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

Digitization
level of
Korean
libraries

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Abstract

Purpose – The purpose of this paper is to evaluate the current digitization levels of Korean libraries by identifying key elements of library services and measuring them for conventional vs digital approaches and use.

Design/methodology/approach – The study utilized previous research related to digital libraries and consultations with experts to arrive at 13 evaluation elements and components within them to analyze. For the purpose of this study specialized libraries, college and university libraries, and public libraries were surveyed, and their responses analyzed to rate their current digitization levels vs more conventional approaches.

Findings – First, after determining the elements that characterized the conventional and digital libraries by analyzing different pieces of literature and consulting with experts, 92 factors were identified for each of the conventional and digital elements based on the axis which was composed of 13 items. Second, this study indicated that the libraries obtained one of the conventional or digital characteristics independent of the situation, rather than that the digital library was more effective than the conventional library. Third, in evaluating the chosen libraries used as the examples, it was observed that the libraries had more conventional characteristics among the elements of the digital and conventional libraries. Also, based on the axis used for comparison of 13 items, elements such as the next generation service, the SNS service, and the library program service were more conventional, but elements such as classification and cataloging, acquisition, and the organization were more digitized.

Originality/value – This study is the 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 had relied solely on literature review. Comprehensive research had never been performed as in this study.

Keywords Digital library, Conventional library, Elements of the digital library,
Level of digitization of the library, Evaluating the digitization level, Evaluation elements

Paper type Research paper

1. Introduction

This research study was undertaken to evaluate the current digitization levels of Korean libraries by identifying key elements of library services and measuring them for conventional vs digital approaches and use. A better understanding of this issue was thought to be essential to comprehend where things currently stand and to allow for development of the libraries of the future.

The study utilized previous research related to digital libraries and consultations with experts to arrive at 13 evaluation elements and components within them to analyze. For the purpose of this study specialized libraries, college and university



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libraries, and public libraries were surveyed, and their responses analyzed to rate their current digitization levels vs more conventional approaches.

A large volume of information resulted and a decision was made to present the findings in two parts. This is part II.

In part I, the results of the literature review are intensely analyzed and presented. The process by which the items for evaluating the digitization levels were determined is discussed and the elements identified. The components that make up each element are presented in a chart and coded for easier analysis. Additionally, the results for the first eight of the 13 elements with respect to the digitization levels broken down by the type of library are presented and summarized (Noh, 2016).

In part II the digitization levels of the remaining five elements with respect to their digitization and library type are presented and summarized. The contents and classifications of the indices for evaluating the levels chart is repeated in this paper to help the reader to understand the data. Additionally, data are presented which analyzes the libraries as a whole on both the elements and the items within them. A detailed discussion of the digitization levels in these libraries is followed by recommendations for where to conduct additional research to shed further light on this issue.

2. Research questions

This study aimed 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:

- RQ1.* What determined the elements of the conventional and the digital libraries?
- RQ2.* Was any research performed to figure out the elements of the digital library?
- RQ3.* Did the researchers insist that the digital library was more effective than the conventional library?
- RQ4.* In selecting a library as a sample, which attributes were most selected and included among the elements of the conventional and the digital libraries?
- RQ5.* According to the axis of comparison, which areas were the highest and which were the lowest?

This study was intended to solve the stated questions above, and discuss them in the result section below.

3. Research design and methodology

3.1 Research process

As mentioned above, the results of this research are presented by being divided into the two parts. And, if we were to concisely express the details of each part, they are as in Figure 1.

If we were to develop the items for evaluating the digitization levels of the libraries and if we were to specifically describe the research procedure based on the evaluation items that have been developed, they are as the following.

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.

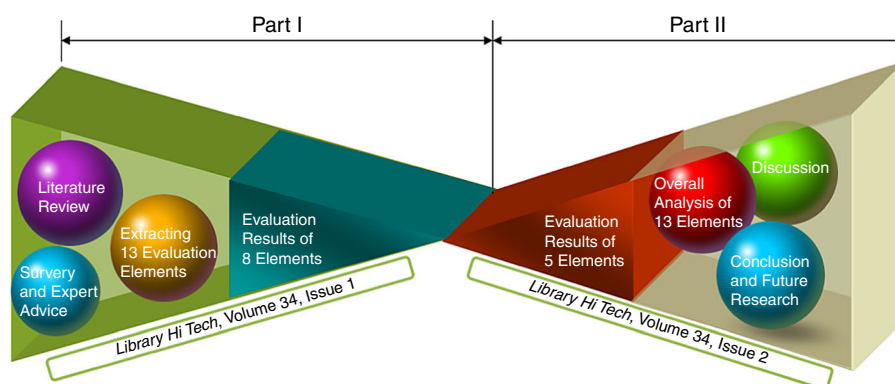


Figure 1.
Research process
and methodology

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 and 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.

3.2 Contents and classifications of the index for evaluating the level

As mentioned in part I of the study, ten expert advisors were consulted to arrive at the thirteen elements of the axis of comparison. They are as follows: 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 are summarized in Table I with codes assigned to more easily allow for the analysis of the tables and charts.

4. Result

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 18-31, 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.

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

4.1.1 SNS service. The digitization level in the SNS service was evaluated on the aspect of the conventional library; it scored 95.00 for I4 (none) and 92.14 for I5 (direction service of library location using offline tools) in the public libraries, 90.53 for I6 (library service guide by website) and 89.47 for I5 (direction service of library location using offline tools) in the university libraries, and 92.67 for I9 (book searching service by the list) and 88.57 for I5 (direction service of library location using offline tools) in the

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

| Code | Conventional | Element of the library | Digital | Code |
|------|---|----------------------------------|--|------|
| A1 | Determining material (book, periodical, annual publication, yearbook, software, 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 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 inter-library 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 |

(continued)

| Code | Conventional | Element of the library | Digital | Code |
|------|--|-------------------------|--|------|
| 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 | Reference service for online resources | E22 |
| E3 | Offline book recommendation service | Reference service | Online book recommendation service | E23 |
| E4 | Collaborative reference service | Reference service | Collaborative Digital Reference Service (CDRS) | E24 |
| E5 | Offline outreach service | Reference 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 | User service | Using online material | F22 |
| F3 | Using offline service | User service | Using online service | F23 |
| F4 | No internet discussion forum | User service | Bulletin board service such as internet discussion forum | F24 |
| F5 | No support for mobile service related to the library resources | User service | Providing support for mobile service related to the library resources | F25 |
| F6 | One-way service | User service | Interactive user-based service | F26 |
| F7 | Sending e-mail related to library events and services | User service | Sending SMS related to library events and service | F27 |
| F8 | Duplication service for material | User service | Support for publication, bookbinding services by digital publication tools and devices | F28 |
| F9 | No support for business service | User service | Example publication services for books or academic journals are provided by the public libraries and major university libraries in USA | F29 |
| F10 | Providing only the library-owned resources | User service | Providing support for business service | F30 |
| F11 | Providing education based on the offline material | User service | Providing linkage service of content with external organizations | F31 |
| G1 | Applying the library programs offline | Library program service | Supporting digital learning center | G21 |
| G2 | Offline user education | Library program service | Applying the library programs online | G22 |
| G3 | Offering culture program offline | Library program service | Online user education | G23 |
| G4 | Offering offline reading program | Library program service | Offering culture program online (online history experience program, online calligraphy program, etc.) | G24 |
| G5 | Offering the library programs offline | Library program service | Offering reading program online (online reading discussion, online guidance for reading and writing, etc.) | G25 |
| G6 | Offering the programs only for members of the library | Library program service | Providing video of the library programs in real time (providing webinar service) | G26 |
| | | | Offering the program open to the local community for participation | |

(continued)

Table I.

| Code | Conventional | Element of the library | Digital | Code |
|------|--|------------------------|--|------|
| H1 | No multimedia room | Space service | Establishing lab (including multimedia room) equipped with high-tech devices such as laptop, iPad, 3D printer | H21 |
| 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) | H26 |
| H7 | Library promotion using poster and bulletin board | | Example Google glass, Galaxy gear, etc. | H27 |
| H8 | Establishing community center available for offline workshop | | Library promotion in digital billboard | H28 |
| H9 | Offline exhibition space | | Establishing community center available for online workshop | H29 |
| H10 | Offline reading and discussion space | | Online exhibition space | H30 |
| H11 | Providing the world's best library service in physical form | | Online reading and discussion space | H31 |
| I1 | Reference service for new books by pamphlets, etc. | SNS service | Providing library service in the virtual world (providing service to experience the library in every corner without directly going to) | I21 |
| I2 | Reference service in special subjects by booklets | | Example museum view of the National Museum of Korea, etc. | I22 |
| I3 | Bibliographic information sharing service by comprehensive list system | | Reference service for new books by Facebook, etc. | I23 |
| I4 | None | | Bibliographic information sharing service based on social tag/bookmark | I24 |
| I5 | Direction service of library location using offline tools | | Information service by Weazine (connecting to short bibliography and the original text) | I25 |
| I6 | Library service guide by website | | Direction service of library location using mash-up, etc. | I26 |
| I7 | Offline new arrival book service of academic resources | | Library service guide by Facebook, Twitter, etc. | I27 |
| I8 | Notification service for new material by sending e-mail | | Social bookmark service of academic resources | I28 |
| I9 | Book searching service by the list | | Notification service for new material by RSS, SNS, and SMS | I29 |
| I10 | Library guide service by brochure | | Book searching service by bookmarks | I30 |
| I11 | Offline promotion and event | | Library guide service by Wiki, blog, Facebook, etc. | I31 |
| I12 | Offline Q&A service | | Promotion and event using Twitter; Facebook, Microblog, etc. | I32 |
| | | | Q&A service using Twitter, Facebook, Kakao Talk, subject guide system, and e-mail | I33 |

