Provider

None of the 7 representative libraries internally produce e-books or audio-books. They all provide e-books and audio-books through a contract with external companies. Companies that provide e-books include Woongjin OPMS, Woori E-book, Kyobo Bookstore, YES24, Book Cube, Aladdin, and ECO, and ECO, Audien, Book Cube, IPAPELIKA, Changbi, and Audiorac are some of the companies that provide audio-books. Seoul Metropolitan Library divides e-books into possession-type and subscrip tion-type and provides possession-type e-books in partnership with Woongjin and YES 24, subscription-type e-books in partnership with ECO, and audio-books in partnership with ECO. Incheon Metropolitan City Michuhol Library provides e-books in partnership with Woongjin OPMS, Woori E-book, Kyobo Bookstore, and YES24, and audio-books in partnership with Audien. Daegu Metropolitan Jungang Library provides e-books in partnership with Book Cube, YES24, and Woongjin OPMS, and audio-book s in partnership with Audien. Daejeon Metropolitan City Hanbat Library provides e-books in partnership with Kyobo Bookstore, YES24, Woongjin OPMS, Woori E-book, and Book Cube, and audio-books in partnership with Book Cube. Ulsan Metropolitan Library provides e-books in partnership with Kyobo Bookstore, YES24, and Book Cube and audio-books in partnership with IPAPRIKA. Gwangju Metropolitan Library provides e-books in partnership with Kyobo Bookstore and YES24 and audio-book s in partnership with Audien. Similarly, Busan Metropolitan Simin Municipal Library provides e-books in partnership with Woongjin OPMS, Kyobo Bookstore, YES24, Book Cube, and Aladdin, and audio-books in partnership with Changbi, Audien, and Audiorac.

4.2.4 Method and Procedure for Using Digital Information Resources

What should be noted in the current status of digital information resources in the representative libraries of the 7 metropolitan cities is the procedure of using digital information resources as a complicated method and procedure for using digital information resources is one of the major user inconveniences (Paik, 2018; Kim, 2020). Examining the current status of the representative libraries revealed the differences between libraries that try to resolve user inconveniences and libraries that do not. The status survey was conducted by separately inspecting the operation of integrated electronic library applications, integrated viewers, and non-face-to-face member subscription services.

First, an integrated e-library application is a service that allows users to check digital information

resources owned by the library through an application. The advantage of an integrated e-library application is that users can search, borrow, and return all digital information resources owned by the library in a mobile environment. However, there is a limitation in that users cannot directly access digital information resources with the e-library application; they need to download a separate execution viewer from a library's partner company to access digital information resources. Metropolitan libraries that operate an integrated electronic library application include Seoul Metropolitan Library, Incheon Metropolitan City Michuhol Library, Daegu Metropolitan Jungang Library, Daejeon Metropolit an City Hanbat Library, and Ulsan Metropolitan Library.

Second, the biggest problem with digital information resources is different viewers used by different companies (Baek, 2018; Kim, 2020). Users need to download different viewers to view e-books or audio-books of the same library if they are provided by different companies. As a solution to the problem, some libraries develop their own integrated viewer. Currently, Seoul Metropolitan Library is the only one out of the seven metropolitan libraries that have developed an integrated viewer to provide to its users. However, Seoul Metropolitan Library's integrated viewer has a clear limitation in that many companies, except the four partner companies of Seoul Metropolitan Library, are reluctant to use the integrated viewer of Seoul Metropolitan Library and the library has only a few types of e-books and audio-books (Kim, 2020).

Third, to use the digital information resources of a library, most libraries require users to sign up for the library membership. The representative libraries in all seven metropolitan cities also require library membership. However, problems arise as many libraries require in-person member registration. Among the representative metropolitan libraries, Incheon Metropolitan City Michuhol Library, Daejeon Metropolitan City Hanbat Library, Ulsan Metropolitan Library, and Gwangju Metropo litan Library require in-person signup for library membership, not allowing the use of digital information resources without member registration. This issue has become more problematic when libraries are closed due to COVID-19, causing great inconvenience for users (Park, 2020). Some libraries, including Daegu Metropolitan Jungang Library and Busan Metropolitan Simin Municipal Library, improved services to solve the problem. Daegu Metropolitan Jungang Library operates Daegu Electronic Library to enable all Daegu citizens to use digital information resources with simplified Daegu citizen authentication and online member registration processes via an administrative information sharing system of the Ministry of Public Administration and Security (Hong, 2020). Similarly, users of Busan Metropolitan Simin Municipal Library can sign up for the library membership by downloading BPASS application and conforming to their residency in Busan at the Busan Metropolitan City Hall's Integrated Library Website.

Table 4. Status of Digital Information Resources of Representative Libraries of Metropolitan Cities

	Seoul	**Incheon**	**Daegu**	**Daejeon**	**Ulsan**	**Gwangju**	**Busan**
Representative Library	Seoul Metropolitan Library	Incheon Metropolitan City Michuhol Library	Daegu Metropolitan Jungang Library	Daejeon Metropolitan Hanbat Library	Ulsan Metropolitan Library	Gwangju Metropolitan Library	Busan Metropolitan Simin Municipal Library

