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A study to evaluate the digitization level of Korean libraries (part I)

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Abstract

Purpose – The purpose of this paper is to discover and enumerate the elements of the digital library and measure how much an individual library was equipped with the characteristics of the digital library accordingly.

Design/methodology/approach – For this purpose several steps were taken. First, research on the characteristics and the representative services of the digital library were comprehensively reviewed. Second, examples of the library services that were being considered for the next generation digital library were investigated to compare with the conventional library services. Third, the elements of the conventional and the digital libraries initially extracted were examined by ten experts. These experts were composed of researchers and professors specializing in digital libraries, and career librarians who had worked in the digital library field for at least ten years. The elements were verified through discussions with them. Fourth, 19 university libraries, 16 public libraries, and 17 special libraries were selected in accordance with the verified elements of the conventional and the digital libraries to measure the digitization level of the libraries.

Findings – The following is a summary of the evaluation of the first eight evaluation items, which are covered in Part 1 of this study. The remaining five items will be covered in Part 2. First, the digitization level of the acquisition element and classification and cataloguing was significantly high. Second, book collections excluding "digital video," reference service, library program service, and space service showed significantly conventional characteristics. Third, in the element of circulation services, the item of lending books offline and returning the books scored 92.64 and the item of lending-returning with use of smart devices and social media obtained significantly low scores. Also, the average in using the book return desk for the circulation service was 81.39, much higher than using the automatic book return machine, which scored 18.61, by a wide margin. Fourth, in the element of user services, the digital item of providing support for mobile services related to the library resources demonstrated higher scores than the conventional item, but other items showed more conventional characteristics. In particular, the item of duplication services for material scored 94.99, but other items such as support for publication/bookbinding services using digital publication tools and devices obtained significantly low scores.

Originality/value – This study is first study in the world to measure the level of digitization of the library. Therefore, hereafter, each library will be able to measure and determine its digital position based on these elements. Up to now, some research was performed in pursuit of extracting the elements of a library but it has relied solely on literature review. Comprehensive research had never been performed as in this study.

Keywords Digital libraries, Conventional library, Digital factors, Elements of the digital library, Level of digitization of the library, Measure the digitization

Paper type Research paper

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1. Introduction

Discussions about digital libraries have been going on since the 1990s and a number of reports and journals have delved into the various changes that have occurred in libraries in this emerging digital world. The level of social contribution or efficiency of the digital library has not always been better than a conventional library; however, social changes according to the development of society and IT have caused the libraries to improve their digital services. For example, the American Library Association (ALA) explained the future of a public library by making a comparison between a physical library and a virtual library as along one of four dimensions, but it emphasized how much the libraries came to have attributes of the virtual library in line with the development of the era, rather than claiming that the virtual library should substitute for the physical library.

Furthermore, a variety of research was performed in relation to the development of the future role for libraries and their strategy for preemptively coping with the environmental changes surrounding them. ALA (2011) suggested several development plans for the public library in the twenty-first century such as strategic visions, purposes, process plans conforming to the strategies, enforced evaluation, and reflux (monitoring). The Association of College and Research Libraries proposed insights into the future for a university library and a development strategy with respect to changes in the social/political/economic environment such as demographic change and globalization. Also, Arts Council England (2013) predicted future library service taking into consideration environmental changes such as reduced budgets, localization/decentralization, and the consumer behaviors of an aging population, multiple cultures, and economic recession, and promoted the strengthening of the availability of librarians in the public library to play a key role for local residents' creation, learning community, digital technology and media production. Besides, the American Museum, the Institute of Museum and Library Services presented its vision for future libraries in the USA, and suggested both a purpose and strategy to realize digital integration.

As with the previously mentioned reviews, the research on the changes in the roles and the elements of the library, according to the environmental changes, were performed by the associations or countries, and they presented the strategies for improving the level of digital integration based on the results.

This study was intended to shed new light on the digital library through reviewing domestic and foreign literature and all kinds of reports and investigated cases. After determining the elements of the digital library, this study measured which elements were included in a specific library among the characteristics of the conventional and the digital libraries. In most cases the digital or conventional elements would be helpful to effectively fulfill the original role of the library. At other times, the same elements could be interruptive depending on the situation in the library. Therefore, this study focussed on deciding the elements of the digital library as much as possible and measuring each library to determine its digital position based on these elements.

It is very important to know the levels of digitization. This is because, by comparing the level of the digitations of our libraries with the levels of the digitization of the other libraries, and evaluating these values, the future direction of our libraries can be decided. It appears that the evaluation elements that have been arrived at in this research can be utilized by each individual library in evaluating the levels of the digitization of their libraries.

2. Literature review

This study set out to find the elements of the digital library to measure the digitization level of the library. Thus, in reviewing previous research and theories, this study concentrated on the studies extracting the elements of the digital library. First of all, as a study on developmental directions for the future library and sustainable elements of the library system, Jochumsen *et al.* (2012) emphasized both the virtual library and the physical library, introduced the 4D model of the public library and explained the way to apply the four dimensions: experience, involvement, empowerment, and innovation. The four dimensions in strategic choices as suggested by the Office for Information Technology Policy (OITP) at ALA were the physical and the virtual libraries, the individual user-centered and the local community-centered, book and creation libraries, and portal and archive libraries. The libraries made choices somewhere between the two extreme ends in line with highly selective continuity to provide the library users and the local community with the optimal service (Figure 1).

Singh and Sharma (2015) analyzed the previous research related to the digital library in pursuit of finding differences between the conventional and the digital libraries and extracted new elements of the digital library. The result divided the attributes of the digital library by five dimensions: use and user, organization, technology use, availability, and employees and the user's understandings of the digital library.

Nam (2011) examined the meaning of digital and the paradigm of the digital library in the Korean library world in a wide approach, which included recognition unit, developmental paradigm of a library, appearance, and the name issue of the digital library. Furthermore, he indicated that some examples of the differences between the conventional and the digital libraries were as follows: facility-centered vs service-centered, printed media-centered vs electronic media-centered, owned material vs accessed material.

Noh (2014) examined digital library services applied by state-of-the-art technologies, in the pursuit of revealing the possibility of applying the technologies and services to the domestic libraries. She concluded that cloud service, space of infinite creation, big data, augmented reality, situation recognition technology, Google glass, innovative display technology, and LOD-based contents would become the core technology, concept, and tools of the next generation digital library. According to further research, Noh (2015) considered the era of 4.0 libraries would come in 2015 and pointed out the

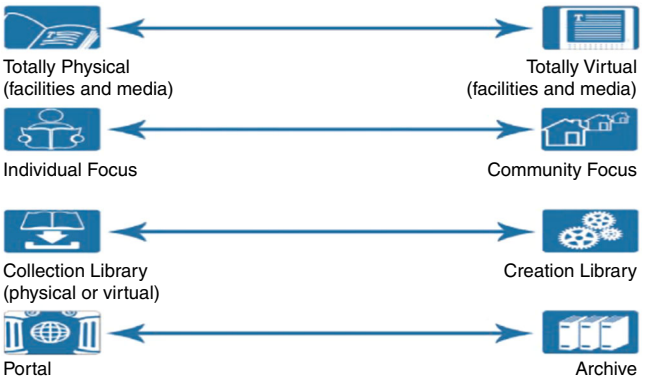

Figure 1.
Vision of the public library in the future

essential keywords and concepts of the library such as intelligence, makerspace, context-aware technology, open contents, big data, cloud service, augmented reality, and state-of-art display.

In addition, the research of several others regarding the elements of the digital library was summarized in Table I.

3. Research design and methodology

Even though it was difficult to clearly distinguish the elements of the conventional and the digital libraries, the elements of the digital library were finally extracted through reviewing the literature of previous research and consultations with experts to compare them with the elements of the conventional library. Figure 2 shows the research process.

In discussions of distinguishing the conventional and the digital libraries, some researchers found different dimensions and the elements accordingly. For example, OITP at ALA classified four dimensions, which were the physical and the virtual libraries, the individual user-centered and the local community-centered, the book and the creation libraries, and the portal and the archive libraries. Jochumsen *et al.* (2012) introduced 4D of experience, involvement, empowerment, and innovation, and Singh

Researcher	Elements of the digital library
Mukaiyama (1997)	Messaging system, agent, multimedia database, system architecture composed by application system, digitization of literatures, intelligent information searching engine, SDI agent, concept-based searching, hypermedia searching with use of 3D visualization, and concept-based video searching
Kroski (2009)	Mobile (new service and basic technology, mobile content, new transfer format, and mobile application), social media (social media and library website, attractive experience, and collaboration and social work), and openness (open source applications and open contents) were suggested, and the core areas of the next generation digital library were suggested as semantic web, grouping, cloud computing, life streaming (recording personal daily life online by writing blogs or collecting pictures or taking videos), and filtering
Breeding (2011)	Changes of book format and the composition (digitization and application of various multimedia) and abundant fusion (boundarylessness between devices and between content formats)
Piper (2013)	Sharing system, meta data, and digitized content
McGettigan (2013)	Virtual reference service, personalized OPAC, 24 hours service, provision of media downloadable at home
American Library Association (2013)	Mobile internet, cloud sourcing, open source development, and cost-effective online education
Chow *et al.* (2010), Kroski (2009), Bell and Trueman (2008) and Chow and Croxton (2012)	Virtual library for such as collaboration in the virtual world, information sharing, and learning activities
Crane *et al.* (2006)	Elaborated screen design according to characteristics of digital collection, autonomous learning, decentralized participation and contribution to community in real time

Table I.
Researches on suggesting the elements of the digital library

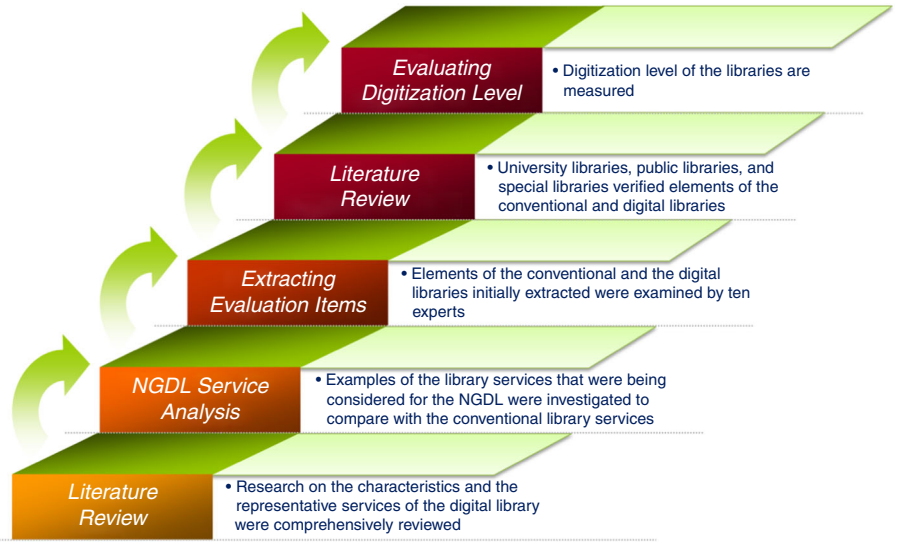

Figure 2.
Research process and methodology

and Sharma (2015) proposed the five dimensions of the use and the user, the organization, the technology use, availability, and the employee and the user's recognitions of the digital library. On the other hand, some research defined the characteristics and the elements of the digital library only in consideration of the services provided by the library. Kroski (2009) characterized the next generation digital library as mobile (new service and basic technology, mobile content, new transfer format, and mobile application), social media (social media and library website, attractive experience, and cooperation and social work), and openness (open source applications and open contents) and he pointed to the semantic web, grouping, cloud computing, life streaming (recording personal daily life online by writing blogs or collecting pictures or taking videos), and filtering as the core areas of the digital library.

This current study divided the elements of the conventional and the digital libraries and contrasted them based on the essential tasks of the library. Through research processes, it initially established an axis to compare along 13 dimensions such as data collection and acquisition, book collection (physical/online book collection), classification and cataloging, circulation service, reference service, library program service, user service, space service, SNS service, organization and employees, device providing service, and next generation service. The indices for evaluating the digitization level according to the elements of the libraries were summarized in Table II.

This research systematically analyzes each of the results with respect to the above items by interest and by item.

With so much data to report, the contents exceeded the publishing limitations, so a decision was made to divide the study results into two parts. In the first part, the results of the literature review are intensively analyzed and presented. Additionally the process for determining which elements would be used for evaluating the digitalized levels of the libraries is described and the elements are identified. The results for the first eight of the 13 elements have also been included in the first part.