(continued)

| Code | Conventional | Element of the library | Digital | Code |
|------|---|------------------------|--|------|
| J1 | Hierarchical organization | Organization | Star organization | J21 |
| J2 | The librarian-centered | and employees | 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 desktop and laptop computers, iPad, e-book device, etc. | K21 |
| K2 | Scanner | providing | 3D scanner | K22 |
| K3 | 2D printer | service | 3D printer | K23 |
| K4 | Film camera | | Digital camera | K24 |
| L1 | No support for cloud-based service | Next generation | Cloud-based service (example of the cloud-based service) | L21 |
| | | 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 | |
| | | | Space service of infinite creation | L22 |
| 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, etc. | |

(continued)

Table I.

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

(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 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 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 | L26 |
| L7 | No support for library service by using QR code | | | L27 |
| L8 | No support for semantic web-based service | | | L28 |
| M1 | This library has more conventional characteristics | Our library is | RDF expression of the list and bibliographic information | M21 |
| M2 | This library has stronger physical attributes | | Establishing the ontology of the library's information resources | M22 |
| M3 | This library is ownership-centered | | This library has more digital characteristics | M23 |
| M4 | The users of the library are consumption oriented | | This library is approach-centered | M24 |
| M5 | This library is collection-centered | | The users of the library are production oriented | M25 |
| M6 | This library is librarian-centered | | This library is data-centered | M26 |
| M7 | This library is facility-centered | | This library is user-centered | M27 |
| M8 | This library is archive-centered | | This library is service-centered | M28 |
| M9 | This is the conventional library | | This library is portal-centered This is the digital library | M29 |

Table I.

special libraries. With respect to the digital library, the scores were: 52.86 for I28 (alarming service for new material by RSS, SNS, and SMS) and 26.25 for I30 (library guide service by Wiki, blog, Facebook, etc.) in the public libraries; 46.67 for I28 (notification service for new material by RSS, SNS, and SMS) and 27.63 for I32 (Q&A service using Twitter, Facebook, Kakao Talk, subject guide system, and e-mail) in the university libraries; and 22.86 for I28 (notification service for new material by RSS, SNS, and SMS) and 19.23 for I27 (social bookmark service of academic resources) in the special libraries.

The SNS service fit the conventional element for all the types of libraries with average scores of 81.81 for the special libraries, 78.55 for the university libraries, and 77.87 for the public libraries. Both the rate of providing library services utilizing the SNS service and the element of next generation service scored significantly low registering 17.08 and 7.09, respectively. While all the types of libraries scored low for the digital elements, the special libraries were particularly low on this element (Table II and Figures 2-5).

4.1.2 Organization and employees. The digitization level in the organization and employees of a library was evaluated on the aspect of the conventional library; the scores were 79.06 for J1 (hierarchical organization) and 55.63 for J9 (offline workload) in the public libraries, 91.05 for J1 (hierarchical organization) and 51.58 for J5 (processing offline material) in the university libraries, and 70.63 for J1 (hierarchical organization) and 57.81 for J9 (offline workload) in the special libraries. With respect to the digital library, the scores were: 79.38 for J27 (learning by oneself to be socially integrated) and 68.13 for J23 (based on collaborative performance) in the public libraries; 77.89 for J27 (learning by oneself to be socially integrated) and 69.47 for J22 (the user-centered) in the university libraries; and 85.38 for J27 (learning by oneself to be socially integrated) and 73.44 for J22 (the user-centered) in the special libraries.

In evaluating whether the organization and employees of a library fit the digital element, the averages were scored as 55.77 for the public library, 53.76 for the university libraries, and 52.56 for the special libraries. On the aspect of the conventional library, the averages were scored as 46.24 for the university libraries, 45.53 for the special libraries, and 44.16 for the public library.

Accordingly, along this aspect both categories apply. The organization and employees of the library showed slightly more digital characteristics; the item of learning by oneself to be socially integrated scored significantly high with 80.88 (Table III and Figures 6-9).

4.1.3 Device providing service. When the digitization level in the device providing service was evaluated on the aspect of the conventional library, it scored 100.00 for K2 (scanner) and 96.88 for K3 (2D printer) in the public libraries; 95.26 for K2 (scanner) and 87.37 for K3 (2D printer) in the university libraries; and 92.67 for both K2 (scanner) and K3 (2D printer) and 18.75 for K4 (film camera) in the special libraries. On the aspect of the digital library, the scores were 93.33 for K24 (digital camera) and 85.94 for K21 (providing desktop and laptop computers, iPad, e-book device, etc.) in the public libraries; 89.38 for K21 (providing desktop and laptop computers, iPad, e-book device, etc.) and 68.75 for K24 (digital camera) in the university libraries; and 86.25 for K21 (providing desktop and laptop computers, iPad, e-book device, etc.) and 78.57 for K24 (digital camera) in the special libraries.

In evaluating that the device providing service fit the conventional element, the averages were scored as 54.40 for the public library, 53.36 for the special libraries, and 51.24 for the university libraries. On the aspect of the digital library, the averages were scored as

| Code | Public | | Conventional Academic | | Special | | Element of the library | Public | | Digital Academic | | Special | | Code |
|-------|--------|-------|-----------------------|-------|---------|-------|------------------------|--------|-------|------------------|-------|---------|-------|-------|
| | Sum | Mean | Sum | Mean | Sum | Mean | | Sum | Mean | Sum | Mean | Sum | Mean | |
| I1 | 1,290 | 86.00 | 1,280 | 75.29 | 990 | 82.50 | SNS service | 210 | 14.00 | 420 | 24.71 | 110 | 7.86 | I21 |
| I2 | 1,150 | 82.14 | 1,230 | 72.35 | 1,060 | 81.54 | | 160 | 11.43 | 370 | 21.76 | 140 | 11.67 | I22 |
| I3 | 1,370 | 91.33 | 1,470 | 86.47 | 1,310 | 87.33 | | 130 | 8.67 | 230 | 13.53 | 90 | 6.43 | I23 |
| I4 | 1,520 | 95.00 | 1,480 | 77.89 | 1,240 | 77.50 | | 80 | 5.00 | 420 | 22.11 | 170 | 11.33 | I24 |
| I5 | 1,290 | 92.14 | 1,700 | 89.47 | 1,240 | 88.57 | | 110 | 7.86 | 200 | 10.53 | 60 | 4.62 | I25 |
| I6 | 1,165 | 72.81 | 1,720 | 90.53 | 1,280 | 85.33 | | 390 | 24.38 | 180 | 9.47 | 120 | 8.57 | I26 |
| I7 | 1,100 | 68.75 | 1,530 | 80.53 | 1,130 | 80.71 | | 100 | 6.25 | 370 | 19.47 | 250 | 19.23 | I27 |
| I8 | 560 | 40.00 | 960 | 53.33 | 1,080 | 72.00 | | 740 | 52.86 | 840 | 46.67 | 320 | 22.86 | I28 |
| I9 | 1,290 | 80.63 | 1,480 | 82.22 | 1,390 | 92.67 | | 310 | 19.38 | 330 | 18.33 | 10 | 0.71 | I29 |
| I10 | 1,180 | 73.75 | 1,630 | 85.79 | 1,040 | 80.00 | | 420 | 26.25 | 270 | 14.21 | 160 | 13.33 | I30 |
| I11 | 1,185 | 74.06 | 1,450 | 76.32 | 1,190 | 77.86 | | 415 | 25.94 | 450 | 23.68 | 210 | 15.00 | I31 |
| I12 | 1,245 | 77.81 | 1,375 | 72.37 | 1,160 | 75.71 | | 355 | 22.19 | 525 | 27.63 | 240 | 17.14 | I32 |
| Total | 14,345 | 77.87 | 17,305 | 78.55 | 14,110 | 81.81 | | 3,420 | 18.68 | 4,605 | 21.01 | 1,880 | 11.56 | Total |

Digitization
level of
Korean
libraries

Table II.
Evaluation for the
digitization level in
the SNS service of
the libraries
according to the
library types