Name of digital information resources	Digital data	Online data	Electronic material	Electronic material	Electronic material	Electronic material	Non-book
Classification of digital information resources	E-book Audio-book Academic DB Cooperation institution DB	E-book Audio-book Full-text	E-book Audio-book VOD Original DB	E-book E-magazine Web DB Audio-book Book-learning	E-book Audio-book E-learning E-magazine Web DB	Possession-type e-Book Subscription-type e-book Audio-book Poetry day Book digest	E-Book Audio-Book
Provider	**E-book**	**E-book**	**E-book**	**E-book**	**E-book**	**E-book**	**E-book**
	Possession type: Woongjin, YES24 Subscription type: ECO	Woongjin OPMS Woori E-Book Kyobo Bookstore YES24	Book Cube E-Book Program Yes24 Woongjin OPMS	Kyobo Bookstore YES24 Woongjin OPMS Woori E-Book Book Cube	yes24, Kyobo Bookstore, Book Cube	Kyobo Bookstore YES24	Woongjin OPMS Kyobo Bookstore Book Cube Yes24 Aladdin
	Audio-book	**Audio-book**	**Audio-book**	**Audio-book**	**Audio-book**	**Audio-book**	**Audio-book**
	ECO	Audien	Audien	Book Cube	IPAPRIKA	Audien	Changbi Audien Audioroc
Method and procedure to use	Integrated e-library application Integrated viewer Non-face-to-face member signup service	Integrated e-library application	Integrated e-library application Non-face-to-face member signup service	Integrated e-library application	Integrated e-library application		Non-face-to-face member signup service

The result of the current status survey revealed that, libraries name and classify digital information resources differently. Some libraries refer to electronic books as Jeonjachaeg while others refer to them as e-books. There are also libraries that divide e-books into subscription-type e-books and possession-type e-books. Such inconsistency can confuse users of digital information resources. Furthermore, as mentioned earlier, since libraries have different e-book and audio-book providers, there is the hassle of having to download multiple viewers to use resources from different providers (Park, 2020). In addition, it was also found that the procedure for using digital information resources is somewhat complex. For users to use digital information resources of a library, they need to visit the library's website and signup for a membership, and in some cases, they also need to download an integrated application and register again using the application. Moreover, even after member registration, libraries require users to make an in-person visit for document submission when making a library membership card or verifying local residency, making it even more difficult for the users

(Hong, 2020). This practice causes even greater difficulties amid of COVID-19.

4.3 Factors of User Inconvenience

4.3.1 Impediments to the Use of Digital Information Resources

In order to provide digital information resources, libraries go through certain management processes, such as selection, collection, management, preservation and disposal of resources. In the process of using these resources, users may face obstacles and difficulties in using digital information resources.

Challenges Impeding and Trends Accelerating Technology Adoption in Academic and Research Libraries (NMC Horizon Report: 2017 Library Edition ③) addresses accessibility of library services and resources, improving digital literacy, adapting organizational designs to the future work, maintainin g ongoing integration, interoperability, and collaborative projects, economic and political pressure, and embracing the need for radical change as some of the impediments to technology adoption in academic and research libraries. Among them, accessibility of library services and resources and improving digital literacy are stated as solvable problems that can be overcome by applying technologies or exerting efforts. The library has been described as an institute making efforts to eliminate obstacles for users with or without disabilities in accessing materials and services. However, First, in a survey conducted by the University of Guelph among students registered in student access support services, more than 60% of the respondents said that the access to library documents and websites is not smooth. To improve the access, the library provided students with access to learning technology resources from classrooms and provided support services to teachers to help them understand their legal obligations. Second, the University of Limpopo in South Africa provides support services for disabled students. The library offers extended library operation hours, organizes cooperation with publishers to increase access to materials, creates user profiles to support students' needs, and provides services such as conducting an individual evaluation for students with disabilities. Third, the University of Wisconsin-Milwaukee, carried out a digital library project for the blind and visually impaired (BVI), funded by the Institute of Museum and Library Services (IMLS).

In order to resolve barriers to access and use digital information resources, digital literacy should also be improved. To improve digital literacy, the University of Michigan School of Information trained its students for data and statistical literacy, considering data and statistical literacy as an important interdisciplinary skill required by future librarians to support learners in digital environments. In addition, DigitalLearn.org of the Public Library Association provided a self-learning tutorial for users to develop their digital capabilities (NMC Horizon Report, 2017).

4.3.2 Impediments by Area from Users' Point of View

Obstacles to the use of digital information resources seem derivable to some extent using the Digital Library Anxiety Scale. Park and Jeong (2010) presents an emotional problem, resource, knowledge of use, security, language, technical problem, and task as the areas users feel anxious about in digital libraries along with a total of 39 sub-elements. In addition, Kim (2011) presented and surveyed security-related anxiety factors that library users experience in the library. Suh (2019) and Yang (2018) separately studied the satisfaction of library users and derived user inconvenience factors related to library services. Finally, inconvenience factors were divided into the aspects of ① sorting and selection of data ② search method ③ obtaining and accessing full-texts ④ technology ⑤ ease-of-use ⑥ speed and usage ⑦ resource utilization ⑧ content and scope of data and quality of information ⑨ library reliability ⑩ psychology, and ⑪ library staff.

Table 5. Derived inconvenience factors in using digital resources

Area	Key Item	Details	Reference
Search	Difficulties in sorting and selection	Search results show too much-unrelated information	Yoon (2009), Park and Jeong (2010)
		It is difficult to sort out desired information resources	
		Cannot quickly determine the suitability of selected materials for intended use	
		Finding desired information resources is difficult	
	Difficult search method	Don't know an appropriate search method	Park and Jeong (2010)
		Not sure how to use electronic resources or online information	
		Don't know what to do after searching for information	
		Don't know which keywords to use when searching data	
		Don't know where to start the search when bibliographic information is unknown	
Possession	Problem with obtaining full-texts	Don't know how to obtain the materials when search results show no available full-text	
		Unlike latest materials, full-text services are not available for old materials, making the access to old materials difficult	
	Access	No portable access	Park and Jeong (2010)
		Often service is only available in limited places	
		Opportunities for access are sometimes blocked	
	Technology	There are times when searched data are not printable	Park and Jeong (2010)
		It is inconvenient to install viewer files for multiple times	
		Sometimes, downloading data is difficult or unavailable	
	Economy	I sometimes have to pay extra to access full-texts	
		It is difficult to claim for expenses	
Usage	Ease of use	Inconvenient to read due to poor readability	Park and Jeong
		Low data resolution. Eyes get tired when using data.	
		In many cases, data downloading is difficult or unavailable.	