Element of the library	Reference
Acquisition	Singh and Sharma (2015)
Collection (physical online collection)	Singh and Sharma (2015) and Kroski (2009)
Classification and cataloging	Singh and Sharma (2015)
Circulation service	Singh and Sharma (2015)
Reference service	Singh and Sharma (2015) and McGettigan (2013)
User service	Singh and Sharma (2015)
Library program service	
Space service	NCSU Hunt Libraries (2015), Willingboro Public Library (2015), Resnick (2014), Chow *et al.* (2010) Bell and Trueman (2008) and McGettigan (2013)
SNS service	Kroski (2009), McGettigan (2013), Facebook Worldcat, Connotea, CiteULike, LibraryThing, Kwack, Noh (2013) and Lee *et al.* (2007)
Organization and employees	Singh and Sharma (2015) and Mohsenzadeh and Isfandyari-Moghaddam (2011)
Device service	Singh and Sharma (2015)
Next generation service	Goh (2011), Singh and Sharma (2015), Unquiet Librarian (2012), Koerber (2012), Britton and Considine (2012), Hopwood (2012), Lee (2013), Kwon (2013), Park (2012), Kim *et al.* (2013), Noh (2013), Ha *et al.* (2011), Hyun *et al.* (2011), Chow *et al.* (2010) Bell and Trueman (2008), McGettigan (2013), Breeding (2011) Koo (2010), Whitchurch (2011), Ohigashi Oasay (2011) Walsh (2010), Ashford (2010), Kim and Park (2011) and Park (2012)
Our library is	Nam (2011) and Levien (2011)

Table II.
Index for evaluating the digitization level by the elements of the library

In Part 2 the remaining five elements will be discussed and the contents and classifications of the index for evaluating the digitization levels of the libraries will be repeated for easier interpretation of the material. The implications of the current research and proposals for future research will also be presented.

4. Result

After consultation with the ten expert advisors chosen for this study, and as a result of the examination of the index of 12 dimensions of conventional and digital factors used to determine the elements of the libraries necessary to evaluate the digitization level, 13 dimensions were finally determined for the axis of comparison: acquisition, book collection, classification and cataloging, circulation service, reference service, user service, library program service, space service, SNS service, organization and employees, device providing service, and next generation service. The results were summarized in the Table III. The code in the table was assigned in order for convenience and simplicity of expression for the analysis tables and charts.

The participants in this study totaled 52 libraries of which 19 were public libraries, 16 university libraries, and 17 special libraries that were registered in the National Library Statistics System; the collected indicators were in total 52 sets, with an 86.67 percent return rate. The evaluation was performed from August 18 to 31, 2015.

The libraries were evaluated on how much they were conventional or digital according to the elements, and 13 items such as acquisition, book collection, classification and cataloging, circulation service, and user service were assessed.

Code	Conventional	Element of the library	Digital	Code
A1	Determining material (book, periodical, annual publication, yearbook, software, video, etc.) for purchasing offline (utilizing agency and booklet)	Acquisition	Determining material (book, periodical, annual publication, yearbook, software, video, etc.) for purchasing online (utilizing online catalogue, etc.)	A21
A2	Requesting material offline		Requesting material online	A22
A3	Selecting material offline		Selecting material online	A23
A4	Purchasing material offline		Purchasing material online	A24
A5	Comprehensively acquiring material offline		Comprehensively acquiring material online	A25
B1	Paper book	Collection (physical online collection)	e-Book	B21
B2	Printed journal		e-Journal	B22
B3	Video tape		Digital video	B23
B4	Audio CD		Digital audio	B24
B5	Analog material		Multimedia material	B25
B6	Mostly providing purchased and physical contents		Providing open contents, open sources, and open applications	B26
B7	Manual and semiautomatic book collection management		RFID-based book collection management	B27
B8	Preserving offline material and involving in the copyright issues		Preserving digital material and involving in the copyright issues	B28
B9	Preserved book collection in the offline form		Preserved book collection in the digital form (archiving)	B29
C1	Creating original list	Classification and cataloging	Creating list by downloading	C21
C2	Providing the printed or the booklet list		Providing online list (including provision by mobile devices such as smartphone)	C22
C3	Providing the list with bibliographic information		Providing the list information online with index, abstract, and table of contents	C23
C4	Creating index by manual labor		Creating index by automatic index system	C24
C5	Creating abstract by manual labor		Creating abstract by automatic abstract system	C25
D1	Lending books offline and returning the books online (excluding smart device)	Circulation service	Circulation Service with use of smart devices and social media	D21
D2	Circulation service of the individual library		Integrated circulation service system of libraries	D22
D3	Offline interlibrary loan service		Online interlibrary loan service	D23
D4	Reserving books offline		Reserving books online	D24
D5	Renewing books offline		Renewing books online	D25
D6	Book returning desk		Automatic book returning machine	D26
D7	Circulation service with use of 2D barcode		RFID-based circulation service	D27
E1	Offline reference service	Reference service	Virtual and online reference service (chat service in real time, bulletin board-based service, etc.)	E21
E2	Reference service for offline resources		Reference service for online resources	E22

Table III.
Contents and classifications of the index for evaluating the level

(*continued*)

Code	Conventional	Element of the library	Digital	Code
E3	Offline book recommendation service		Online book recommendation service	E23
E4	Collaborative reference service		Collaborative digital reference service (CDRS)	E24
E5	Offline outreach service		Digital (online) outreach service (reference-question service in utilization of such as video lecture system, online reading-books service for the elders and children, etc.)	E25
F1	Number of offline users	User service	Number of online users	F21
F2	Using offline material		Using online material	F22
F3	Using offline service		Using online service	F23
F4	No internet discussion forum		Bulletin board service such as internet discussion forum	F24
F5	No support for mobile service related to the library resources		Providing support for mobile service related to the library resources	F25
F6	One-way service		Interactive user-based service	F26
F7	Sending e-mail related to library events and services		Sending SMS related to library events and service	F27
F8	Duplication service for material		Support for publication/bookbinding services by digital publication tools and devices, e.g. publication services for books or academic journals are provided by the public libraries and major university libraries in USA	F28
F9	No support for business service		Providing support for business service	F29
F10	Providing only the library-owned resources		Providing linkage service of content with external organizations	F30
F11	Providing education based on the offline material		Supporting digital learning center	F31
G1	Applying the library programs offline	Library program service	Applying the library programs online	G21
G2	Offline user education		Online user education	G22
G3	Offering culture program offline		Offering culture program online (online history experience program, online calligraphy program, etc.)	G23
G4	Offering offline reading program		Offering reading program online (online reading discussion, online guidance for reading and writing, etc.)	G24
G5	Offering the library programs offline		Providing video of the library programs in real time (providing webinar service)	G25
G6	Offering the programs only for members of the library		Offering the program open to the local community for participation	G26
H1	No multimedia room	Space service	Establishing lab (including multimedia room) equipped with high-tech devices such as laptop, iPad, 3D printer	H21

(*continued*)

Table III.

Code	Conventional	Element of the library	Digital	Code
H2	No seats for using computer and laptop		Providing many seats for using computer and laptop	H22
H3	No wireless Wi-Fi		Providing wireless Wi-Fi	H23
H4	Providing offline meeting room		Providing meeting room available for video teleconference	H24
H5	Providing lecture room for seminar		Providing seminar room with large screen	H25
H6	No experience room for high-tech devices		Providing experience room for high-tech devices (experience space of the most recently launched devices), e.g. Google glass, Galaxy gear, etc.	H26
H7	Library promotion using poster and bulletin board		Library promotion in digital billboard	H27
H8	Establishing community center available for offline workshop		Establishing community center available for online workshop	H28
H9	Offline exhibition space		Online exhibition space	H29
H10	Offline reading and discussion space		Online reading and discussion space	H30
H11	Providing the world's best library service in physical form		Providing library service in the virtual world (providing service to experience the library in every corner without directly going to), e.g. Museum view of the National Museum of Korea, etc.	H31
I1	Reference service for new books by pamphlets, etc.	SNS service	Reference service for new books by Facebook, etc.	I21
I2	Reference service in special subjects by booklets		Reference service in special subjects based on social tag/bookmark	I22
I3	Bibliographic information sharing service by comprehensive list system		Bibliographic information sharing service based on social tag/bookmark	I23
I4	None		Information service by Webzine (connecting to short bibliography and the original text)	I24
I5	Direction service of library location using offline tools		Direction service of library location using mash-up, etc.	I25
I6	Library service guide by website		Library service guide by Facebook, Twitter, etc.	I26
I7	Offline new arrival book service of academic resources		Social bookmark service of academic resources	I27
I8	Notification service for new material by sending e-mail		Notification service for new material by RSS, SNS, and SMS	I28
I9	Book searching service by the list		Book searching service by bookmarklets	I29
I10	Library guide service by brochure		Library guide service by Wiki, blog, Facebook, etc.	I30
I11	Offline promotion and event		Promotion and event using Twitter, Facebook, Microblog, etc.	I31
I12	Offline Q&A service		Q&A service using Twitter, Facebook, Kakao Talk, subject guide system, and e-mail	I32

Table III. (*continued*)

Code	Conventional	Element of the library	Digital	Code
J1	Hierarchical organization	Organization and employees	Star organization	J21
J2	The librarian-centered		The user-centered	J22
J3	Based on personal performance		Based on collaborative performance	J23
J4	Performing works mostly by offline system		Performing works mostly by online system	J24
J5	Processing offline material		Digitization of material	J25
J6	Maladjustment of library's employees due to rapid informatization		Maladjustment of library's employees due to rapid increase of data volume	J26
J7	Social alienation due to refusing re-education		Learning by oneself to be socially integrated	J27
J8	Centralized authorities		Decentralized authorities	J28
J9	Offline workload		Online workload	J29
K1	No desktop and laptop computers, etc.	Device providing service	Providing desktop and laptop computers, iPad, e-Book device, etc.	K21
K2	Scanner		3D scanner	K22
K3	2D printer		3D printer	K23
K4	Film camera		Digital camera	K24
L1	No support for cloud-based service	Next generation service	Cloud-based service (example of the cloud-based service) Cloud service for IT resources in the library Collaborative preserving and sharing services of the library's data (collaborative cloud repository) Social network service based on cloud computing Cloud collection service Integrated service of electronic contents based on the cloud Integrated service of the library's academic resources based on the cloud Volunteer service for special subjects in the library based on the cloud	L21
L2	No support for space service of infinite creation		Space service of infinite creation Offering Infinite-imagination program Space service for creative production utilizing 3D printer Space service for realizing business ideas Book publication service and, etc. [a]The space of infinite creation physically demolishes all barriers between local community and the global, academic society and practical reality, writers and	L22

(*continued*)

Table III.

Code	Conventional	Element of the library	Digital	Code
			readers, producers and users, professors and students, employers and employees, creators and consumers, etc. to be social communication space	
L3	No support for big data-based service		Big data-based service (example of the big data-based service) User-centered service based on big data Book recommendation service based on big data Customized user education service based on big data Analysis service for information source network based on big data Analysis service for utilization pattern based on big data Book collection development service based on big data	L23
L4	No support for utilizing Google glass		Service for utilizing Google glass (example of the service by utilizing Google glass) Voice directions service for the disabled Reading-books service Language translation service	L24
L5	No support for augmented reality-based service		Augmented reality-based service (example of the augmented reality-based service) Guide service for location of books in the application of the augmented reality Providing book information service by applying the augmented reality in real books Providing evaluation service for books by applying the augmented reality in real books Providing information service of the library building in application of the augmented reality Providing information service of the inside of library in application of the augmented reality Providing reading support in application of the augmented reality Providing education support in application of the augmented reality	L25

Table III. (*continued*)

Code	Conventional	Element of the library	Digital	Code
L6	No support for situation recognition technology-based service		Situation recognition technology-based service (example of the situation recognition technology-based service) Reference service in the application of the situation recognition technology Lending books service in the application of the situation recognition technology Recognition service for user's behavior, moving route, and temperature Recognition service for users in a state of emergency	L26
L7	No support for library service by using QR code		Library service by using QR Code (example of the library service by using QR Code) Guide service of books by using QR Code Tour service of the library by using QR Code Reservation service for group study room by using QR Code Connection service automatically to the website by using QR Code Location information service for the collections by using QR Code Connection service to book reviews by using QR Code Searching service of the collections by using QR Code	L27
L8	No support for semantic web-based service		Semantic web-based service (example of the semantic web-based service): Searching service by combining semantic matching Linked open data (LOD) connection service to the resources of the world's library RDF expression of the list and bibliographic information Establishing the ontology of the library's information resources	L28
M1	This library has more conventional characteristics	Our library is	This library has more digital characteristics	M21
M2	This library has stronger physical attributes		This library has stronger digital and virtual attributes	M22
M3	This library is ownership-centered		This library is approach-centered	M23

(*continued*)

Table III.