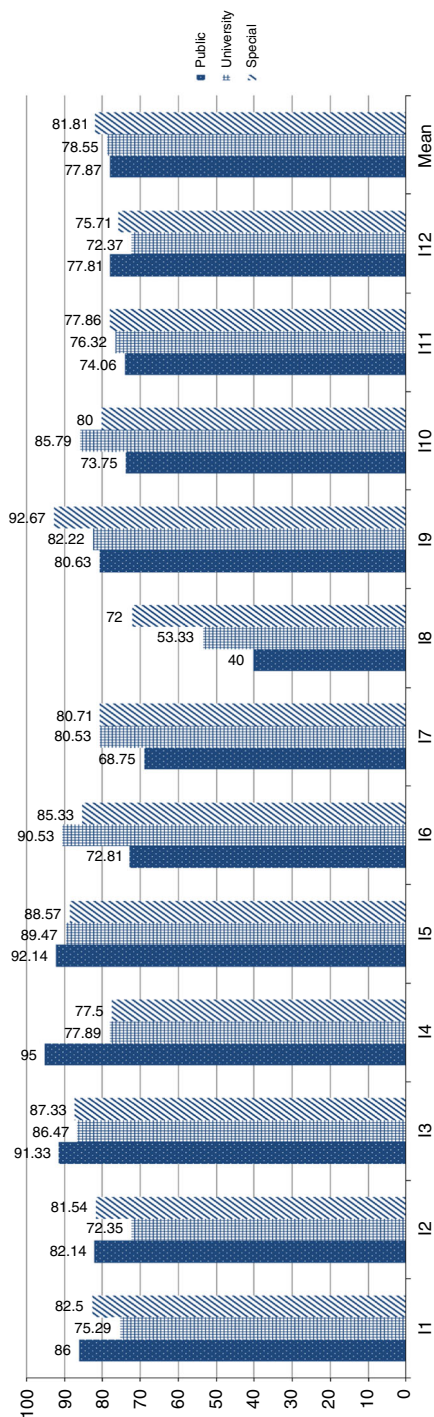


Figure 2.
Evaluation for the
conventional
elements in the SNS
service of the
libraries

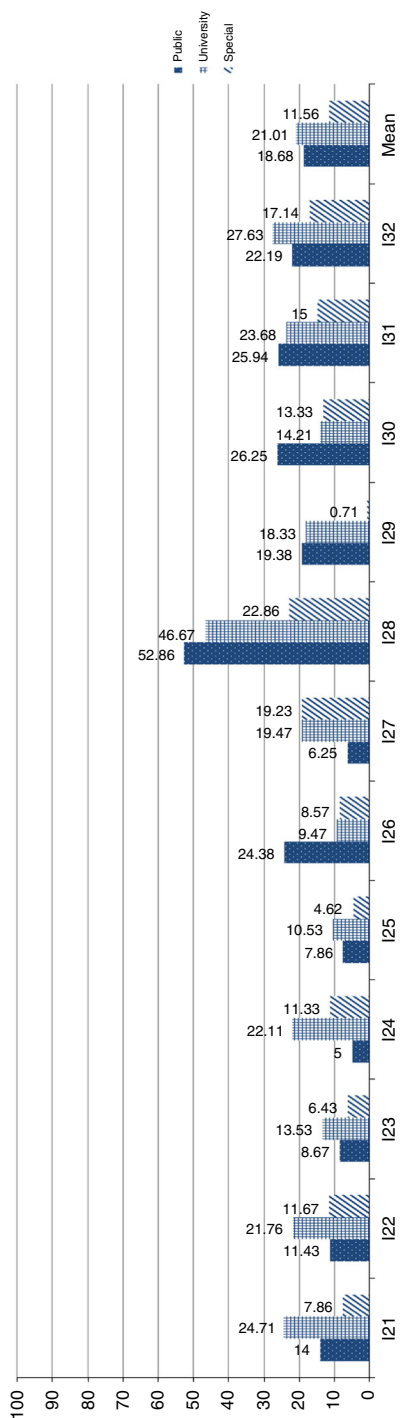


Figure 3.
Evaluation for the
digital elements in
the SNS service of
the libraries

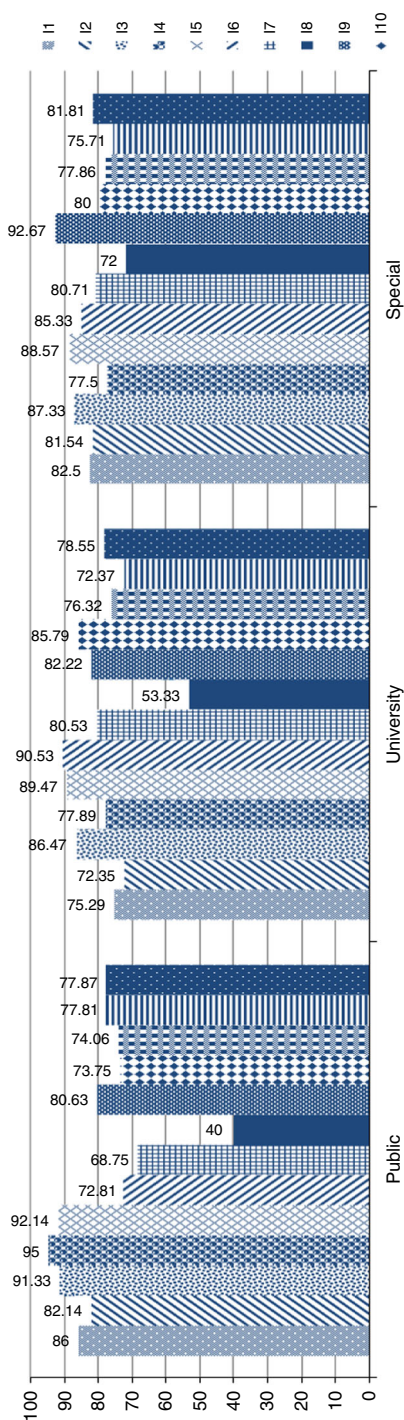


Figure 4. Evaluation for the conventional elements in the SNS service of the libraries according to the library types

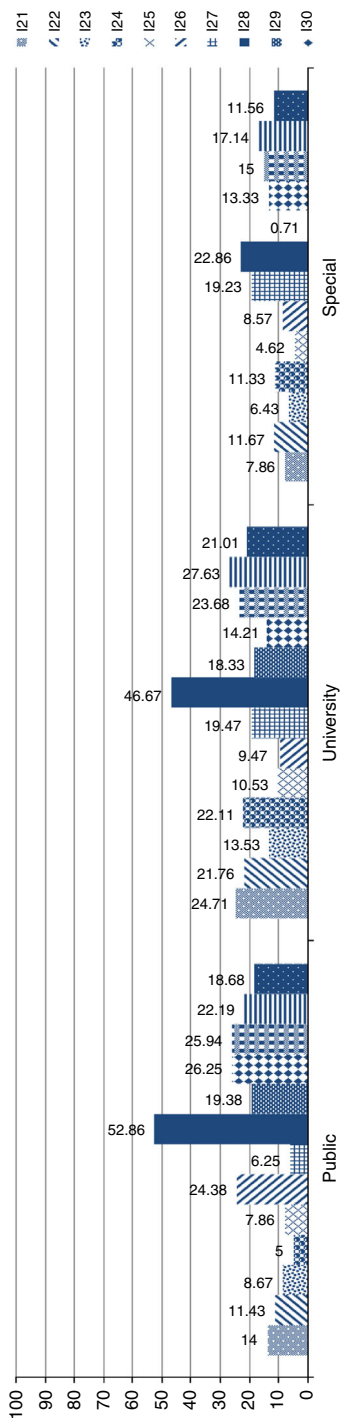


Figure 5.
Evaluation for the
digital elements in
the SNS service of
the libraries
according to the
library types

Table III.