		Incorrectly uploaded data can be seen when using digital information resources.	(2010), Yang (2005)
		Various system errors frequently occur when using digital information resources.	
		It is cumbersome to visit the library to use searched data	
		It is difficult to find library applications or websites	
	Speed	Searching to find data takes a lot of time	
		It takes a lot of time to use some data which require separate authentication or other procedures (security certificate, membership registration, etc.).	
	Usage	Don't know how to get the materials I need	Park and Jeong (2010)
		It is difficult to find the location of information that I look for on a website.	
		Don’t know what data are available in online academic DBs.	
		Don’t know which database to choose to find desired data	
		Accessing online academic DBs, which is a type of digital resources, is complicated and difficult	
		Using digital resources is more difficult than using offline resources.	
	Resource utilization	It is difficult to use data when editing (copying or pasting) is not allowed	Park and Jeong (2010)
		It is inconvenient that search results often show only the table of content (TOC) of desired materials without the full-text.	
		It is Inconvenient because there are many materials that can only be accessed through separate authentication or procedures.	
		Search results provide no help	
		Sometimes, use of materials is restricted due to problems with security certificate.	
Content	Content and scope of data	It is difficult to perform tasks using digital resources	
		No description is given for data	
		Sometimes page information is missing	
		Citation information is often unclear	
		Unable to know all contents through a table of content (TOC)	
	Quality of information	Uncertain whether the contents are verified	Park and Jeong (2010)
		Poor accuracy	
		Many errors made in computerization process and contents of data are inaccurate.	
Psychology	Problems with library reliability	Using a digital library through a public computer is not safe.	Kim (2011), Park and Jeong (2010)
		I am concerned that my information usage records may be leaked if I use a digital library.	
		I am reluctant to use a digital library due to the risk of leaking my personal information.	
		When I use a digital library, I am concerned as I am not sure whether security devices are properly working or not.	
	Psychology	I get nervous before using	Park

	It's disappointing that there are not as many materials as I expected available for use.	and Jeong (2010), Yang (2005)
	I am not sure whether the library does not have the materials I look for or I am the one who cannot find the materials.	
	It's embarrassing that I don't know how to use.	
	I am not confident in finding useful materials for myself	
	I feel unfamiliar and awkward to use library applications or homepages	
	I feel lost as I don't know what to do after searching information	
Library staff	Librarians do not provide sufficient guidance on digital information resource services	Suh (2019), Yang (2018)
	When there is a problem with using digital information resources, librarians do not take an active stance to solve the problem.	
	When there is a problem with using digital information resources, it is difficult to contact library staff	
	Library staff fail to respond properly to inquiries regarding digital information resources	

5. Analysis

A total of 124 respondents participated in the survey. The analysis of the demographic characteristics of the respondents showed that 32 (25.80%) of the respondents were male and 92 (74.19%) of them were female. While analyzing the age groups of the respondents, it was found that a maximum number of 110 (88.71%) of the respondents are within the 20s followed by 7 (5.64%) in their 10s, 4 (3.22%) in their 30s, and 3 (2.41%) in their 40s. Although the communities to which the questionnaires were distributed had a constant number of floating populations, the respondents were predominantly in their 20s, indicating that those in their 20s have the highest level of interest in digital information resources of the library (see **Table 6**).

Table 6. Demographical Characteristics

Item			N (N=124)	%
Demographical characteristics	Gender	Male	32	25.80
		Female	92	74.19
	Age	10-19	7	5.64
		20-29	110	88.71
		30-39	4	3.22
		40-49	3	2.41

On analysis of the frequency and method of using libraries and digital information resources, it was found that 6.45% of the respondents visit libraries at least 3 times a week, 25.80%, about 1-2 times a week, 38.71% about 1-2 times a month, and 29.03% about 1-2 times a year. Similarly, 7.25% of the respondents use digital information resources of the library more than 3 times a week, 10.48% about 1-2 times a week, 51.61% about 1-2 times a month, and 30.64% about 1-2 times a year. 39.51% of the respondents use digital information resources through library websites, 32.25% through mobile library applications, 27.41% by visiting libraries, and 0.80% by other means (see **Table 7**).

Table 7. Frequency and method of use

Item			N	%
Frequency and method of use	Frequency of library visit	More than 3 times a week	8	6.45
		1-2 times a week		
		1-2 times a month	48	38.71
		1-2 times a year		
	Frequency of library digital information resource use	More than 3 times a week	9	7.25
		1-2 times a week		
		1-2 times a month	64	51.61
		1-2 times a year		
	Method of library digital information resource use	Library homepage	49	39.51
		Mobile library application	40	32.25
		Visit to library	34	27.41
		Other	1	0.80

5.1 Analysis of the Difficulties of Digital Information Resources of the Library

5.1.1 Sorting and Selection of Data

As a result of the **Table 8** on the difficulties of digital information resources of the library in terms of classification and selection of data, not being able to quickly determine the suitability of selected data for intended use was found to be the biggest difficulty. Since most of the participants are in their twenties who are familiar with digital devices and online, they seem to show no difficulty in the question items under information search (search results show too much unrelated information, it is difficult to sort out desired information materials).