Table III.

Code	Conventional	Element of the library	Digital	Code
M4	The users of the library are consumption oriented		The users of the library are production oriented	M24
M5	This library is collection-centered		This library is datacentered	M25
M6	This library is librarian-centered		This library is user-centered	M26
M7	This library is facility-centered		This library is service-centered	M27
M8	This library is archive-centered		This library is portal-centered	M28
M9	This is the conventional library		This is the digital library	M29

4.1 Evaluation for the digitization level in the elements of the libraries according to the library types

4.1.1 Acquisition. First of all, how much the library was conventional or digital was measured in relation to the acquisitions of the library as follows: the evaluation results for the acquisition element with respect to the conventional library scored 48.06 for A4 (purchasing material offline) and 38.06 for A5 (comprehensively acquiring material offline) in the public libraries, 46.84 for A1 (determining material for purchasing offline) and 35.05 for A4 (purchasing material offline) in the university libraries, and 43.06 for A1 (determining material for purchasing offline) and 38.82 for A2 (requesting material offline) in the special libraries. With respect to the digital library the scores in order were 78.75 for A23 (selecting material online) and 74.69 for A22 (requesting material online) in the public libraries, 71.05 for A23 (selecting material online) and 69.42 for A22 (requesting material online) in the university libraries, and 77.06 for A25 (comprehensively acquiring material online), 75.88 for A24 (purchasing material online), and 75.59 for A23 (selecting material online) in the special libraries.

In evaluating that acquisition was a digital element by a significantly high margin, the averages were scored as 69.86 for the special libraries, 66.65 for the public libraries, and 65.24 for the university libraries, and the most digitized item in the acquisition element was "selecting material online" with a score of 75.13 percent (Table IV and Figures 3-6).

4.1.2 Collection. The digitization level in the book collection was evaluated with respect to the conventional library; the scores were 95.63 for B2 (printed journal) and 94.06 for B1 (paper book) in the public libraries, 87.26 for B9 (preserved book collection in the offline form) and 80.00 for B6 (mostly providing purchased and physical contents) in the university libraries, and 78.13 for B7 (manual and semiautomatic book

Table IV.
Evaluation for the digitization level in the acquisition of the libraries by the library types

	Conventional							Digital						
	Public		Academic		Special			Public		Academic		Special		
Code	Sum	Mean	Sum	Mean	Sum	Mean	Element of the library	Sum	Mean	Sum	Mean	Sum	Mean	Code
A1	545	34.06	890	46.84	732	43.06	Acquisition	1,055	65.94	1,010	53.16	968	56.94	A21
A2	405	25.31	581	30.58	660	38.82		1,195	74.69	1,319	69.42	1,085	63.82	A22
A3	340	21.25	550	28.95	415	24.41		1,260	78.75	1,350	71.05	1,285	75.59	A23
A4	769	48.06	666	35.05	410	24.12		831	51.94	1,234	64.95	1,290	75.88	A24
A5	609	38.06	645	33.95	390	22.94		991	61.94	1,285	67.63	1,310	77.06	A25
Total	2,668	33.35	3,332	35.07	2,607	30.67		5,332	66.65	6,198	65.24	5,938	69.86	Total

collection management) and 76.29 for B1 (paper book) in the special libraries. On the aspect of the digital library, the scores were 78.71 for B23 (digital audio) and 65.31 for B27 (RFID-based book collection management) in the public libraries, 63.53 for B22 (e-journal) and 52.11 for B23 (digital audio) in the university libraries, and 58.33 for B 23 (digital audio) and 52.75 for B22 (e-journal) in the special libraries.

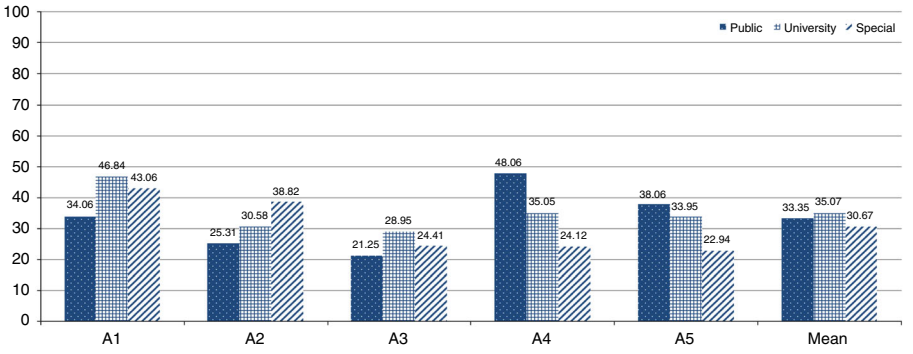

Figure 3.
Evaluation for the conventional elements in the acquisition of the libraries

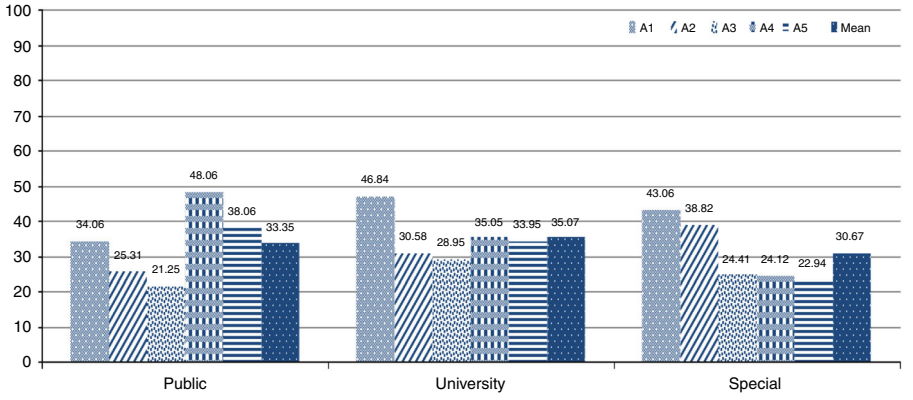

Figure 4.
Evaluation for the digital elements in the acquisition of the libraries

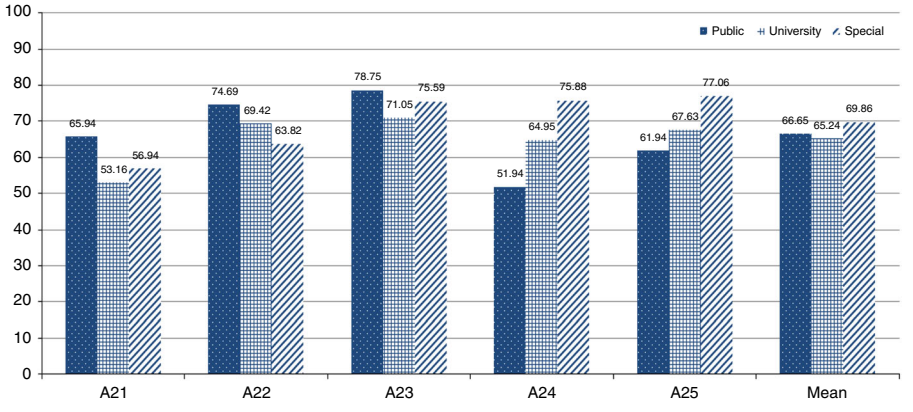

Figure 5.
Evaluation for the conventional elements in the acquisition of the libraries by the library types

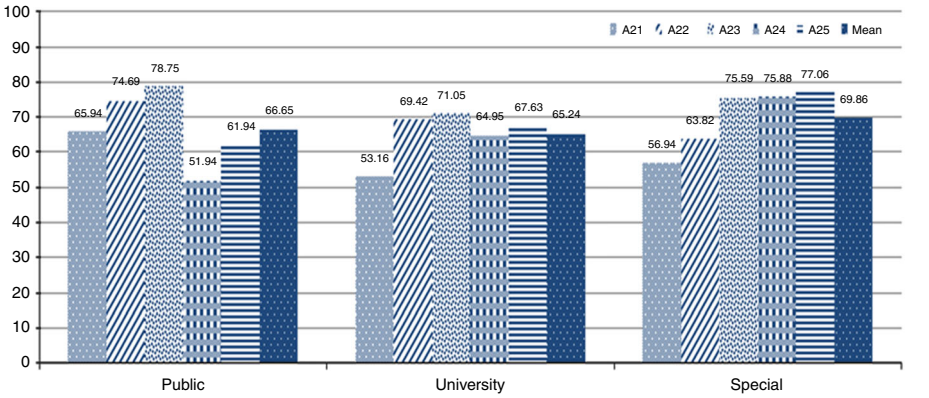

Figure 6.
Evaluation for the digital elements in the acquisition of the libraries by the library types

In evaluating that the book collection was a conventional element, the averages were scored as 73.48 for the public libraries, 65.68 for the university libraries, and 59.10 for the special libraries; thus, the element of book collection was determined to be conventional by all the types of libraries. Additionally, in the element of book collections, all items excluding the item of "digital video" had more conventional characteristics; the paper book collection especially obtained a significantly higher score of 83.19 than the e-book.

Book collection was determined to be a conventional element in all the libraries, with the averages scored as 73.48 for the public libraries, 65.68 for the university libraries, and 59.10 for the special libraries. Additionally, within this element, all items excluding the item of "digital video" had more conventional characteristics; the paper book collection especially obtained a significantly higher score of 83.19 than the e-book (Table V and Figures 7-10).

4.1.3 Classification and cataloging. The digitization level in the classification and cataloging was evaluated with respect to the conventional library; the scores were 39.06 for C3 (providing the list with bibliographic information) and 37.50 for C1 (creating original list) in the public libraries, 27.53 for C3 (providing the list with bibliographic information) and 25.79 for C4 (creating index by manual labor) in the university

Table V.
Evaluation for the digitization level in the collection of the libraries by the library types

Conventional								Digital						
	Public		Academic		Special		Element of	Public		Academic		Special		
Code	Sum	Mean	Sum	Mean	Sum	Mean	the library	Sum	Mean	Sum	Mean	Sum	Mean	Code
B1	1,505	94.06	1,505	79.21	1,297	76.29	Collection	95	5.94	405	21.32	403	23.71	B21
B2	1,530	95.63	693	36.47	756	44.47	(physical	70	4.38	1,207	63.53	844	52.75	B22
B3	298	21.29	910	47.89	500	38.46	online	1,102	78.71	990	52.11	700	58.33	B23
B4	693	46.20	1,185	62.37	660	50.77	collection)	807	53.80	715	37.63	540	45.00	B24
B5	1,236	77.25	985	54.72	810	47.65		364	22.75	815	45.28	590	42.14	B25
B6	2,165	79.06	1,520	80.00	1,100	73.33		335	20.94	380	20.00	400	26.67	B26
B7	555	34.69	1,335	70.26	1,250	78.13		1,045	65.31	565	29.74	350	21.88	B27
B8	1,070	66.88	1,385	72.89	925	57.81		530	33.13	515	27.11	575	38.33	B28
B9	1,440	90.00	1,658	87.26	975	65.00		160	10.00	242	12.74	425	30.36	B29
Total	9,586	73.48	10,184	65.68	7,819	59.10		5,414	32.77	6,831.6	34.38	5,590	37.68	Total

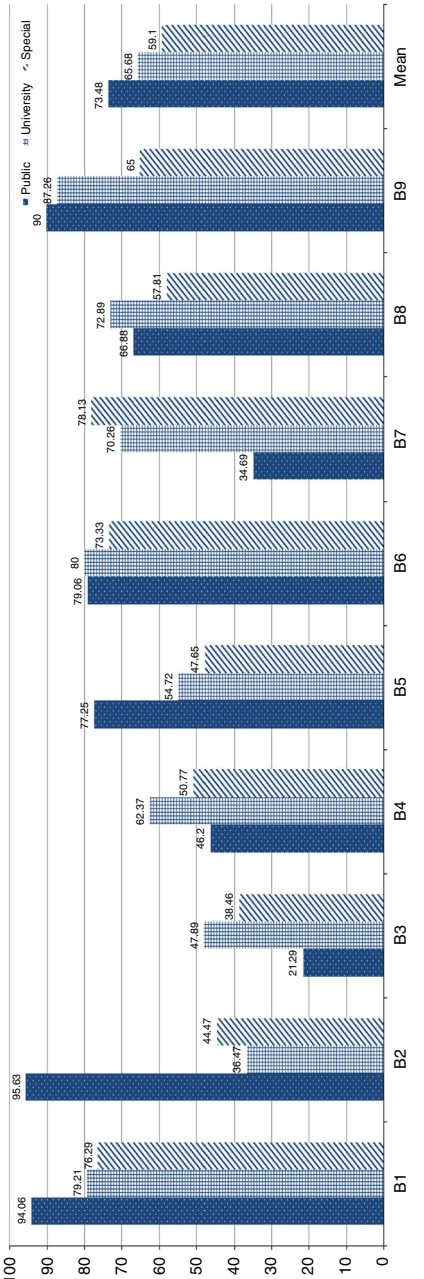

Figure 7.
Evaluation for the conventional elements in the book collection of the libraries