Evaluation for the digitization level in the organization and employees of the libraries according to the library types

| Code | Public | | Conventional Academic | | Special | | Element of the library | | Public | | Digital Academic | | Special | | Code |
|-------|--------|-------|-----------------------|-------|---------|-------|----------------------------|-------|--------|-------|------------------|-------|---------|-------|------|
| | Sum | Mean | Sum | Mean | Sum | Mean | Organization and employees | Sum | Mean | Sum | Mean | Sum | Mean | Sum | |
| J1 | 1,265 | 79.06 | 1,730 | 91.05 | 1,130 | 70.63 | Organization and employees | 335 | 20.94 | 170 | 8.95 | 370 | 24.67 | J21 | |
| J2 | 520 | 32.50 | 580 | 30.53 | 425 | 26.56 | | 1,080 | 67.50 | 1,320 | 69.47 | 1,175 | 73.44 | J22 | |
| J3 | 510 | 31.88 | 750 | 39.47 | 820 | 51.25 | | 1,090 | 68.13 | 1,150 | 60.53 | 680 | 45.33 | J23 | |
| J4 | 760 | 47.50 | 700 | 36.84 | 835 | 52.19 | | 840 | 52.50 | 1,200 | 63.16 | 765 | 47.81 | J24 | |
| J5 | 720 | 45.00 | 980 | 51.58 | 910 | 56.88 | | 820 | 51.25 | 920 | 48.42 | 690 | 46.00 | J25 | |
| J6 | 730 | 48.67 | 820 | 48.24 | 520 | 37.14 | | 770 | 51.33 | 880 | 51.76 | 780 | 60.00 | J26 | |
| J7 | 330 | 20.63 | 420 | 22.11 | 190 | 13.57 | | 1,270 | 79.38 | 1,480 | 77.89 | 1,110 | 85.38 | J27 | |
| J8 | 585 | 36.56 | 920 | 51.11 | 700 | 43.75 | | 1,065 | 66.56 | 880 | 48.89 | 740 | 49.33 | J28 | |
| J9 | 890 | 55.63 | 860 | 45.26 | 925 | 57.81 | | 710 | 44.38 | 1,040 | 54.74 | 657 | 41.06 | J29 | |
| Total | 6,310 | 44.16 | 7,760 | 46.24 | 6,455 | 45.53 | | 7,980 | 55.77 | 9,040 | 53.76 | 6,967 | 52.56 | Total | |

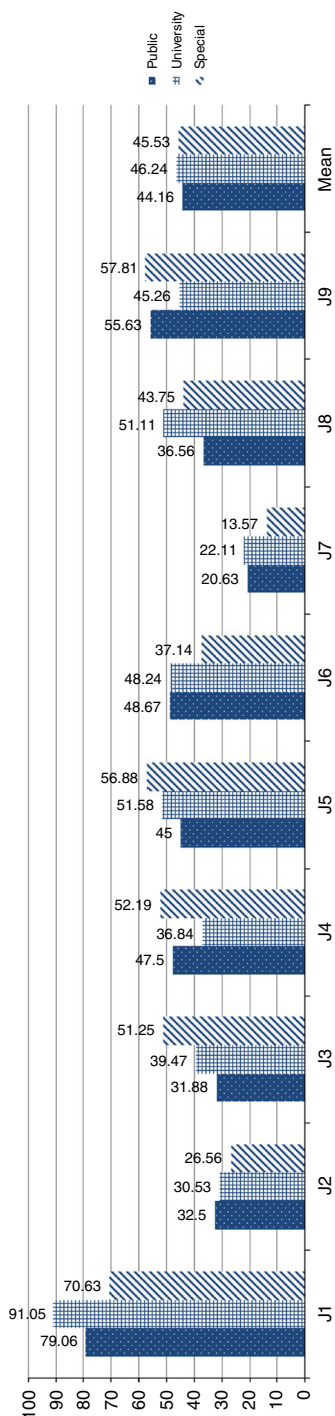


Figure 6.
Evaluation for the
conventional
elements in the
organization and
employees of the
libraries

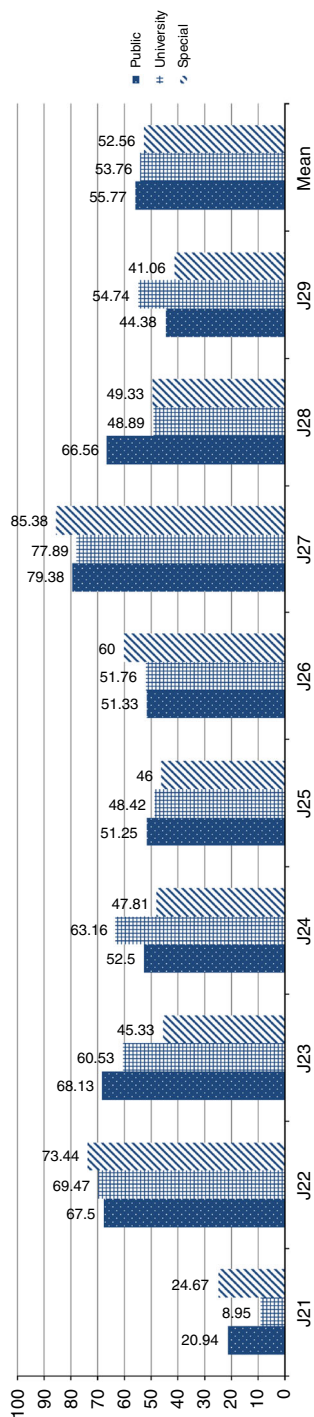


Figure 7.
Evaluation for the digital elements in the organization and employees of the libraries

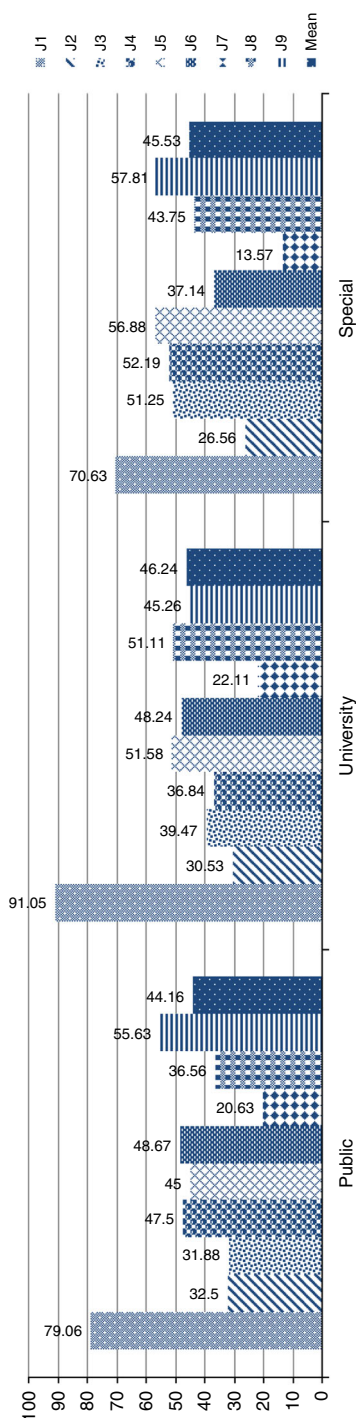


Figure 8.
Evaluation for the
conventional
elements in the
organization and
employees of the
libraries according to
the library types

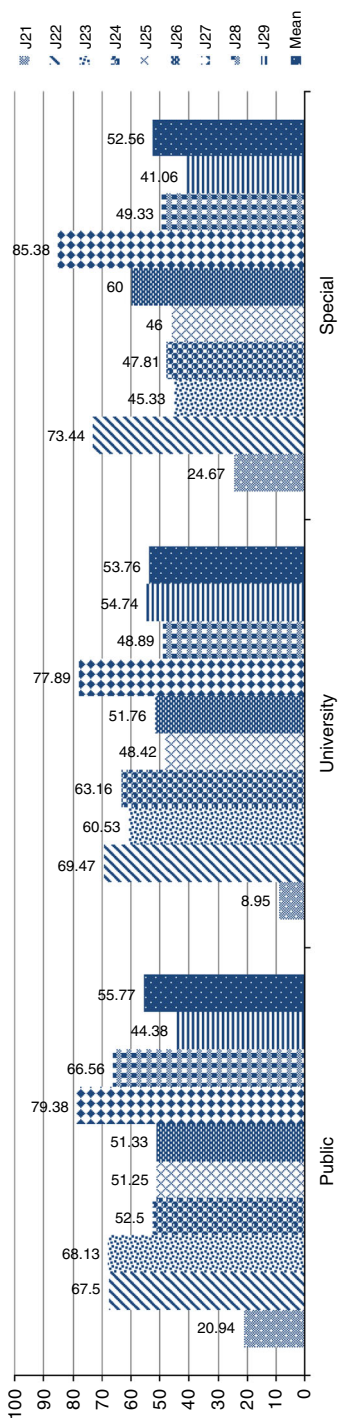


Figure 9. Evaluation for the digital elements in the organization and employees of the libraries according to the library type

45.60 for the public library, 41.56 for the special libraries, and 41.09 for the university libraries. Accordingly, the averages for the element of the device providing service were similar to both the conventional and digital models (Table IV and Figures 10-13).

4.1.4 Next generation service. The digitization level in the next generation service was evaluated on the aspect of the conventional library. The scores were: 100.00 for L1 (no support for cloud-based service), L5 (no support for augmented reality-based service), and L6 (no support for situation recognition technology-based service), 99.38 for L8 (no support for semantic web-based service), 95.00 for L4 (no support for utilizing Google glass) in the public libraries; 90.53 for L5 (no support for augmented reality-based service) and L6 (no support for situation recognition technology-based service) and 88.95 for L2 (no support for space service of infinite creation) in the university libraries; and 93.75 for L6 (no support for situation recognition technology-based service) and 93.13 for each of L1 (no support for cloud-based service), L4 (no support for utilizing Google glass), and L5 (no support for augmented reality-based service) in the special libraries. With respect to the digital library, the scores were: 18.75 for L22 (space service of infinite creation) and 6.25 for L23 (big data-based service) in the public libraries; 28.42 for L21 (cloud-based service) and 17.37 for L28 (semantic web-based service) in the university libraries; and 8.00 for L27 (library service by using QR Code) and 6.00 for L28 (semantic web-based service). The public libraries scored 0.00 for each of L21 (cloud-based service), L25 (augmented reality-based service), and L26 (situation recognition technology-based service), implying that they rarely provided those services; while, the special libraries scored 0.00 for L26 (situation recognition technology-based service), implying that they did not provide the service.