Table 8. Difficulties in sorting and selecting data

Item	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		M	Std
	N	%	N	%	N	%	N	%	N	%		
Search results show too much unrelated information	17	13.7	40	32.2	40	32.2	23	18.5	4	3.2	2.65	1.036
It is difficult to sort out desired information resources	18	14.5	34	27.4	29	23.3	38	30.6	5	4.0	2.82	1.141
Cannot quickly determine the suitability of selected materials for intended use	14	11.2	27	21.7	34	27.4	39	31.4	10	8.0	3.03	1.147
Finding desired information resources is difficult	17	13.7	24	19.3	39	31.4	34	27.4	10	8.0	2.96	1.161

5.1.2 Search Method

As a result of the **Table 9** on the difficulties of digital information resources of the library in terms of the search method, respondents found not knowing where to start the search when bibliographic information is unknown as the most common difficulty. In general, respondents do not find difficulties in search methods or device usage; however, they find not knowing where to start the search when bibliographic information is unknown as the most common difficulty, indicating that they are not so familiar with finding resources in libraries.

Table 9. Difficulties in terms of search method

Item	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		M	Std
	N	%	N	%	N	%	N	%	N	%		
Don’t know an appropriate search method	29	23.3	32	25.8	25	20.1	27	21.7	11	8.8	2.66	1.292
Not sure how to use electronic resources or online information	36	29.0	37	29.8	28	22.5	17	13.7	6	4.8	2.35	1.177
Don't know what to do after searching for information	34	27.4	48	38.7	17	13.7	21	16.9	4	3.2	2.29	1.14
Don't know which keywords to use when searching data	24	19.3	42	33.8	29	23.3	24	19.3	5	4.0	2.54	1.129
Don’t know where to start the search when bibliographic information is unknown	22	17.7	28	22.5	26	20.9	34	27.4	14	11.2	2.91	1.292

5.1.3 Obtaining and Accessing Full-texts

Analyzing the difficulties of digital information resources in terms of obtaining and accessing full-texts showed that users find not knowing how to obtain materials when search results show no available full-text. It was also found from the analysis that, except for the case of blocked access opportunities, about 40% of the participants responded to either 'Agree' or 'Strongly agree', and over 50% responded to either 'Agree' or 'Strongly agree' to not knowing how to obtain materials that do not have available full-text or old materials for which full-text services are not available, suggesting that users find immense difficulties in obtaining full-texts.

Table 10. Difficulties in obtaining and accessing full-texts

Item	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		M	Std
	N	%	N	%	N	%	N	%	N	%		
Don't know how to obtain the materials when search results show no available full-text	12	9.6	21	16.9	29	23.3	44	35.4	18	14.5	3.28	1.193
Unlike latest materials, full-text services are not available for old materials, making the access to old materials difficult	12	9.6	23	18.5	26	20.9	53	42.7	10	8.0	3.21	1.135
No portable access	12	9.6	24	19.3	37	29.8	39	31.4	12	9.6	3.12	1.13
Often service is only available in limited places	16	12.9	25	20.1	33	26.6	39	31.4	11	8.8	3.03	1.182
Opportunities for access are sometimes blocked	14	11.2	24	19.3	44	35.4	33	26.6	9	7.2	2.99	1.101

5.1.4 Technology

Analyzing technical difficulties of digital information resources identified having to install viewer files multiple times as the biggest drawback. As mentioned above, the problem of having to install viewer files for multiple times was investigated as causing great inconvenience to users. Also, in this survey, more than 65% of the users of digital information resources responded either 'Agree' or 'Strongly agree' to the issue, demonstrating the big hassle they experienced. In addition, more than 50% of the participants responded 'Agree' or 'Strongly agree' to issues with downloading, reflecting the inconvenience in downloading.

Table 11. Technical difficulties

Item	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		M	Std
	N	%	N	%	N	%	N	%	N	%		
There are times when searched data are not printable	21	16.9	30	24.1	45	36.2	23	18.5	5	4.0	2.68	1.085
It is inconvenient to install viewer files for multiple times	16	12.9	14	11.2	30	24.1	47	37.9	17	13.7	3.28	1.22
Sometimes, downloading data is difficult or unavailable	12	9.6	20	16.1	36	29.0	45	36.2	11	8.8	3.18	1.114

5.1.5 Ease-of-use

Analyzing difficulties in terms of ease-of-use revealed that most of the users find visiting the library to use searched materials cumbersome. It is also related to the problem of issuing a library membership card mentioned above, seemingly causing the greatest inconvenience, coinciding with COVID-19, to the users surveyed in this study. It was observed that the users do not have much difficulty in finding library applications and websites or matters related to errors. However, with more than 40% of respondents who responded 'Agree,' or 'Strongly agree' to questions related to functions (e.g. readability, resolution, and download) of digital information resources, it can be interpreted that the users feel functional difficulties when using digital information resources.