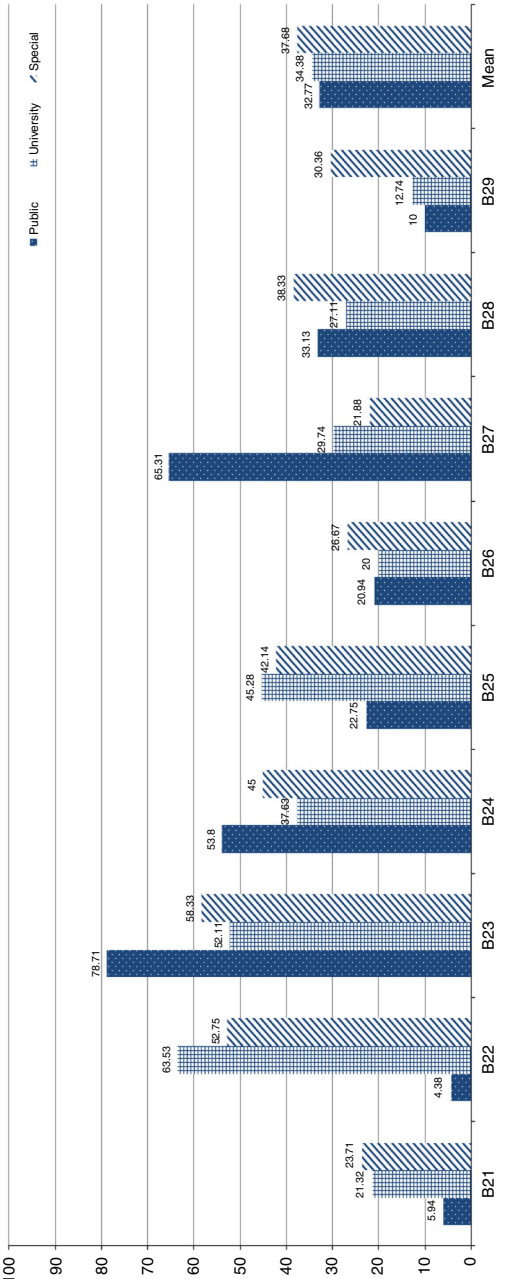

Figure 8.
Evaluation for the digital elements in the book collection of the libraries

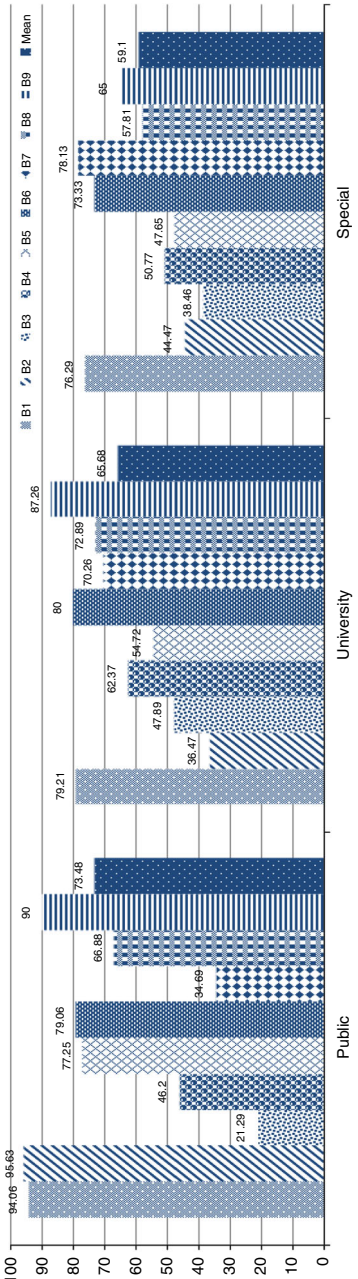

Figure 9.
Evaluation for the conventional elements in the book collection of the libraries by the library types

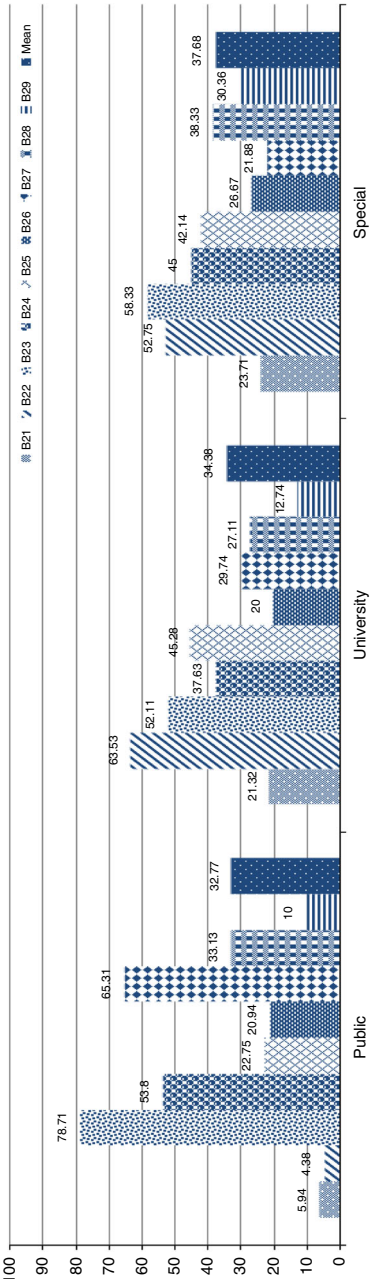

Figure 10.
Evaluation for the digital elements in the book collection of the libraries by the library types

libraries, and 51.47 for C1 (creating original list) and 46.25 for C5 (creating abstract by manual labor) in the special libraries. When considering the digital library, the scores were 80.67 for C25 (creating abstract by automatic abstract system) and 78.67 for C24 (creating index by automatic index system) in the public libraries, 87.21 for C22 (providing online list) and 77.22 for C21 (creating list by downloading) in the university libraries, and 90.94 for C22 (providing online list) and 68.24 for C23 (providing the list information online with index, abstract, and table of contents) in the special libraries.

In evaluating that classification and cataloging was a digital element in all the types of libraries, the averages were scored as 75.96 for the university libraries, 72.18 for the public libraries, and 63.85 for the special libraries. The item of providing online lists scored 85.42, demonstrating a significant difference and had the highest digitization level among all of the items (Table VI and Figures 11-14).

4.1.4 Circulation service. The digitization level in the circulation service was evaluated on the aspect of the conventional library; it scored 91.56 for D1 (lending books offline and returning the books online) and 63.13 for D6 (book returning desk) in the public libraries, 93.68 for D1 (lending books offline and returning the books online) and 83.89 for D6 (book returning desk) in the university libraries, and 97.14 for D6 (book returning desk) and 92.67 for D1 (lending books offline and returning the books online) in the special libraries. On the aspect of a digital library, it scored 73.75 for D24 (reserving books online) and 65.94 for D27 (RFID-based circulation service) in the

Table VI. Evaluation for the digitization level in the classification and cataloging of the libraries by library types

	Conventional							Digital						
	Public		Academic		Special		Element of the	Public		Academic		Special		
Code	Sum	Mean	Sum	Mean	Sum	Mean	library	Sum	Mean	Sum	Mean	Sum	Mean	Code
C1	600	37.50	410	21.18	875	51.47	Classification	1,000	62.50	1,390	77.22	725	45.31	C21
C2	350	21.88	243	12.79	190	11.18	and cataloging	1,250	78.13	1,657	87.21	1,455	90.94	C22
C3	625	39.06	523	27.53	540	31.76		975	60.94	1,377	72.47	1,160	68.24	C23
C4	320	21.33	490	25.79	610	35.88		1,180	78.67	1,410	74.21	1,090	64.12	C24
C5	290	19.33	395	20.79	740	46.25		1,210	80.67	1,305	68.68	760	50.67	C25
Total	2,185	27.82	2,061	21.61	2,955	35.31		5,615	72.18	7,139	75.96	5,190	63.85	Total

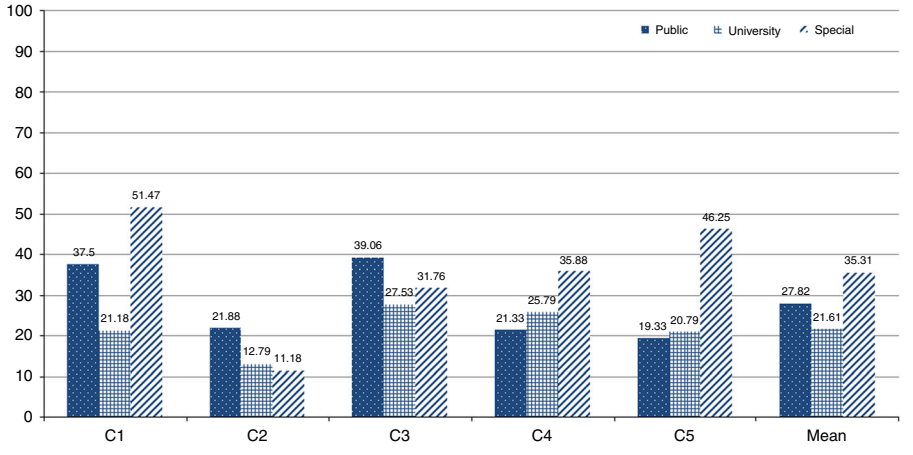

Figure 11. Evaluation for the conventional elements in the classification and cataloging of the libraries

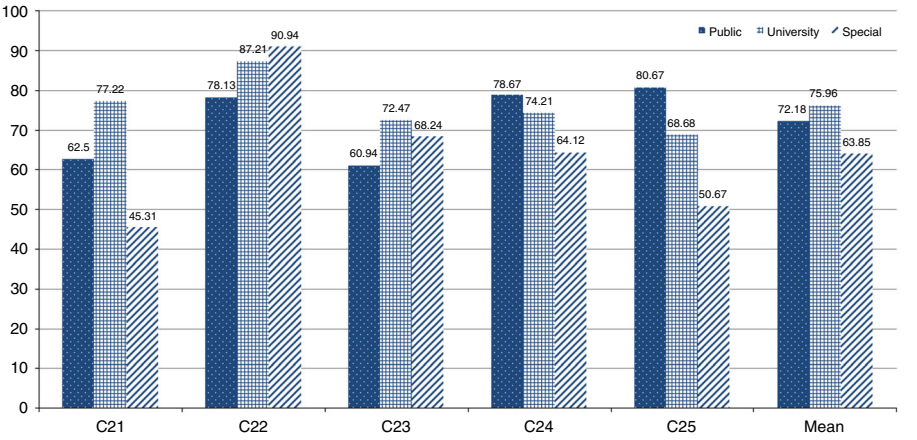

Figure 12.
Evaluation for the digital elements in the classification and cataloging of the libraries

public libraries, 87.37 for D24 (reserving books online) and 83.06 for D25 (renewing books online) in the university libraries, and 58.75 for D24 (reserving books online) and 52.14 for D23 (online interlibrary loan service) in the special libraries.

With respect to the conventional library, the average of the special libraries was 66.36, while on the aspect of the digital library, the averages of the university libraries and the public libraries were in order 51.59 and 50.19. The special libraries were evaluated as being conventional for the circulation service, and the university and public libraries showed similar average scores in circulation services for both aspects of conventional and digital libraries.

Furthermore, on the element of circulation services, the item of lending books offline and returning the books scored 92.64, and the item of lending-returning with use of smart devices and social media obtained significantly low scores. Also, the average in using the book return desk for the circulation service was 81.39, much higher, by a wide margin, than using the automatic book return machine, which scored only 18.61 (Table VII and Figures 15-18).