In evaluating that the next generation service fit the conventional element, the average scores were 96.02 for the public library, 91.09 for the special libraries, and 85.56 for the university libraries, putting all the libraries in that category (Table V and Figures 14-17).

4.1.5 Our library is. The digitalization level of the libraries was comprehensively evaluated on the aspect of the conventional library; its scores were 86.00 for M1 (this library has more conventional characteristics) and 85.31 for M2 (this library has stronger physical attributes) in the public libraries; 65.26 for M5 (this library is collection-centered) and 65.00 for M2 (this library has stronger physical attributes) in the university libraries; and 76.56 for M2 (this library has stronger physical attributes) and 74.00 for M9 (this is the conventional library) in the special libraries. With respect to the digital library, the scores were 78.75 for M26 (this library is user-centered) and 65.63 for M27 (this library is service-centered) in the public libraries; 65.79 for M26 (this library is user-centered) and 56.32 for M27 (this library is service-centered) in the university libraries; and 68.44 for M27 (this library is service-centered) and 66.56 for M26 (this library is user-centered) in the special libraries.

For the conventional aspect the libraries scored 64.11 for the public libraries, 55.35 for the university libraries, and 59.72 for the special libraries, and for the digital aspect, 36.16 for the public libraries, 44.53 for the university libraries, and 39.86 for the special libraries. An insignificant difference was found between the level of digitization in the university libraries and the conventional model so they were found to fit both categories. The other two types of libraries more clearly came out to be conventional.

Thus, in evaluating whether our library was overall digital or conventional, many evaluators concluded their libraries to be more conventional; the average score was 59.73 for being conventional and 40.18 for being digital (Table VI and Figures 18-21).

Table IV.
Evaluation for the digitization level in the device providing service of the libraries according to the library types

| Code | Public | | Conventional Academic | | Special | | Element of the library | | Public | | Digital Academic | | Special | |
|-------|--------|--------|-----------------------|-------|---------|-------|--------------------------|-------|--------|-------|------------------|-------|---------|-------|
| | Sum | Mean | Sum | Mean | Sum | Mean | Element of the library | Sum | Mean | Sum | Mean | Sum | Mean | Sum |
| K1 | 225 | 14.06 | 270 | 14.21 | 150 | 9.38 | Device providing Service | 1,375 | 85.94 | 1,530 | 89.38 | 1,380 | 86.25 | K21 |
| K2 | 1,600 | 100.00 | 1,810 | 95.26 | 1,390 | 92.67 | | 0 | 0.00 | 0 | 0.00 | 10 | 0.71 | K22 |
| K3 | 1,550 | 96.88 | 1,660 | 87.37 | 1,390 | 92.67 | | 50 | 3.13 | 100 | 6.25 | 10 | 0.71 | K23 |
| K4 | 100 | 6.67 | 130 | 8.13 | 150 | 18.75 | | 1,400 | 93.33 | 1,200 | 68.75 | 550 | 78.57 | K24 |
| Total | 3,475 | 54.40 | 3,870 | 51.24 | 3,080 | 53.36 | | 2,825 | 45.60 | 3,330 | 41.09 | 1,950 | 41.56 | Total |

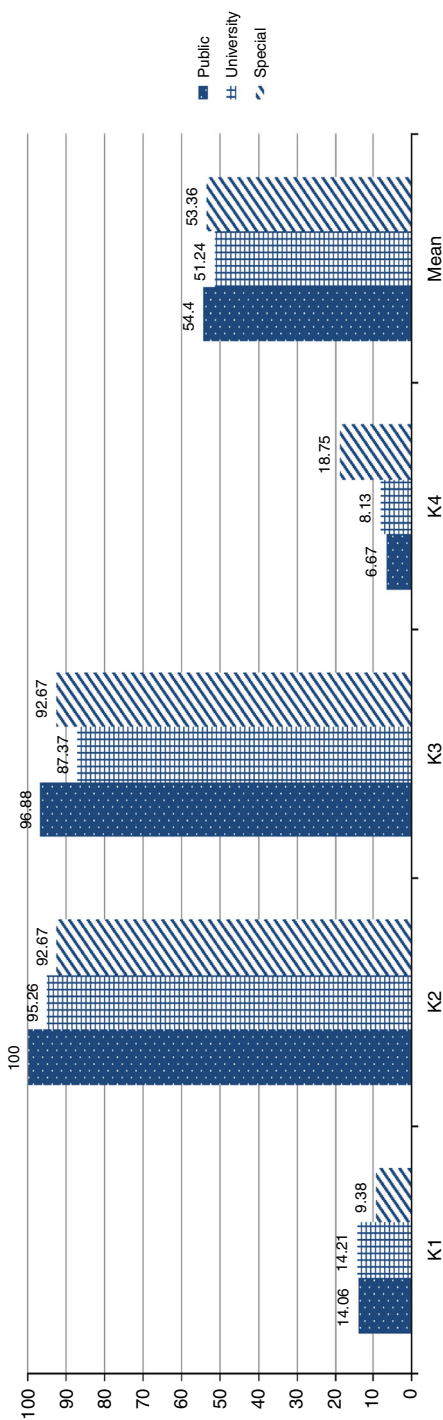


Figure 10.
Evaluation for the
conventional
elements in the
device providing
service in
the libraries

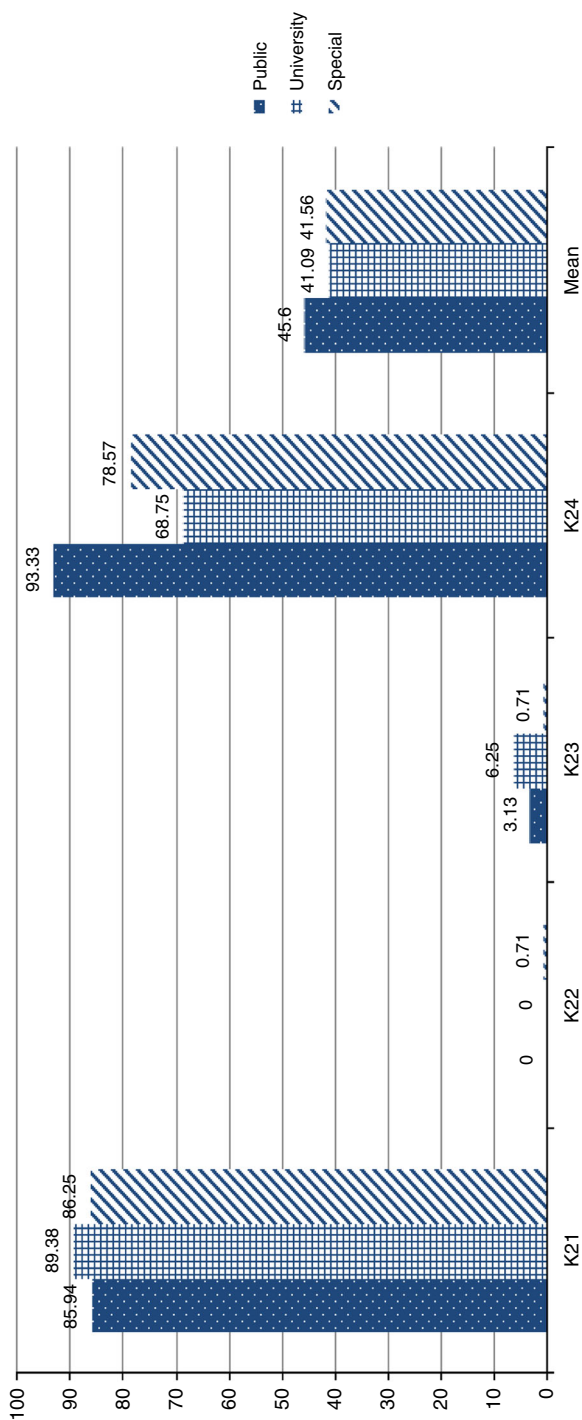


Figure 11.
Evaluation for the
digital elements
in the device
providing service
in the libraries