Table 12. Difficulties in terms of ease-of-use

Item	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		M	Std
	N	%	N	%	N	%	N	%	N	%		
Inconvenient to read due to poor readability	15	12.0	29	23.3	29	23.3	36	29.0	15	12.0	3.05	1.225
Low data resolution. Eyes get tired when using data.	13	10.4	23	18.5	34	27.4	37	29.8	17	13.7	3.17	1.197
In many cases, data downloading is difficult or unavailable.	14	11.2	25	20.1	36	29.0	34	27.4	15	12.0	3.08	1.189
Incorrectly uploaded data can be seen when using digital information resources.	22	17.7	34	27.4	40	32.2	21	16.9	7	5.6	2.65	1.127
Various system errors frequently occur when using digital information resources.	17	13.7	39	31.4	41	33.0	21	16.9	6	4.8	2.67	1.063
It is cumbersome to visit the library to use searched data	20	16.1	14	11.2	28	22.5	42	33.8	20	16.1	3.22	1.306
It is difficult to find library applications or websites	36	29.0	37	29.8	30	24.1	16	12.9	5	4.0	2.33	1.146

5.1.6 Speed and Usage

As a result of analyzing difficulties in terms of speed and usage, it was found that time-consuming is one of the biggest drawbacks of digital information resources as separate authentication or other procedures is/are required to access some digital information resources. It was also found that a complicated membership registration process to use digital information resources, as appeared in the current status survey, was considered as the biggest difficulty by the users. However, it was observed that the users do not have much trouble in terms of methods and ability to use digital information resources (using digital resources is more difficult than using offline resources, don't know what data are available in online academic DBs, and don't know which database to choose to find desired data)

Table 13. Difficulties in terms of speed and usage

Item	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		M	Std
	N	%	N	%	N	%	N	%	N	%		
Searching to find data takes a lot of time	18	14.51	22	17.74	30	24.1	38	30.6	16	12.9	3.09	1.259
It takes a lot of time to use some data which require separate authentication or other procedures (security certificate, membership registration, etc.).	12	9.6	16	12.9	39	31.4	39	31.4	18	14.5	3.28	1.159
Don't know how to get the materials I need	25	20.1	32	25.8	29	23.3	30	24.1	8	6.4	2.71	1.222
It is difficult to find the location of information that I look for on a website.	19	15.3	26	20.9	34	27.4	34	27.4	11	8.8	2.93	1.208
Don't know what data are available in online academic DBs.	28	22.5	30	24.1	26	20.9	28	22.5	12	9.6	2.72	1.303
Don't know which database to choose to find desired data	22	17.7	34	27.4	28	22.5	24	19.3	16	12.9	2.82	1.294
Accessing online academic DBs, which is a type of digital resources, is complicated and difficult	22	17.7	25	20.1	39	31.4	23	18.5	15	12.0	2.87	1.256
Using digital resources is more difficult than using offline resources.	27	21.7	32	25.8	35	28.2	22	17.7	8	6.4	2.61	1.194

5.1.7 Resource Utilization

As a result of analyzing the difficulties in utilizing resources, not being able to edit (copying and pasting) materials is found to be one of the difficulties in use, and only being able to see the table of content (TOC) of materials without full-text is another common difficulty that the users encounter. It seems that the respondents tend to have no difficulty in searching and using digital information resources since the majority of them are in their 20s. However, they demonstrated

difficulties in utilizing digital information resources and handling diverse data.

Table 14. Difficulties in resource utilization

Item	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		M	Std
	N	%	N	%	N	%	N	%	N	%		
It is difficult to use data when editing (copying or pasting) is not allowed	12	9.6	19	15.3	31	25.0	41	33.0	21	16.9	3.32	1.207
It is inconvenient that search results often show only the table of content (TOC) of desired material without the full-text.	11	8.8	16	12.9	39	31.4	38	30.6	20	16.1	3.32	1.159
Search results provide no help	12	9.6	25	20.1	44	35.4	32	25.8	11	8.8	3.04	1.1
Sometimes, use of materials is restricted due to problems with security certificate.	16	12.9	26	20.9	42	33.8	23	18.5	17	13.7	2.99	1.213

5.1.8 Data Content and Scope and Information

As a result of analyzing the difficulties in terms of data content and scope and information quality, not thoroughly knowing all contents of data through a TOC was found to be the biggest drawback. Chung (2020) described watching abridged 10-minute short videos, such as short forms, as one of the most unique characteristics of the z-generation. However, since digital information resources have the disadvantage that it is difficult to know the contents through a TOC, it is less suitable for the primary users in their 20s who see the disadvantage as one of the biggest drawbacks.

Table 15. Difficulties in terms of data content and scope and information quality

Item	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		M	Std
	N	%	N	%	N	%	N	%	N	%		
It is difficult to perform tasks using digital resources	21	16.9	33	26.6	29	23.6	31	25.0	10	8.0	2.80	1.221
No description is given for data	18	14.5	35	28.2	33	26.6	34	27.4	4	3.2	2.76	1.105
Sometimes page information is missing	21	16.9	27	21.7	45	36.2	23	18.5	8	6.4	2.75	1.136
Citation information is often unclear	20	16.1	22	17.7	44	35.4	30	24.1	8	6.4	2.87	1.147
Unable to know all contents through a table of content (TOC)	12	9.6	14	11.2	41	33.0	45	36.2	12	9.6	3.25	1.094
Uncertain whether the contents are verified	26	20.1	29	23.3	41	33.0	24	19.3	5	4.0	2.63	1.129
Poor accuracy	23	18.5	34	27.4	46	37.0	17	13.7	4	3.2	2.55	1.046
Many errors made in computerization process and contents of data are inaccurate.	25	20.1	38	30.6	49	39.5	9	7.2	3	2.4	2.41	0.971

5.1.9 Library Reliability

Analyzing the difficulties of digital information resources in terms of library reliability showed security-related hindrance as the most commonly observed difficulty. However, the users seem to have confidence in library security as more than 50% of the participants responded either 'Disagree' or 'Strongly disagree' to all the questions related to library reliability. The statistics on the frequency and method of using libraries and digital information resources in **Table 7** indicate that only about 27% of the users visit libraries to use digital information resources, implying that the reliability of the library does not have a significant impact on the use of digital information resources.