4.1.5 Reference service. The digitization level in the reference service was evaluated on the aspect of the conventional library; the scores were 87.33 for E5 (offline outreach service) and 76.06 for E1 (offline reference service) in the public libraries, 83.24 for E5 (offline outreach service) and 74.21 for E1 (offline reference service) in the university libraries, and 80.00 for E5 (offline outreach service) and 72.35 for E1 (offline reference service) in the special libraries. With respect to the digital library, it scored 56.56 for E23 (online book recommendation service) and 34.38 for E24 (collaborative digital reference service) in the public libraries, 53.89 for E23 (online book recommendation service) and 40.00 for E22 (reference service for online resources) in the university libraries, and 51.25 for E23 (online book recommendation service) and 40.63 for E22 (reference service for online resources) in the special libraries.

In evaluating that the reference service all fit the conventional element, the averages were scored 67.22 for the public library, 66.09 for the university libraries, and 63.62 for the special libraries. Conventional characteristics were shown in all of the items. In particular, the offline outreach service scored 83.52 percent higher than the online outreach service and the offline reference service scored 74.21 percent higher than the virtual reference service (Table VIII and Figures 19-22).

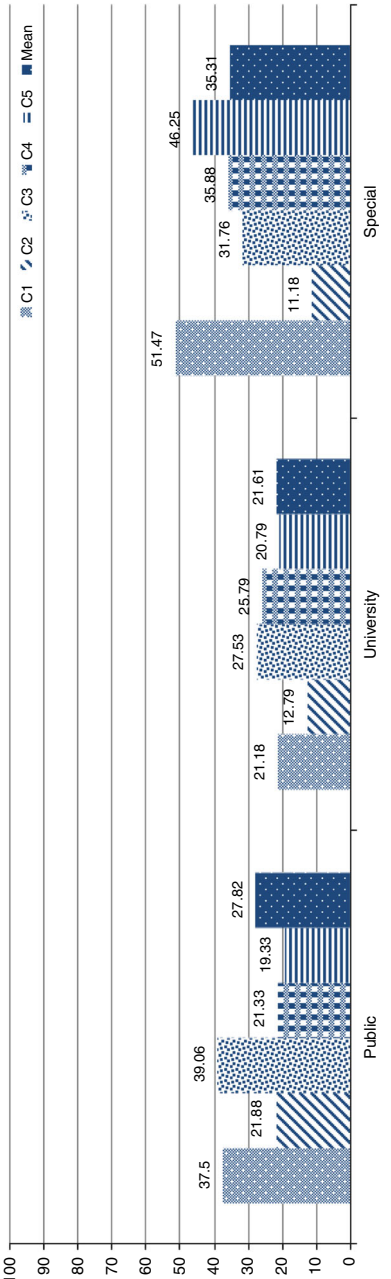

Figure 13.
Evaluation for the conventional elements in the classification and cataloging of the libraries by the library types

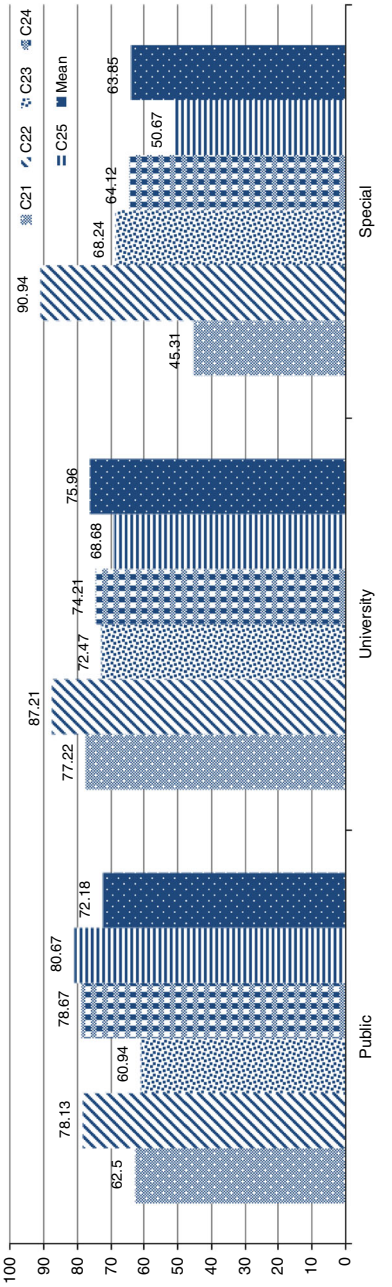

Figure 14.
Evaluation for the digital elements in the classification and cataloging of the libraries by the library types

4.1.6 User service. When the digitization level in the user service was evaluated on the aspect of the conventional library, it scored 94.67 for F8 (duplication service for material) and 85.94 for F11 (providing education based on the offline material) in the public libraries; 96.32 for F8 (duplication service for material) and 82.11 for F9 (no support for business service) in the university libraries; and 94.00 for F8 (duplication service for material) and 82.86 for F9 (no support for business service) in the special libraries. On aspect of digital library, it scored 81.56 for F27 (sending SMS related to library events and service) and 69.38 for F25 (providing support for mobile service related to the library resources) in the public libraries, 57.37 for F25 (providing support for mobile service related to the library resources) and 55.26 for F30 (providing linkage service of content with external organizations) in the university libraries, and 37.67 for F30 (providing linkage service of content with external organizations) and 34.25 for F22 (using online material) in the special libraries. The average scores for F8 (duplication service for material) were high in all types of libraries.

In evaluating that the user service fit the conventional element for all the types of libraries, the averages were scored 71.00 for the special library, 65.40 for the public libraries, and 61.29 for the university libraries. The digital item of providing support for mobile services related to the library resources demonstrated higher scores than the conventional item, but other items showed more conventional characteristics. One item in particular, duplication services for material, scored 94.99, but other items such as support for publication/bookbinding services using digital publication tools and devices obtained significantly low scores (Table IX and Figures 23-26).

4.1.7 Library program service. The digitization level in the library program service was evaluated on the aspect of the conventional library; the scores were 100.00 for G3 (offering culture program offline) and G4 (offering offline reading program) and 96.88 for G5 (offering the library programs offline) in the public libraries, 91.11 for G6 (offering the programs only for members of the library) and 85.56 for G3 (offering culture program offline) in the university libraries, and 83.85 for G5 (offering the library programs offline) and 84.62 for G6 (offering the programs only for members of the library) in the special libraries. With respect to the digital library, the scores were 61.25 for G26 (offering the program open to the local community for participation) and 51.25 for G21 (applying the library programs online) in the public libraries, 55.79 for G21 (applying the library programs online) and 28.95 for G22 (online user education) in the university libraries, and 40.00 for G21 (applying the library programs online) and 15.00 for G22 (online user education) in the special libraries The public libraries scored

	Conventional							Digital						
	Public		Academic		Special		Element of	Public		Academic		Special		
Code	Sum	Mean	Sum	Mean	Sum	Mean	the library	Sum	Mean	Sum	Mean	Sum	Mean	Code
D1	1,465	91.56	1,780	93.68	1,390	92.67	Circulation	135	8.44	120	6.32	110	7.33	D21
D2	820	54.67	725	40.28	1,260	74.12	service	680	45.33	1,075	59.72	340	21.25	D22
D3	440	33.85	425	22.37	570	38.00		760	63.33	1,475	77.63	730	52.14	D23
D4	420	26.25	240	12.63	550	32.35		1,180	73.75	1,660	87.37	940	58.75	D24
D5	550	42.31	305	16.94	720	42.35		750	57.69	1,495	83.06	780	48.75	D25
D6	1,010	63.13	1,510	83.89	1,360	97.14		590	36.88	290	16.11	40	2.86	D26
D7	545	34.06	1,313	69.11	1,230	87.86		1,055	65.94	587	30.89	170	12.14	D27
Total	5,250	49.40	6,298	48.41	7,080	66.36		5,150	50.19	6,702	51.59	3,110	29.03	Total

Table VII. Evaluation for the digitization level in the circulation service of the libraries by the library types

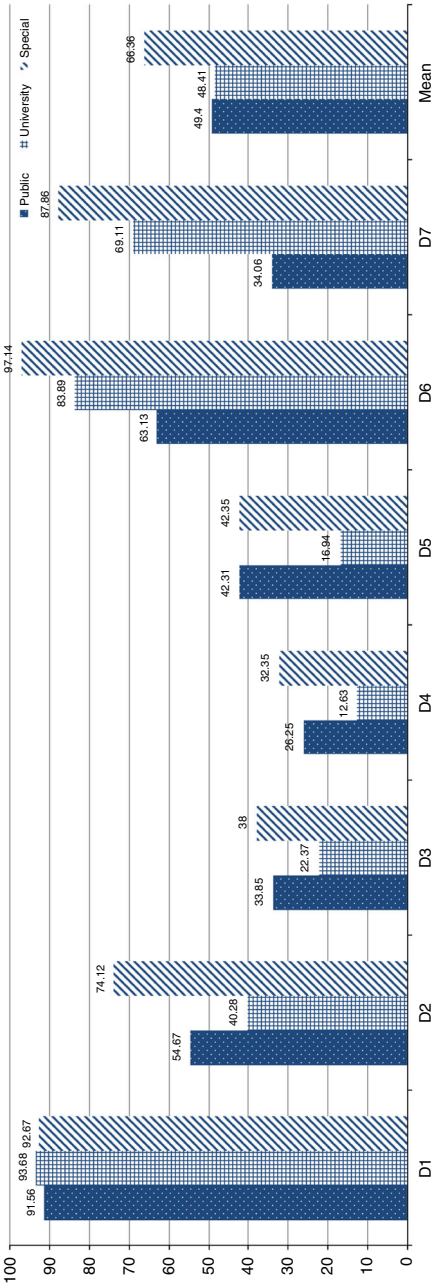

Figure 15.
Evaluation for the conventional elements in the circulation service of the libraries

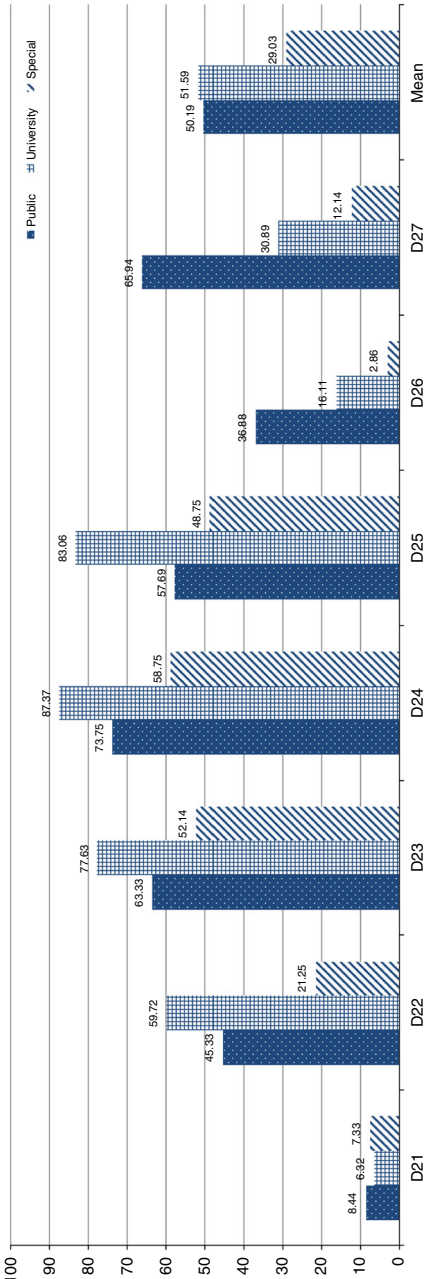

Figure 16.
Evaluation for the digital elements in the circulation service of the libraries

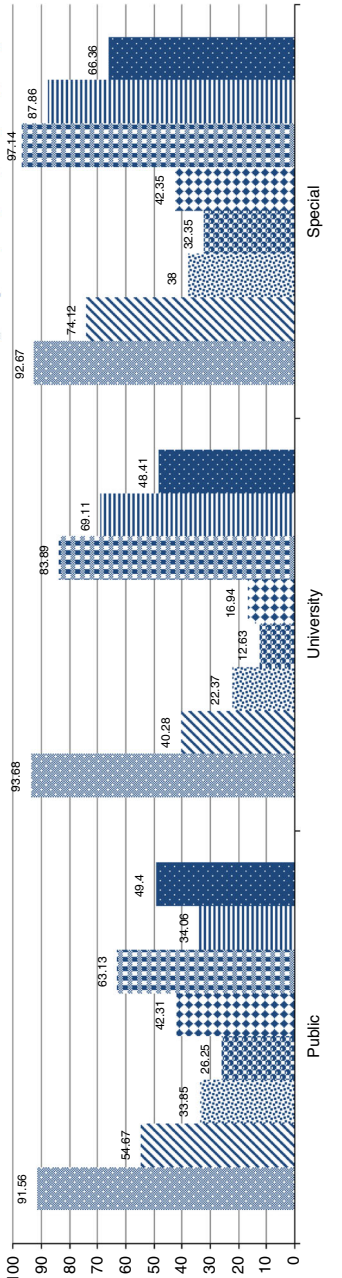

Figure 17.
Evaluation for the conventional elements in the circulation service of the libraries by the library types