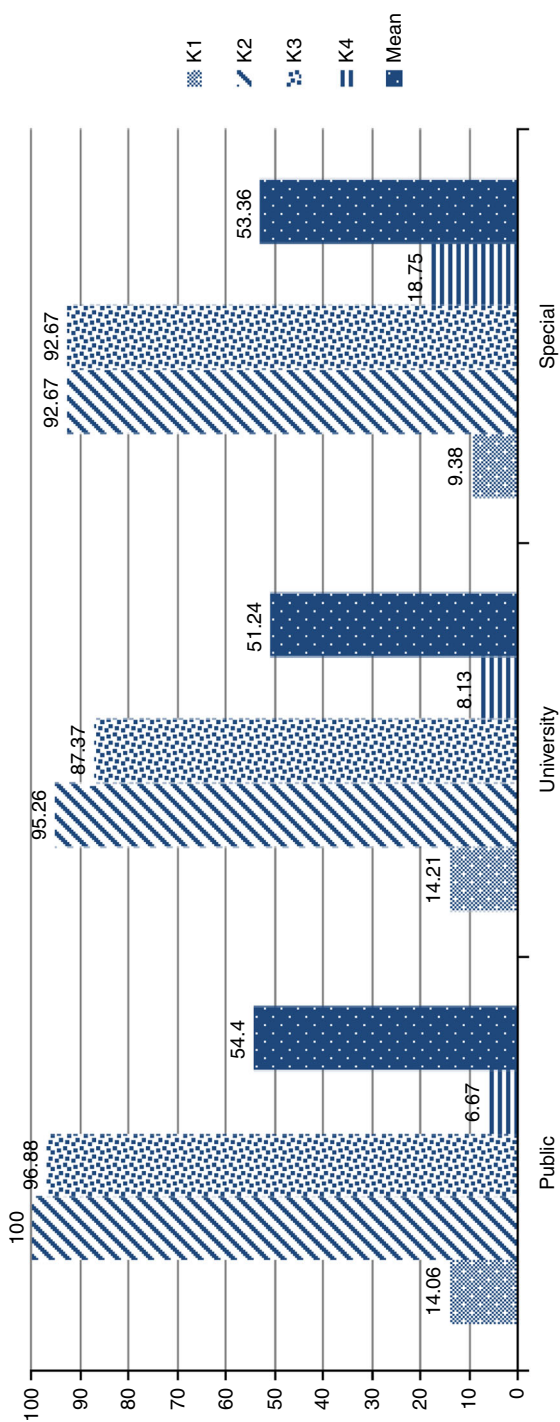


Figure 12. Evaluation for the conventional elements in the device providing service in the libraries according to the library types

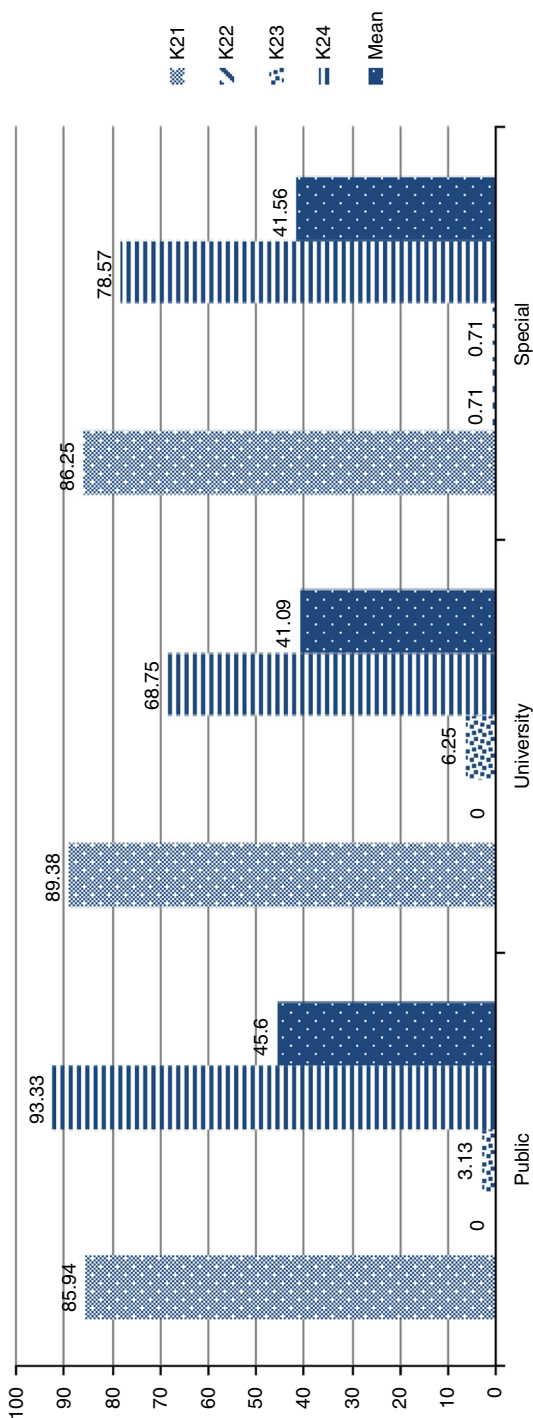


Figure 13. Evaluation for the digital elements in the device providing service in the libraries according to the library types

| Code | Public | | Conventional Academic | | Element of the library | Special | | Public | | Digital Academic | | Special | | Code |
|-------|--------|--------|-----------------------|-------|------------------------|---------|------|--------|-------|------------------|------|---------|-------|------|
| | Sum | Mean | Sum | Mean | | Sum | Mean | Sum | Mean | Sum | Mean | Sum | Mean | |
| L1 | 1,600 | 100.00 | 1,360 | 71.58 | 1,490 | 93.13 | 0 | 0.00 | 540 | 28.42 | 10 | 0.67 | L21 | |
| L2 | 1,300 | 81.25 | 1,690 | 88.95 | 1,480 | 92.50 | 300 | 18.75 | 210 | 11.05 | 20 | 1.33 | L22 | |
| L3 | 1,500 | 93.75 | 1,590 | 83.68 | 1,420 | 88.75 | 100 | 6.25 | 310 | 16.32 | 80 | 5.33 | L23 | |
| L4 | 1,520 | 95.00 | 1,700 | 89.47 | 1,490 | 93.13 | 80 | 5.00 | 200 | 10.53 | 10 | 0.67 | L24 | |
| L5 | 1,600 | 100.00 | 1,720 | 90.53 | 1,490 | 93.13 | 0 | 0.00 | 180 | 9.47 | 10 | 0.67 | L25 | |
| L6 | 1,600 | 100.00 | 1,720 | 90.53 | 1,500 | 93.75 | 0 | 0.00 | 180 | 9.47 | 0 | 0.00 | L26 | |
| L7 | 1,580 | 98.75 | 1,655 | 87.11 | 1,380 | 86.25 | 20 | 1.25 | 245 | 12.89 | 120 | 8.00 | L27 | |
| L8 | 1,590 | 99.38 | 1,570 | 82.63 | 1,410 | 88.13 | 10 | 0.63 | 330 | 17.37 | 90 | 6.00 | L28 | |
| Total | 12,290 | 96.02 | 13,005 | 85.56 | 11,660 | 91.09 | 510 | 3.98 | 2,195 | 14.44 | 340 | 2.83 | Total | |

Digitization
level of
Korean
libraries

Table V.
Evaluation for the
digitization level in
the next generation
service of the
libraries according to
the library types

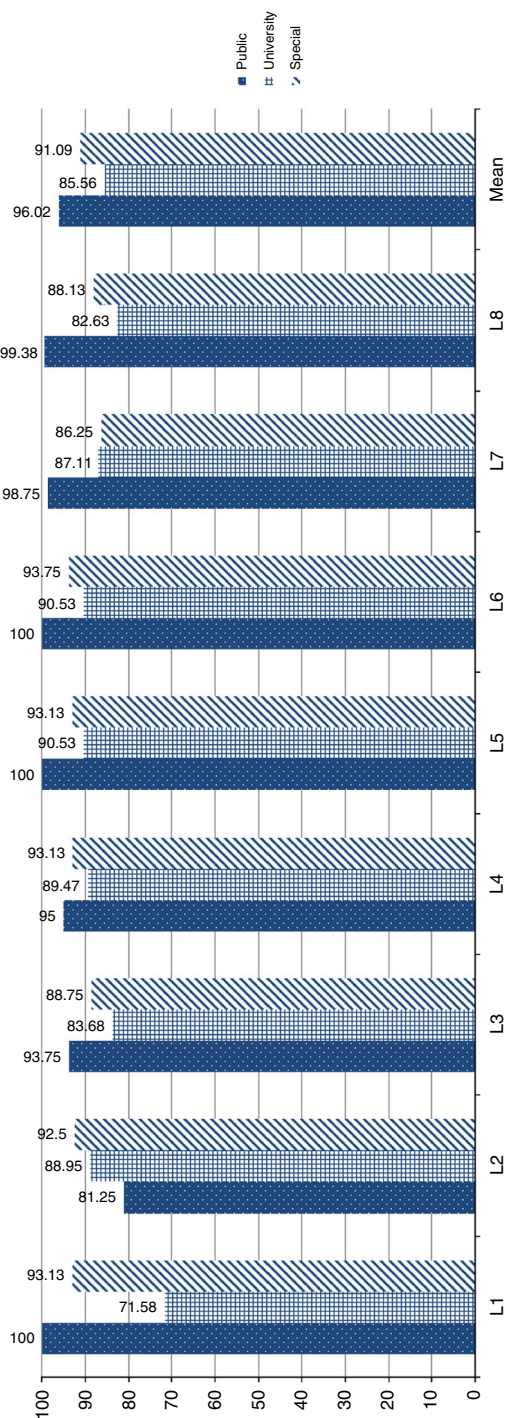


Figure 14.
Evaluation for the
conventional
elements in the next
generation service
of the libraries