Table 16. Difficulties in terms of library reliability

Item	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		M	Std
	N	%	N	%	N	%	N	%	N	%		
Using a digital library through a public computer is not safe.	27	21.7	37	29.8	35	28.2	16	12.9	9	7.2	2.54	1.178
I am concerned that my information usage records may be leaked if I use a digital library.	30	24.1	28	22.5	28	22.5	32	25.8	6	4.8	2.64	1.238
I am reluctant to use a digital library due to the risk of leaking my personal information.	32	25.8	37	29.8	31	25.0	18	14.5	6	4.8	2.42	1.163
When I use a digital library, I am concerned as I am not sure whether security devices are properly working or not.	25	20.1	25	20.1	34	27.4	30	24.1	10	8.0	2.79	1.243

5.1.10 Psychology

From a psychological point of view, it was found that users feel confused as they are not sure whether the library does not have the materials they look for or it is they who cannot find the materials. They were also observed to be disappointed as they feel that there are not so many materials they can use. Considering the primary users of digital information resources and the finding that more than 60% of the participants responded 'Disagree' or 'Strongly disagree' to all question items in psychology, except the two items stated above, not enough materials that can be used in common and the unfamiliarity in searching in library databases seem to have caused difficulties.

Table 17. Psychological difficulties

Item	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		M	Std
	N	%	N	%	N	%	N	%	N	%		
I get nervous before using	52	41.9	33	26.6	24	19.3	9	7.2	6	4.8	2.06	1.160
It's disappointing that there are not as many materials as I expected available for use.	17	13.7	29	23.3	33	26.6	35	28.2	10	8.0	2.93	1.181
I am not sure whether the library does not have the materials I look for or I am the one who cannot find the materials.	19	15.3	17	13.7	30	24.1	38	30.6	20	16.1	3.18	1.296
It's embarrassing that I don't know how to use.	45	36.2	32	25.8	16	20.9	16	12.9	5	4.0	2.22	1.188
I am not confident in finding useful materials for myself	44	35.4	25	20.1	29	23.3	18	14.5	8	6.4	2.36	1.277
I feel unfamiliar and awkward to use library applications or homepages	42	33.8	28	22.5	22	17.7	21	16.9	11	8.8	2.44	1.345
I feel lost as I don't know what to do after searching information	40	32.2	34	27.4	27	21.7	18	14.5	5	4.0	2.30	1.184

5.1.11 Library Staff

As a result of analyzing the difficulties in terms of library staff, users do not seem to have major difficulties related to library staff. It can be partially due to the fact that only 27% of the users visit libraries to use digital information resources as shown in **Table 7**. However, what seems to have played a bigger role is considerably improved service satisfaction and kindness of library staff.

Table 18. Difficulties in terms of library staff

Item	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		M	Std
	N	%	N	%	N	%	N	%	N	%		
Librarians do not provide sufficient guidance on digital information resource services	28	22.5	32	25.8	36	29.0	22	17.7	6	4.8	2.56	1.163
When there is a problem with using digital information resources, librarians do not take an active stance to solve the problem.	28	22.5	36	29.0	37	29.8	15	12.0	8	6.4	2.50	1.158
When there is a problem with using digital information resources, it is difficult to contact library staff	25	20.1	38	30.6	39	31.4	17	13.7	5	4.0	2.50	1.086
Library staff fail to respond properly to inquiries regarding digital information	30	24.1	41	33.0	34	27.4	14	11.2	5	4.0	2.37	1.094

resources

5.2 Improvement Measures for Digital Information Resources of the Library

The survey on improvement measures for digital information resources of the library found that expanding the diversity of materials by securing additional digital information resources is the most urgent matter to be improved. This issue, also appearing as a major difficulty in other survey questions shown in **Table 18** and **Table 10**, clearly demonstrates how the users perceive the lack of diversity as the biggest problem of digital information resources of the library.

Table 19. Improvement measures for digital information resources of the library

Item	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		M	Std
	N	%	N	%	N	%	N	%	N	%		
Standardize digital information resource execution viewers and providers	4	3.2	6	4.8	31	25.0	58	46.7	25	20.1	3.75	0.940
Conduct education on digital information resources	5	4.0	8	6.4	33	26.6	57	45.9	21	16.9	3.65	0.971
Unify the names and classifications of digital information resources that are different for each library	2	1.61	13	10.48	28	22.58	52	41.9	29	23.3	3.75	0.985
Simplify the process of using digital information resources (member registration process, etc.)	3	2.4	9	7.2	30	24.1	47	37.9	35	28.2	3.82	1.004
Expand the diversity of materials by securing additional digital information resources	2	1.6	6	4.8	22	17.7	48	38.7	46	37.0	4.04	0.944
Actively promote digital information resources of the library	4	3.2	10	8.0	30	24.1	45	36.2	35	28.2	3.78	1.048
Protect personal information and expand security for the use of digital information resources	2	1.6	13	10.4	31	25.0	42	33.8	36	29.0	3.78	1.032
Increase librarian services for the use of digital information resources	5	4.0	11	8.8	47	37.9	36	29.0	25	20.1	3.52	1.040