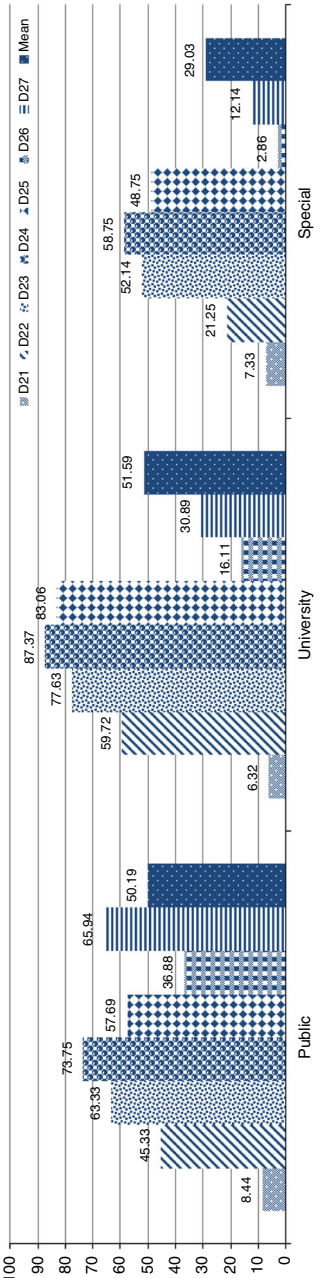

Figure 18.
Evaluation for the digital elements in the circulation service of the libraries by the library types

0.00 for G24 (offering reading program online), implying that they did not provide any reading programs.

The library program service was found to fit the conventional element for all types of libraries, with the averages scored as 78.51 for the public library, 77.80 for the special libraries, and 75.84 for the university libraries. In this element most of the items were significantly conventional. Particularly, the item of offering cultural programs offline scored 89.43 and was significantly higher than the average of offering cultural programs online, which scored 9.90 (Table X and Figures 27-30).

Table VIII. Evaluation for the digitization level in the reference service of the libraries by the library types

	Conventional							Digital						
	Public		Academic		Special		Element of	Public		Academic		Special		
Code	Sum	Mean	Sum	Mean	Sum	Mean	the library	Sum	Mean	Sum	Mean	Sum	Mean	Code
E1	1,217	76.06	1,410	74.21	1,230	72.35	Reference	383	23.94	490	25.79	370	23.13	E21
E2	1,055	65.94	1,140	60.00	950	55.88	service	545	34.06	760	40.00	650	40.63	E22
E3	695	43.44	830	46.11	780	45.88		905	56.56	970	53.89	820	51.25	E23
E4	950	63.33	1,070	66.88	960	64.00		550	34.38	530	33.13	240	17.14	E24
E5	1,310	87.33	1,415	83.24	1,120	80.00		190	11.88	285	16.76	80	6.15	E25
Total	5,227	67.22	5,865	66.09	5,040	63.62		2,573	32.16	3,035	33.91	2,160	27.66	Total

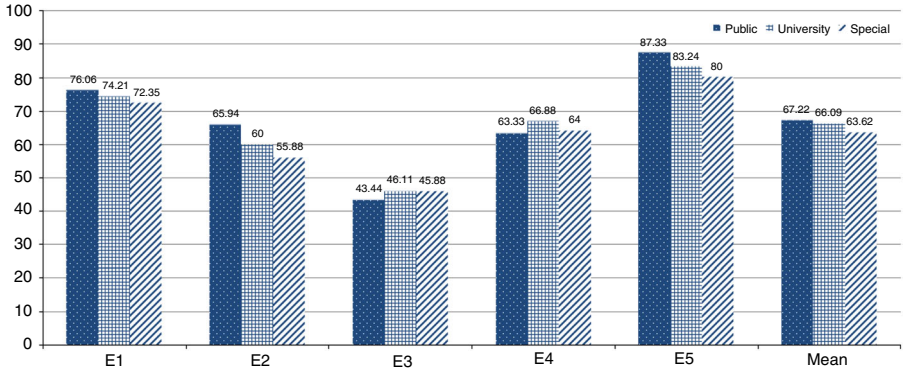

Figure 19. Evaluation for the conventional elements in the reference service of the libraries

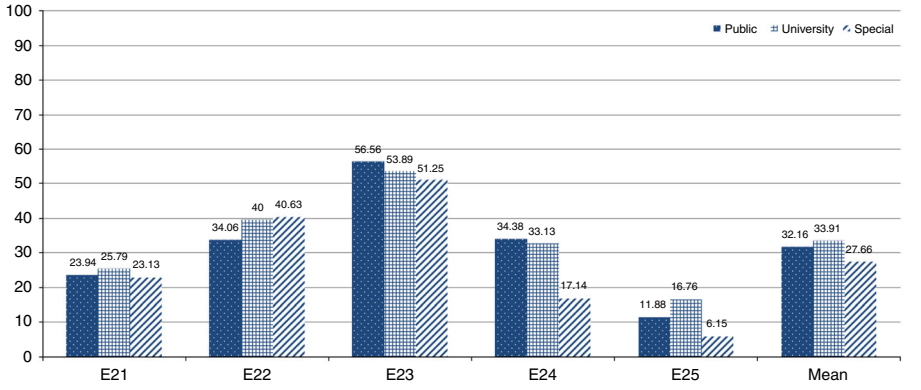

Figure 20. Evaluation for the digital elements in the reference service of the libraries

4.1.8 Space service. When the digitization level of the space service was evaluated on the aspect of the conventional library, it scored 96.43 for H11 (providing the world's best library service in physical form) and 96.00 for H9 (offline exhibition space) in the public libraries; 94.21 for H6 (no experience room for high-tech devices) and 91.11 for H4 (providing offline meeting room) in the university libraries; and 88.13 for H7 (library promotion using poster and bulletin board) and H10 (offline reading and discussion space), 86.67 for H8 (establishing community center available for offline workshop), and 85.45 for H11 (providing the world's best library service in physical form) in the special libraries.

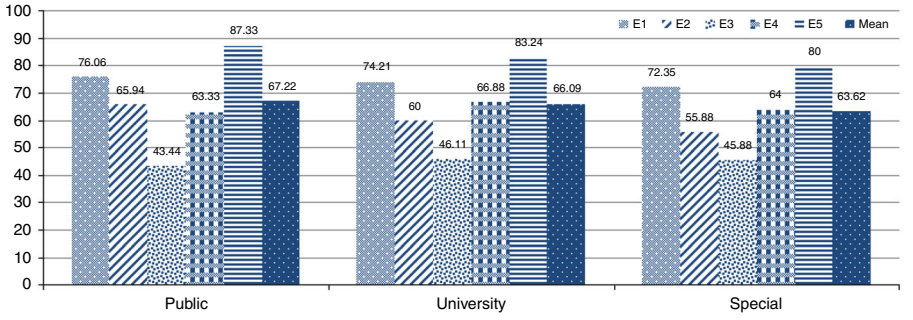

Figure 21.
Evaluation for the conventional elements in reference service of the libraries by the library types

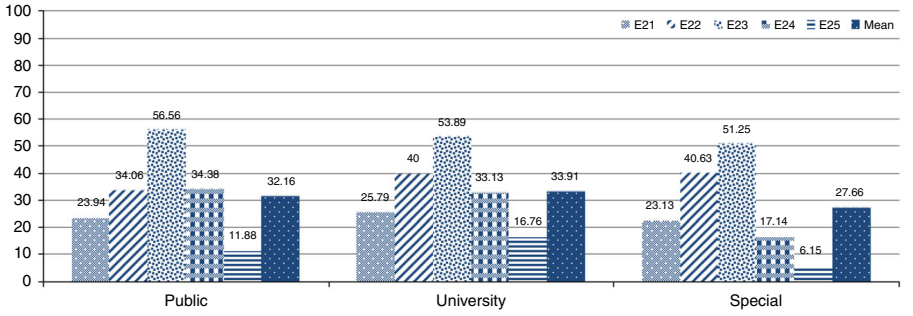

Figure 22.
Evaluation for the digital elements in reference service of the libraries according to the library types

Conventional								Digital							
	Public		Academic		Special		Element of	Public		Academic		Special			
Code	Sum	Mean	Sum	Mean	Sum	Mean	the library	Sum	Mean	Sum	Mean	Sum	Mean	Code	
F1	1,335	83.44	1,265	66.58	1,062	66.38	User service	265	16.56	635	33.42	538	33.63	F21	
F2	1,355	84.69	1,170	61.58	1,052	65.75		245	15.31	730	38.42	548	34.25	F22	
F3	1,290	80.63	1,200	63.16	1,097	68.56		310	19.38	700	36.84	423	26.44	F23	
F4	760	47.50	995	52.37	1,160	72.50		840	52.50	905	47.63	340	22.67	F24	
F5	490	30.63	810	42.63	920	57.50		1,110	69.38	1,090	57.37	580	38.67	F25	
F6	555	34.69	1,000	52.63	1,000	62.50		1,045	65.31	900	47.37	500	33.33	F26	
F7	295	18.44	910	47.89	1,275	79.69		1,305	81.56	990	52.11	225	15.00	F27	
F8	1,420	94.67	1,830	96.32	1,410	94.00		80	5.33	70	3.68	90	5.63	F28	
F9	1,150	82.14	1,560	82.11	1,160	82.86		150	10.71	340	17.89	140	10.00	F29	
F10	1,227	76.69	850	44.74	935	58.44		373	23.31	1,050	55.26	565	37.67	F30	
F11	1,375	85.94	1,220	64.21	1,120	72.86		225	14.06	680	35.79	280	20.00	F31	
Total	11,252	65.40	12,810	61.29	12,191	71.00		5,948	33.95	8,090	38.71	4,229	25.21	Total	

Table IX.
Evaluation for the digitization level in the user service of the libraries by the library types

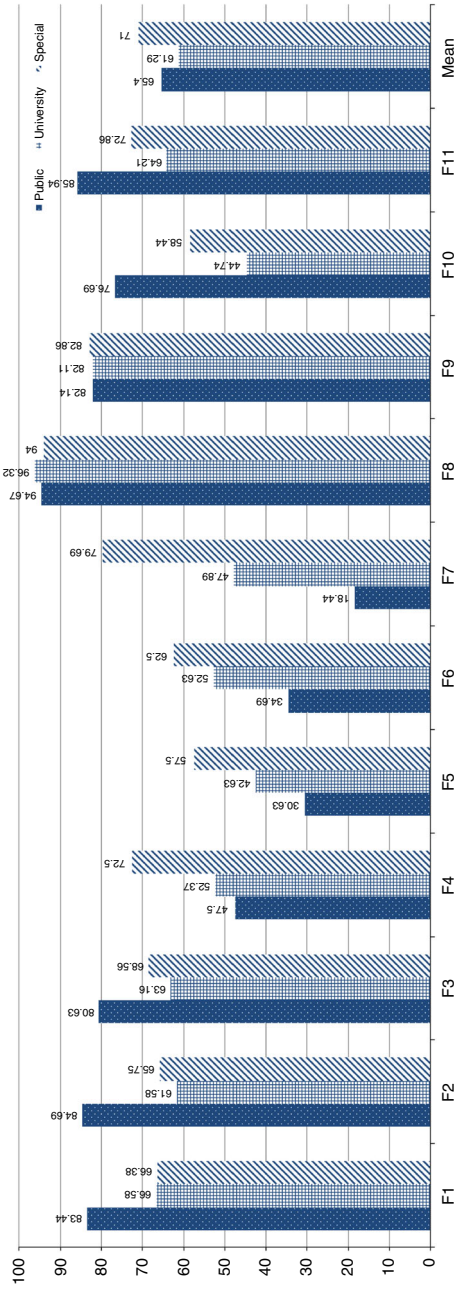

Figure 23.
Evaluation for the conventional elements in the user service of the libraries