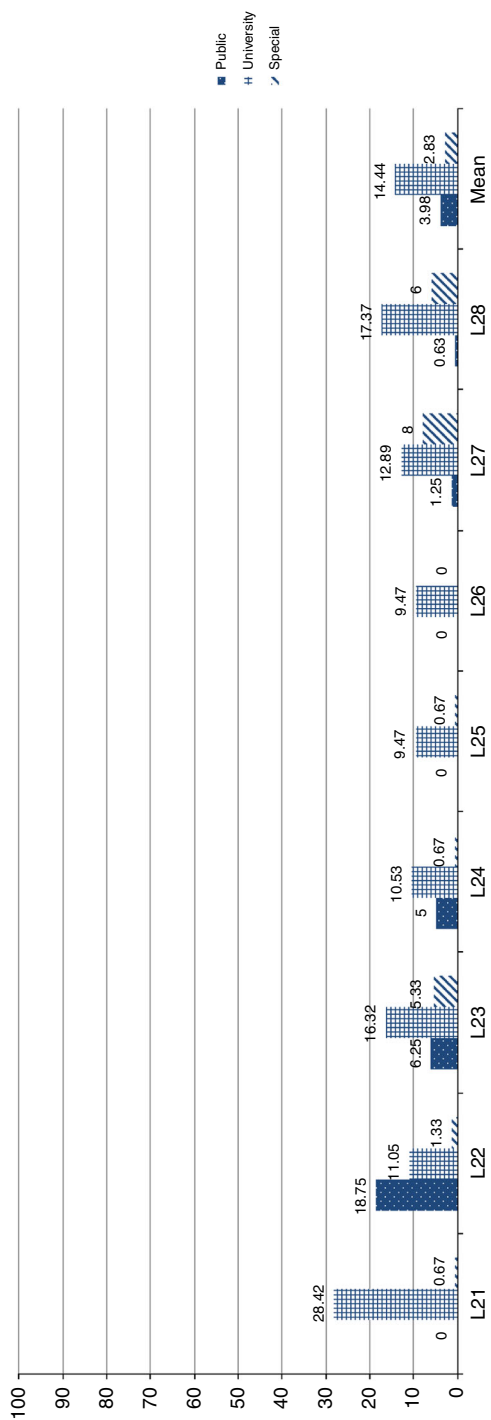


Figure 15. Evaluation for the digital elements in the next generation service of the libraries

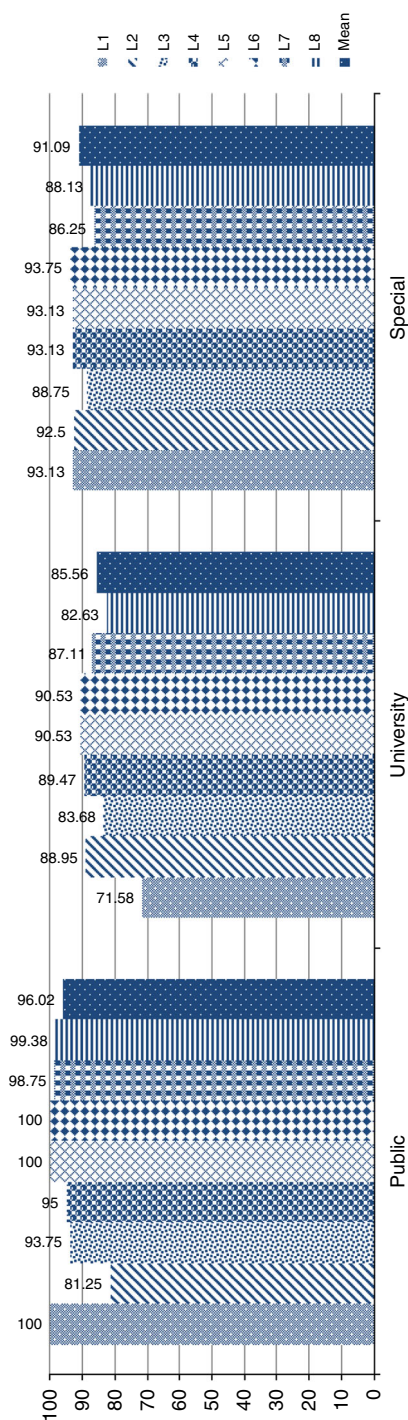


Figure 16.
Evaluation for the
conventional
elements in the next
generation service of
the libraries
according to the
library types

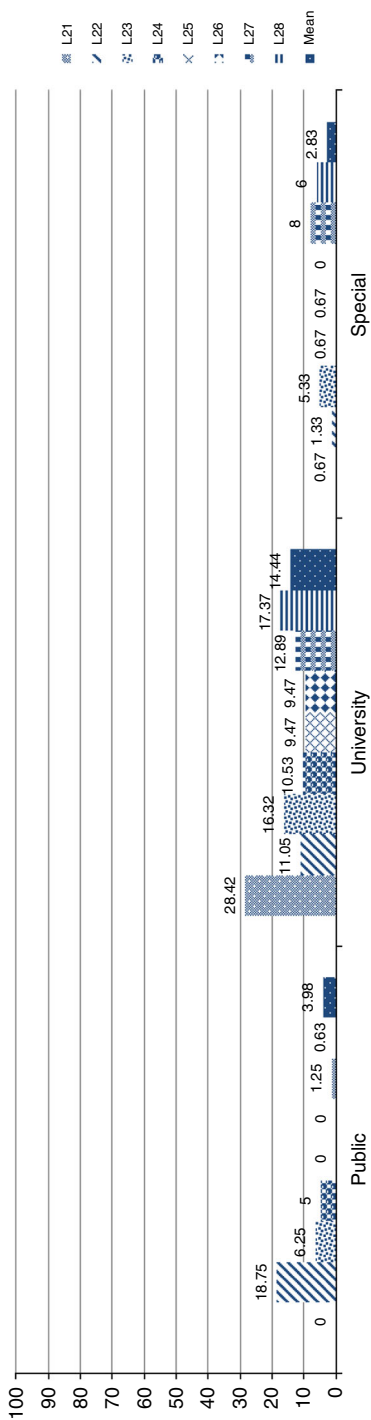


Figure 17. Evaluation for the digital elements in the next generation service of the libraries according to the library types

Table VI.
Evaluation for the
digitization level of
the libraries
according to the
library types

| Code | Public | | Conventional Academic | | Special | | Element of the library | Public | | Digital Academic | | Special | | Code |
|-------|--------|-------|-----------------------|-------|---------|-------|------------------------|--------|-------|------------------|-------|---------|-------|------|
| | Sum | Mean | Sum | Mean | Sum | Mean | | Sum | Mean | Sum | Mean | Sum | Mean | |
| M1 | 1,370 | 86.00 | 1,160 | 61.05 | 1,165 | 72.81 | Our library is? | 230 | 14.38 | 740 | 38.95 | 435 | 27.19 | M21 |
| M2 | 1,365 | 85.31 | 1,235 | 65.00 | 1,225 | 76.56 | | 225 | 14.06 | 665 | 35.00 | 375 | 23.44 | M22 |
| M3 | 930 | 58.13 | 1,100 | 57.89 | 1,110 | 69.38 | | 670 | 41.88 | 800 | 42.11 | 500 | 31.25 | M23 |
| M4 | 1,090 | 68.13 | 1,150 | 60.53 | 830 | 51.88 | | 510 | 31.88 | 750 | 39.47 | 770 | 48.13 | M24 |
| M5 | 1,360 | 85.00 | 1,240 | 65.26 | 1,065 | 66.56 | | 240 | 15.00 | 640 | 33.68 | 535 | 33.44 | M25 |
| M6 | 340 | 21.25 | 650 | 34.21 | 535 | 33.44 | | 1,260 | 78.75 | 1,250 | 65.79 | 1,065 | 66.56 | M26 |
| M7 | 550 | 34.38 | 830 | 43.68 | 505 | 31.56 | | 1,050 | 65.63 | 1,070 | 56.32 | 1,095 | 68.44 | M27 |
| M8 | 840 | 56.00 | 925 | 48.68 | 920 | 61.33 | | 710 | 47.33 | 975 | 51.32 | 480 | 34.29 | M28 |
| M9 | 1,325 | 82.81 | 1,175 | 61.84 | 1,110 | 74.00 | | 265 | 16.56 | 725 | 38.16 | 390 | 26.00 | M29 |
| Total | 9,170 | 64.11 | 9,465 | 55.35 | 8,465 | 59.72 | 5,160 | 36.16 | 7,615 | 44.53 | 5,645 | 39.86 | Total | |