6. Improvement Measures for Digital Information Resources

6.1 Improving the Library's Internal System

6.1.1 Improvement Search Performance and Accessibility of Digital Data

As with the names and classifications of digital information resources, companies that provide

digital information resources, such as Woongjin OPMS, Woori E-book, Kyobo Bookstore, YES24, Book Cube, Aladdin, and ECO for e-books, and ECO, Audien, Book Cube, IPAPELIKA, Changbi, and Audiorac for audio-books, vary from a library to another. It is very inconvenient for the users as they need to download different viewers to access digital information resources of the same library if they are provided by different companies. In addition, for libraries that do not support an integrated application (e.g. Busan Metropolitan Simin Municipal Library and Gwangju Metropolitan Library) users must visit the library's website to find books or use viewers of e-book providers of the library, such as Book Cube and Kyobo Bookstore, to find books. As revealed by the survey results, this problem has caused a great deal of inconvenience to users. However, the library cannot help but have more than one provider in order to keep the diversity of digital information resources (Kim, 2020). In order to solve the problem, it is crucial to develop an integrated application for e-books and unify the e-book viewers that are different for each company into one. Daejeon Metropolitan City Hanbat Library and Seoul Metropolitan Library show two good cases of achieving this goal. Daejeon Metropolitan City Hanbat Library has developed an integrated application that links different viewers and allows the users to search and read books through the application. The users only need to download the application along with five viewers from the e-book suppliers once. Similarly, Seoul Metropolitan Library has also developed an integrated viewer, allowing its users to read all e-books of the library through a single viewer. However, due to a high cost, neither of the above two methods can be implemented by all libraries. Also, due to a conflict of interest with digital information resource suppliers, the integrated viewer of Seoul Metropolitan Library has a lack of diversity of the books it offers (Kim, 2020). In order to solve the problem, mediating different opinions of each company and supporting the cost of creating an integrated application at a national level are deemed necessary.

6.1.2 Providing One-stop Services for Digital Information Resources through the Operation of an integrated Data Management System

Yoon (2009) stated that the library's website needs to act as a gateway to internal and external electronic resources. In addition, she also argued that it should provide, as much as possible, a way to access through a single path and make an integrated search, rather than collecting and listing or linking various electronic resources. Seoul Metropolitan Library and Daegu Metropolitan Jungang Library show a precedent for the role of library's website. In the case of the Seoul Metropolitan Library, users can use all digital information resources of the Seoul Metropolitan Library through the Library's integrated website and application for e-books. Likewise, users can use all digital information resources provided by the libraries in Daegu City through the city's integrated website for libraries. In the above cases, all digital information resources of the libraries are being provided as a one-stop service, greatly improving the accessibility of digital information resources (Hong 2020: Kim, 2020). As such, other local governments should also introduce similar services to strengthen the function of library websites and improve accessibility of digital information resources.

6.1.3 Conducting Customized user Education

East (2005) asserted that users should be educated to understand how to find a specialized gateway or search engine that can identify suitable web resources. Also, Yoon (2009) argued that education should be conducted to increase the level of knowledge in searching and processing electronic materials on the web rather than in the library. In addition, examining the survey results reveals that the rate of participation in the survey by those who are between 30 and 69 years old is very low, unlike that of those in their 20s who are familiar with mobile and digital devices. More than 40% of those aged between 30 and 69 years old responded 'Agree' or 'Strongly agree' to question items of ' It is difficult to find the location of information that I look for on a website. ' and 'Don't know which database to choose to find desired data,' showing the difficulties they find when using digital information resources of the library. Therefore, the library should periodically conduct customized user education to eliminate reluctance to use digital information resources for age groups unfamiliar with digital devices in order to increase the utilization of digital information resources by library users.

6.1.4 Establishing Web Archives and Digital Information Resource Preservation Systems

The preservation value of information resources distributed on the web is well-recognized by many researchers and users. The amount of information resources circulating on the web is increasing rapidly, and many information resources are only published on the web, and the reality is that the dependence on such information resources is very high (Noh & Ko, 2012). Therefore, it is necessary to expand the construction of web archives as well as private archives for the preservation of digital information resources. In particular, libraries must establish digital information resources on their own by expanding the private collection and preservation of electronic manuscripts, electronic journals and online data. In order to support the establishment, it is also vital to implement a long-term preservation policy for digital information resources.

6.2 Improving External Environment and Policy

6.2.1 Contracting with more Libraries for Digitized Data Use Agreements and Strengthening Support

Kim, Cho, & Ko (2003) stated that the digitization of a library puts a heavy burden on the library, as it entails an economic burden and requires a large fixed cost. In addition, the government is not seeking to immediately resolve the problems of insufficient access to and content of digital information resources of the library since it still doubts the economic feasibility of digitizing the library. However, from an economic point of view, digitization of the library has a very good benefit/cost ratio of 1.70 and is evaluated to have a long-term ripple effect (Kim, Cho, & Ko, 2003). Therefore, it is necessary to contract with more domestic and overseas libraries to have a cooperative agreement with large libraries, such as the National Library of Korea or representative libraries of each region to lift the burden of supplementing digital information resources. Library

compensation to support increasing convenience of use should continue in order to verify the usefulness of library digitization in the long term.

6.2.2 Improving Copyright Laws and Enforcement Decree

Legal practice under the copyright laws and enforcement decree should be improved to expand Internet services for orphan works. Currently, in order to service orphan works on the Internet, it is necessary to request the search for the copyright holder of the orphan works. If the whereabouts of the copyright holder cannot be found, an approval from the Ministry of Culture, Sports and Tourism and a "legal license" to deposit compensation must be obtained before servicing the orphan works. However, too much cost and time required during this process hinders the use of copyrights (Ahn, 2016). Thus, it is necessary to reduce the time and cost by improving the rules and regulations for orphan works in order to expand Internet service. In addition, prospective discussion considering the purpose of publicity and copyright protection system of the library also needs to be carried out.

6.2.3 Unifying the Names and Classifications of Digital Information Resources

The current status survey of representative libraries in metropolitan cities showed that each of the libraries uses different names for digital information resources, such as digital data, online data, electronic data, and non-book data. In addition, the classification of digital information resources also varies from a library to another, such as e-books, possession-type e-books, subscription-type e-books, e-books, audio-books, academic DBs, partner institution DBs, full texts, and full-text DBs. Indeed, such inconsistency hinders libraries from sharing and cooperating for digital information resources, and it may confuse users of the digital information resources. Consequently, it is necessary to unify the names and classifications of digital information resources. The unification needs to start from the regional representative libraries, which manage the public and small libraries in each region, so they can prepare and distribute guidelines to the libraries they oversee.