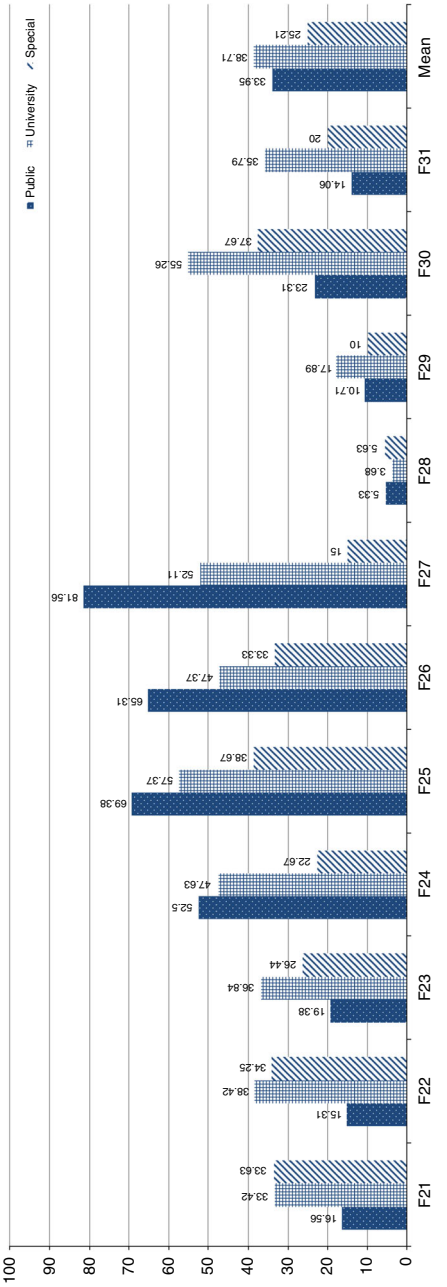

Figure 24.
Evaluation for the digital elements in the user service of the libraries

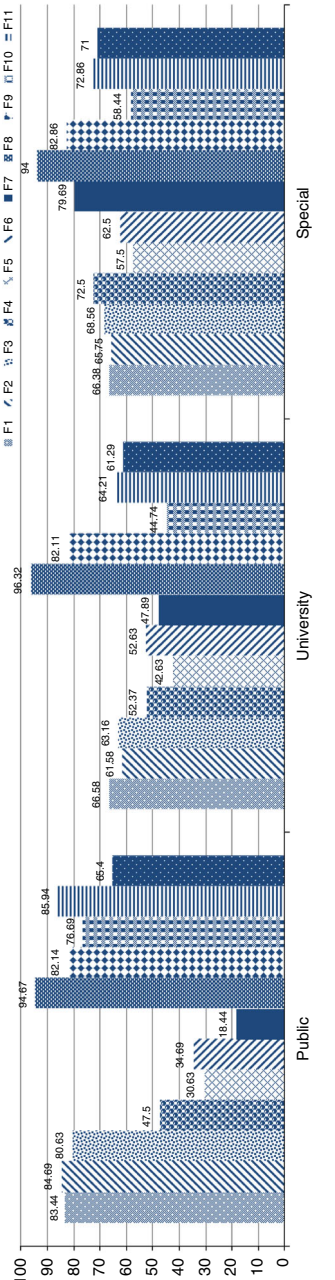

Figure 25.
Evaluation for the conventional elements in the user service of the libraries by the library types

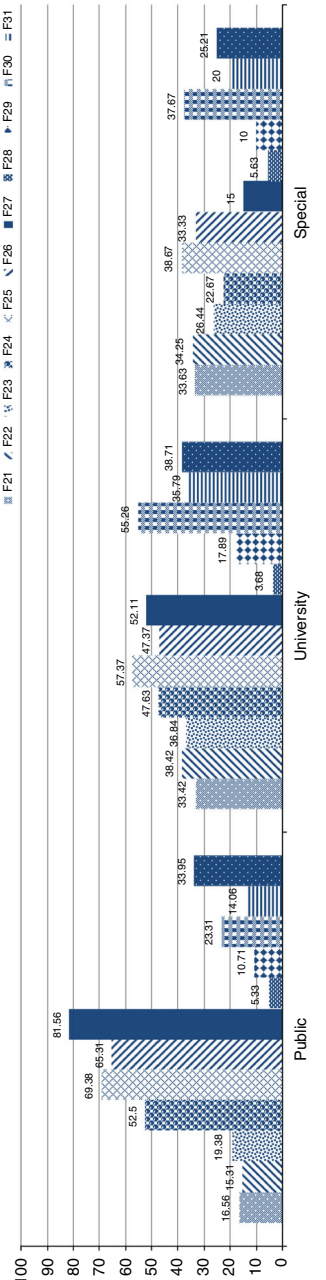

Figure 26.
Evaluation for the digital elements in the user service of the libraries by the library types

On the aspect of the digital library, the scores were: 100.00 for H23 (providing wireless Wi-Fi) and 79.38 for H22 (providing many seats for using computer and laptop) in the public libraries; 91.05 for H22 (providing many seats for using computer and laptop) and H23 (providing wireless Wi-Fi) and 72.11 for H21 (establishing lab equipped with high-tech devices such as laptop, iPad, 3D printer) in the university libraries; and 69.33 for H23 (providing wireless Wi-Fi) and 50.00 for H22 (providing many seats for using computer and laptop) in the special libraries. The public libraries scored 100.00 for H23 (providing wireless Wi-Fi), but scored 0.00 for H24 (providing meeting room available for video teleconference) and H26 (providing an experience room for high-tech devices). All types of

Table X.
Evaluation for the digitization level in the library program service of the libraries according to the library types

	Conventional							Digital						
	Public		Academic		Special		Element of	Public		Academic		Special		
Code	Sum	Mean	Sum	Mean	Sum	Mean	the library	Sum	Mean	Sum	Mean	Sum	Mean	Code
G1	780	48.75	840	44.21	720	55.38	Library	820	51.25	1,060	55.79	480	40.00	G21
G2	1,300	86.67	1,350	71.05	1,190	79.33	program	250	16.67	550	28.95	210	15.00	G22
G3	1,600	100.00	1,540	85.56	910	82.73	service	100	6.25	260	14.44	90	9.00	G23
G4	1,600	100.00	1,250	78.13	890	80.91		0	0.00	350	21.88	110	11.00	G24
G5	1,550	96.88	1,530	85.00	1,090	83.85		50	3.13	270	15.00	110	9.17	G25
G6	620	38.75	1,640	91.11	1,100	84.62		980	61.25	160	8.89	100	8.33	G26
Total	7,450	78.51	8,150	75.84	5,900	77.80		2,200	23.09	2,650	24.16	1,100	15.42	Total

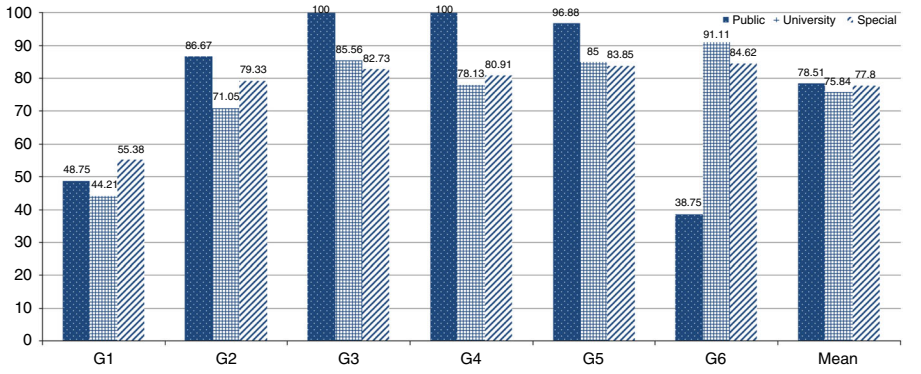

Figure 27.
Evaluation for the conventional elements in the library program service of the libraries

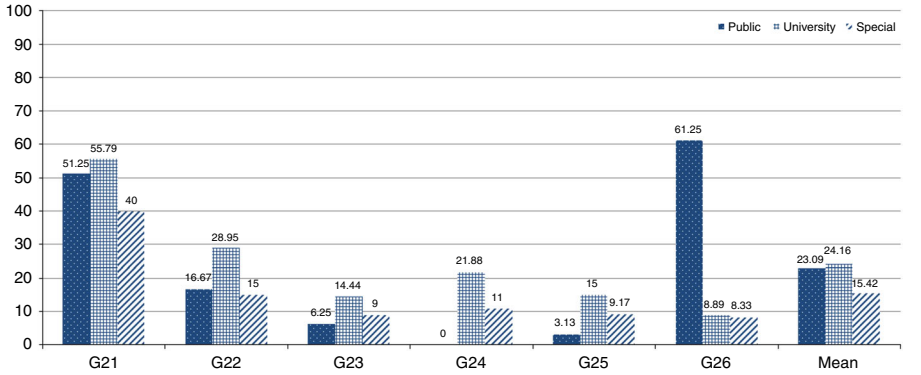

Figure 28.
Evaluation for the digital elements in the library program service of the libraries

the libraries obtained high scores for H22 (providing many seats for using computer and laptop) and H23 (providing wireless Wi-Fi) to imply that they were digitized.

In evaluating that all the libraries fit the conventional element for space service the average scores were 75.90 for the special library, 69.37 for the public libraries, and 67.37 for the university libraries. Only two items showed digital characteristics with any significance. The item of providing many seats for using computers and laptops scored 73.48 and providing wireless Wi-Fi scored 86.80. The element of device providing services obtained similar scores for both online and offline services (Table XI and Figures 31-34).

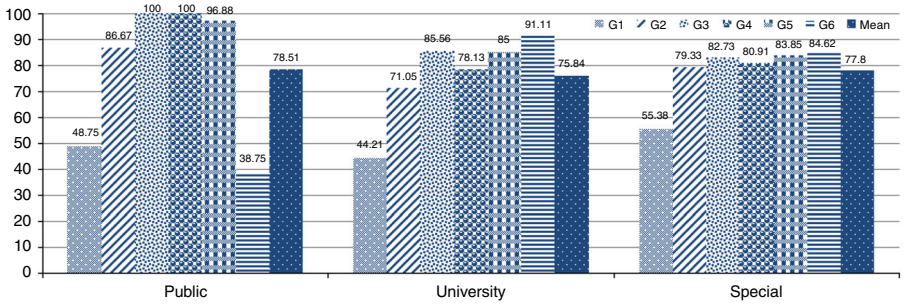

Figure 29.
Evaluation for the conventional elements in the library program service of the Libraries by the Library Types

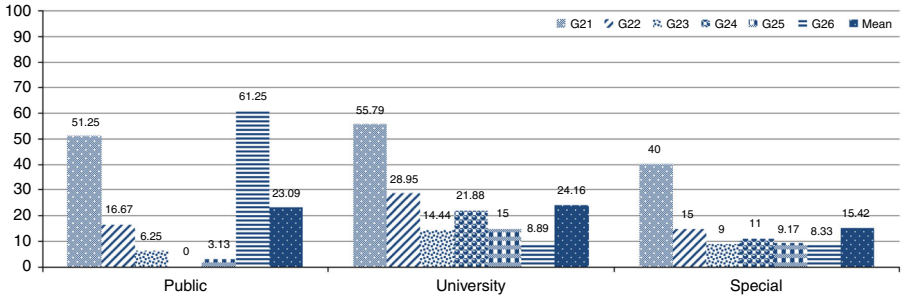

Figure 30.
Evaluation for the digital elements in the library program service of the libraries by the library types

	Conventional							Digital						
	Public		Academic		Special		Element of	Public		Academic		Special		
Code	Sum	Mean	Sum	Mean	Sum	Mean	the library	Sum	Mean	Sum	Mean	Sum	Mean	Code
H1	680	42.50	530	27.89	1,245	77.81	Space	920	57.50	1,370	72.11	255	17.00	H21
H2	330	20.63	170	8.95	750	50.00	service	1,270	79.38	1,730	91.05	750	50.00	H22
H3	0	0.00	170	8.95	460	28.75		1,600	100.00	1,730	91.05	1,040	69.33	H23
H4	1,400	93.33	1,640	91.11	1,090	83.85		0	0.00	70	3.89	10	0.83	H24
H5	870	58.00	1,010	53.16	1,060	81.54		630	42.00	890	46.84	40	3.33	H25
H6	1,500	100.00	1,790	94.21	1,090	83.85		0	0.00	10	0.53	10	0.83	H26
H7	1,260	78.75	1,200	63.16	1,410	88.13		340	21.25	700	36.84	90	6.00	H27
H8	1,340	89.33	1,510	83.89	1,040	86.67		160	10.67	290	16.11	60	5.45	H28
H9	1,440	96.00	1,630	85.79	1,130	80.71		60	4.00	170	8.95	170	12.14	H29
H10	1,410	88.13	1,690	88.95	1,410	88.13		190	11.88	210	11.05	90	6.00	H30
H11	1,350	96.43	1,665	87.63	940	85.45		50	3.57	135	7.11	60	6.00	H31
Total	11,580	69.37	13,905	67.37	11,625	75.90		5,220	30.02	7,305	35.05	2,575	16.08	Total

Table XI.
Evaluation for the digitization level in the space service of the libraries by the library types

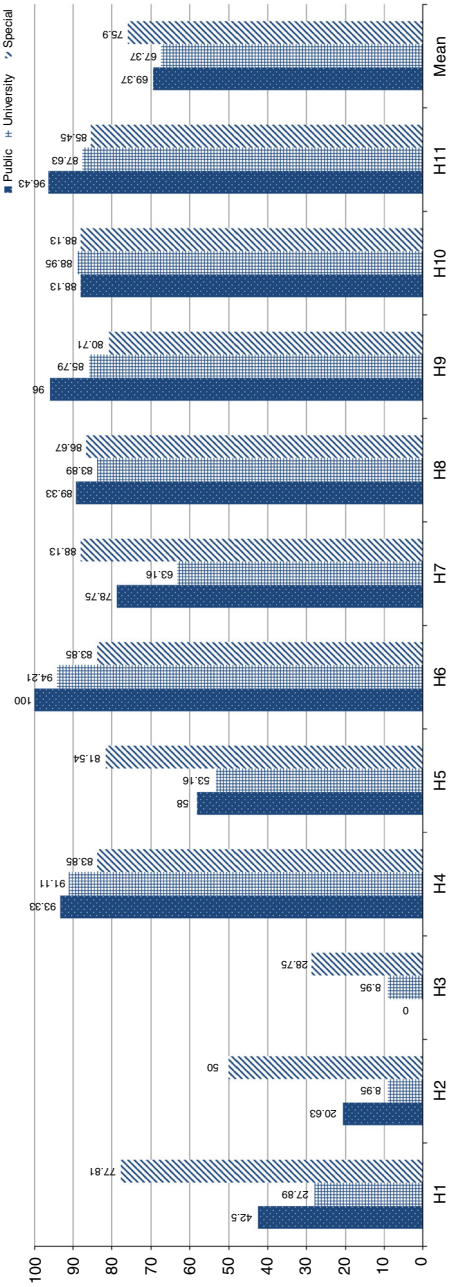

Figure 31.
Evaluation for the conventional elements in the space service of the libraries

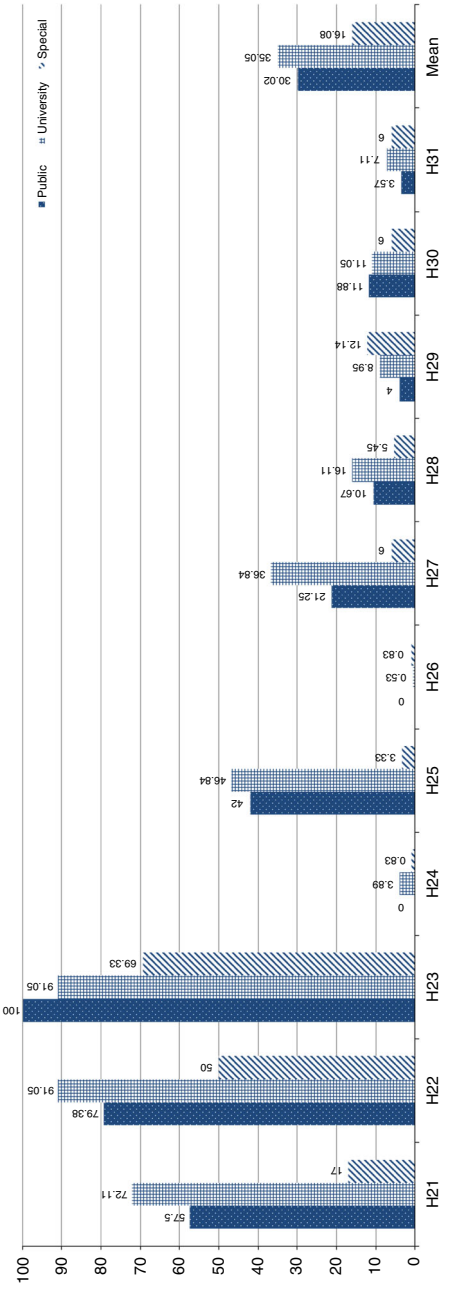

Figure 32.
Evaluation for the digital elements in the space service of the libraries

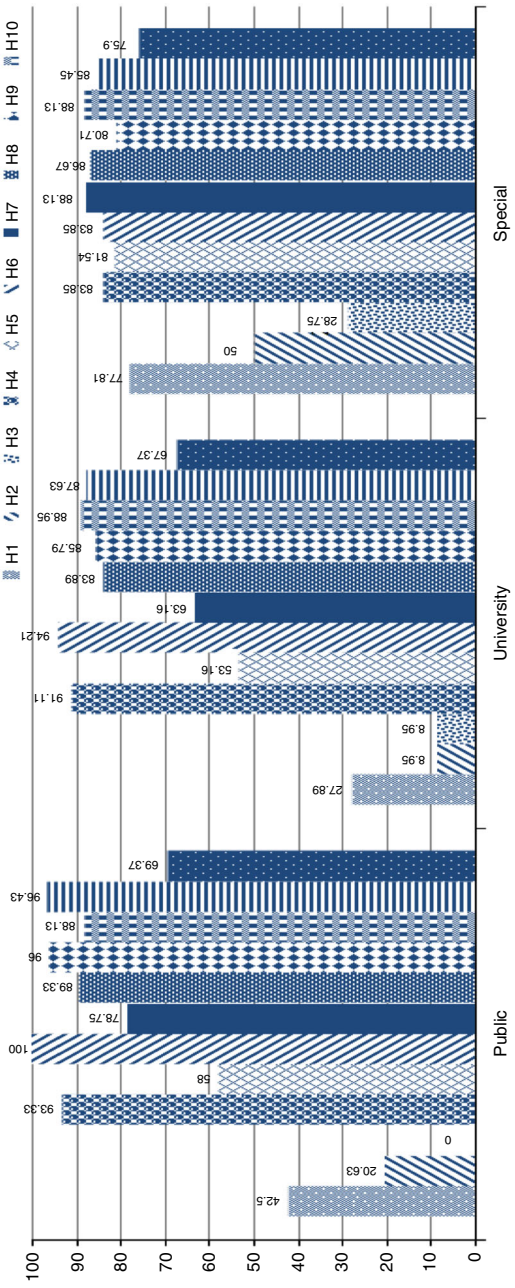

Figure 33.
Evaluation for the conventional elements in the space service of the libraries by the library types

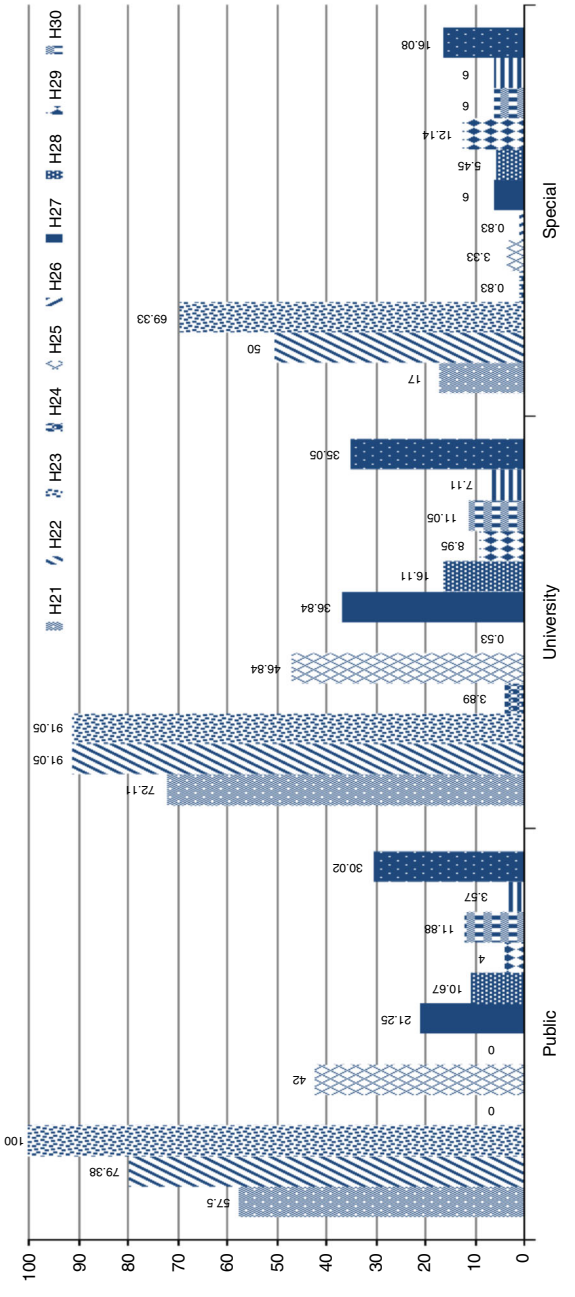

Figure 34.
Evaluation for the digital elements in the space service of the libraries by the library types

5. Conclusions

This study divided the elements of library into conventional elements and digital elements to determine which elements were found most in an individual library. It was not meant to say that having more digital elements made the library better or having more conventional elements made the library worse. For example, the library programs might have more offline characteristics in the participation of many people, but it did not imply that the lack of digital elements made the library far behind the times. This study aimed just to measure whether the elements of the library were more conventional or more digital.

The elements for determining whether the individual library was conventional or digital were initially extracted, and 13 items were selected to be used in an axis of comparison through consultations with experts: acquisition, book collection (physical/online collection), classification and cataloging, the circulation service, the reference service, the user service, the library program service, the service space, the SNS service, the organization and employees, the device providing service, the next generation service, and what our library is. In total, 52 libraries were chosen for exemplary evaluation based on the elements. The following is a summary of the evaluation of the first eight evaluation items, which are covered in Part 1 of this study. The remaining five items will be covered in Part 2.

First, in evaluating the digitization level of a library according to the elements, the most digitized item in the acquisition element was "selecting material online" by 75.13 percent. Overall, the digitization level of the acquisition element was significantly high.

Second, in the element of book collections, all items excluding the item of "digital video" had more conventional characteristics; the paper book collection especially obtained a significantly higher score of 83.19 than the e-book.

Third, in the element of classification and cataloging, the digitization level was comprehensively high; the item of providing online lists scored 85.42, demonstrating a significant difference and having the highest digitization level among all of the items.

Fourth, in the element of circulation services, the item of lending books offline and returning the books scored 92.64 and the item of lending-returning with use of smart devices and social media obtained significantly low scores. Also, the average in using the book return desk for the circulation service was 81.39, much higher than using the automatic book return machine which scored 18.61 by a wide margin.

Fifth, in the element of reference service, conventional characteristics were shown in all of the items. In particular, the offline outreach service scored 83.52 percent higher than the online outreach service and the offline reference service scored 74.21 percent higher than the virtual reference service.

Sixth, in the element of user service, the digital item of providing support for mobile services related to the library resources demonstrated higher scores than the conventional item, but other items showed more conventional characteristics. In particular, the item of duplication services for material scored up to 94.99 but other items such as support for publication/bookbinding services using digital publication tools and devices obtained significantly low scores.

Seventh, in the element of library program service, most of the items were significantly conventional. Particularly, the item of offering cultural programs offline scored 89.43 and was significantly higher than the average of offering cultural programs online that scored 9.90.

Eighth, the element of space service showed significantly conventional characteristics in all of the items, and only two items showed digital characteristics with significant differences; the item of providing many seats for using computer and

laptop scored 73.48 and providing wireless Wi-Fi scored 86.80. The element of device providing services obtained similar scores for both online and offline services.

As mentioned above, in this research, regarding a total of 13 items, the levels of the digitizations of the libraries were evaluated. However, because of the publication limitations, in this thesis, only the results regarding the first eight items were presented. In Part 2 of this thesis, the digital level evaluations of the remaining five items (the SNS service, the organization and employees, the device providing service, the next generation service, and what our library is) will be presented, as well as the evaluation results of digitization level of the elements and items within each element. The implications of this study and suggestions for future research will be discussed.

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