6.2.4 Simplifying Procedure for Using Digital Information Resources

In order to use digital information resources in a library, users need to sign up for a member on the library website and visit the library in person to make a membership card. In addition, users also need to subscribe to an integrated e-book website for libraries that have an integrated e-book website (e.g. Incheon Metropolitan City Michuhol Library and Daejeon Metropolitan City Hanbat Library) and sign up for different viewers of e-book suppliers if they need to use a separate viewer for each supplier. It was confirmed in the survey that users of digital information resources are experiencing a great deal of inconvenience due to such a complicated procedure. In addition, amid of COVID-19, it became frequent that users cannot sign up for a library membership that requires an in-person visit to the library as the library is closed (Park, 2020). In order to resolve the inconvenience of users, it is necessary to implement a non-face-to-face signup service and simplify

the registration process. In the case of the Seoul Metropolitan Library, Busan Metropolitan Library, and Daegu Metropolitan Jungang Library, users can sign up as a member without having to go to the library by downloading an application to confirm their residence in the city. Libropia, an e-book service provider, also stated that, “If a non-face-to-face signup service for the library is activated, the users’ convenience will be enhanced.” (Park, 2020). However, Seoul Metropolitan Library, which offers a non-face-to-face registration service, has a complex procedure for users other than Seoul citizens, such as those who work or study in Seoul, requiring submission of supporting documents and apply for a membership card. Also, users need to download two or more applications and go through three separate signup processes to use the non-face-to-face registration service of Busan Metropolitan Simin Municipal Library. As such, there are still a lot of matters to be improved for non-face-to-face registration services. No user will endure such a process, and it will, rather, force the users to leave. There is an urgent need to strengthen accessibility by simplifying the procedure for using digital information resources.

7. Concluding remarks and policy implications

This study analyzed previous research and investigated the current status of representative metropolita n libraries to identify impediments to the use of digital information resources and surveyed users to devise improvement measures for the use of digital information resources. As a result of the study, it was found that the primary users of digital information resources are in their 20s who are familiar with digital devices; however, they were observed to feel functional difficulties when using digital information resources provided by the library. Consequently, the following are proposed separately for the library and the nation in order to solve the problem. From the viewpoint of the library, first, it is necessary to supplement digitized materials by expanding agreements between libraries to efficiently construct digital information resources of the library. In addition, the research found that the users perceive expanding the diversity of data by securing additional digital information resources as the most urgent issue to be improved. Moreover, among the psychological difficulties, the numbers that responded to 'Agree' or 'Strongly agree' to 'It’s disappointing that there are not as many materials as I expected available for use' and ‘I am not sure whether the library does not have the materials I look for or I am the one who cannot find the materials.’ are most dominant. In order to solve such a data shortage problem, it is necessary for the library to actively collect data through agreements between libraries.

Second, it is necessary to support users for easy access to digital information resources by improving the function of library websites and developing library applications for the use of digital information resources. As observed in this study, 65% of the participants responded that they are experiencing the inconvenience of having to install multiple viewers several times to use digital information resources, which is one of the main problems that users complain of inconvenience when using library information resources. Consequently, it is necessary to implement a platform to facilitate the use of electronic resources by developing information services for quick and easy access and reading.

Third, customized user education should be provided to educate users who are not familiar with using digital information resources. The survey results showed that the primary users digital information resources are in their 20s, and those aged between 30 and 69 have a relatively low use rate. Also, it was found that even those users in their 20s are not familiar with searching for information through library websites. Therefore, it is necessary to increase the utilization of digital information resources through continuous user education.

At a national level, first, impediments to the use of digital collections should be improved through revising copyright laws and making institutional improvements related to digital resources. As suggested earlier for the library sector, users responded that expanding the diversity of materials by securing additional digital information resources is the most urgent issue to be resolved. However, the biggest factor that hinders the library's collection of information resources is that the library's rights are institutionally restricted. Because the library's rights are institutionally restricted for literary works, the information services that libraries can offer are also limited. As seen in the survey results, users experience inconvenience as they cannot edit or copy data due to a limited scope of use. In order to solve such problems, it is necessary to ensure that there is no difficulty in using digital information resources by enacting copyright laws suitable for digital information resources and enabling the library to smoothly collect digital information resources through institutional improvement.

Second, it is necessary to unify the names and classifications of digital information resources by establishing national guidelines. Because the names of digital information resources are different for each library, misunderstanding between the library and users may occur. As discussed earlier, 64% of the users responded that the names and classifications of digital information resources, which differ from library to library, should be unified. Still, ambiguous legal boundaries of digital information resources do not only cause libraries to have different names for digital information resources but also lead to a lack of institutional services. Therefore, it is urgent to unify the names of digital information resources through revision of national guidelines.

The limitations of this study are that it was difficult to directly survey library users due to the outbreak of COVID-19 and the survey was conducted only among people who had experience in using digital information resources in various communities. Thus, this study falls short of surveying users who are not familiar with digital information resources. The majority of the participants were in their 20s who are the primary users of digital information resources, and it was difficult to collect accurate information on the reasons why library users aged between 30 and 69 were not able to make good use of digital information resources.

Consequently, it is deemed necessary to establish customized user education for each age group and accordingly revise the library law by analyzing the exact reasons why library users aged between 30 and 69 were not able to make good use of digital information resources.

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