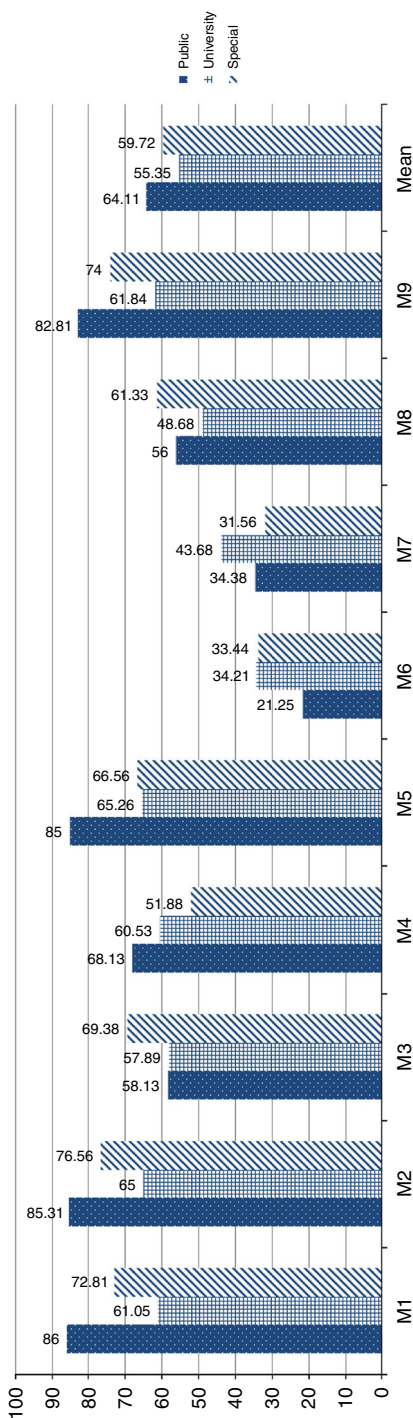


Figure 18.
Evaluation for the
conventional
elements in
all aspects
of the libraries

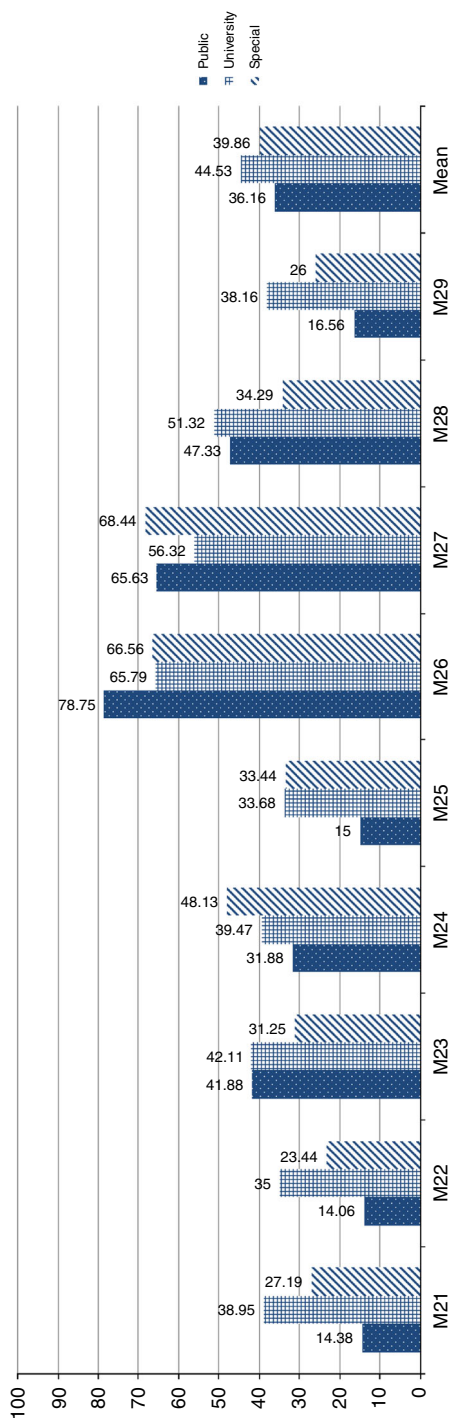


Figure 19.
Evaluation for
the digital elements
in all aspects of
the libraries

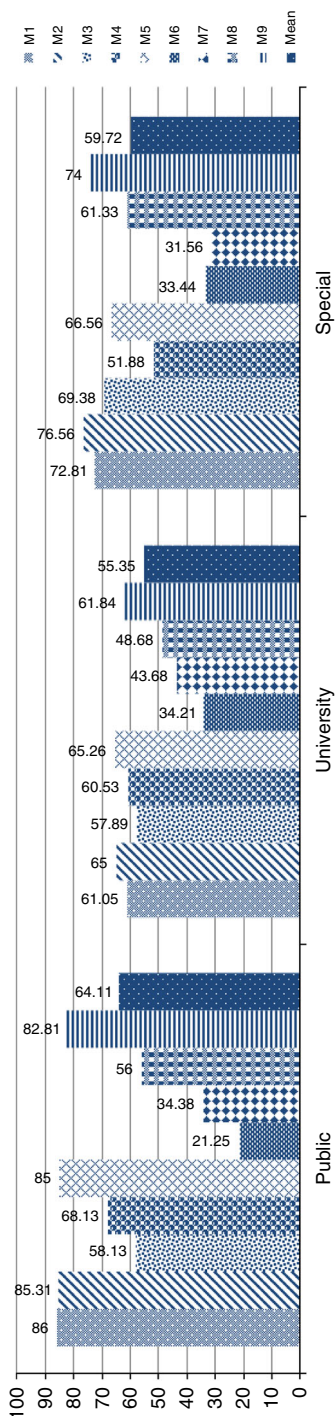


Figure 20.
Evaluation for the
conventional
elements in all
aspects of the
libraries according to
the library types

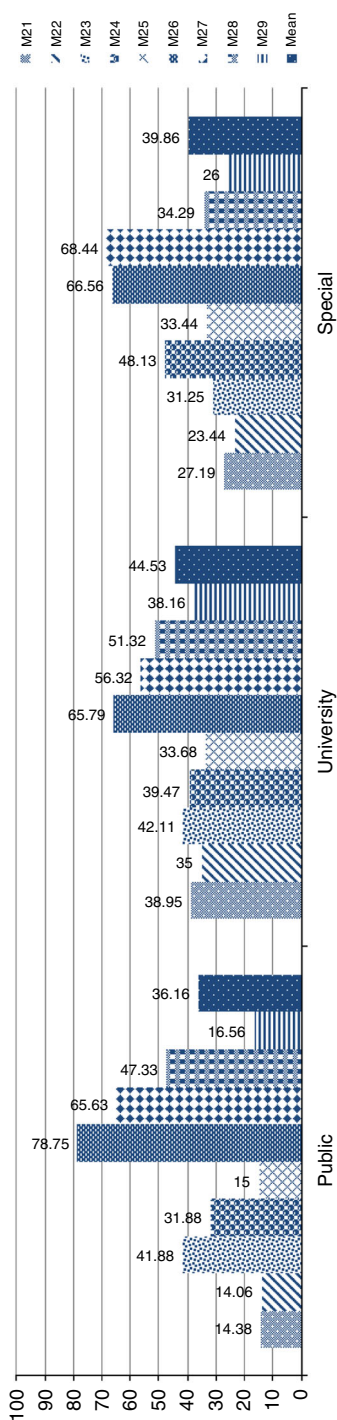


Figure 21.
Evaluation for the digital elements in all aspects of the libraries according to the library types

4.2 Evaluation of the digitization level according to items in the elements of library

The digitization level according to the items in the elements of library was assessed by evaluators who belonged to the library. First of all, the element of acquisition scored 75.13 for selecting material online (A23), 69.31 for requesting material online (A22), and 68.88 for comprehensively acquiring material online (A25). As the average of the acquisition on the aspect of digital function was 67.25, it was determined to be more digitized.

The element of book collection scored 83.19 for paper books (B1) and 80.75 for a preserved book collection in the offline form (B9) and it scored 63.05 for digital video (B23), 45.48 for digital audio (B24), and 40.22 for e-journal (B22). Since the average of the book collection with respect to the conventional function was 64.00, it was determined to still be conventional.

The element of classification and cataloging scored 85.42 for providing online lists (C22) and 72.33 for creating indexes by an automatic indexing system (C24). As the average of the classification and cataloging on the aspect of the digital function was 70.66, it was determined to be more digitized.

The element of circulation service scored 92.64 for lending books offline and returning the books online (D1) and 81.39 for a book returning desk (D6) and it scored 73.29 for reserving books online (D24), 64.37 for online interlibrary loan service (D23), and 63.17 for renewing books online (D25). As the average of the circulation service on the aspect of the conventional function was 54.72, and 43.60 with respect to the digital function it implied that it was digitized to a similar level.

The element of reference service scored 83.52 for offline outreach service (E5) and 74.21 for offline reference service (E1). As the average of the reference service on the aspect of the conventional function was 65.64, it implied that it was still conventional. The conventional items of the reference service obtained generally high scores; the scores for offline/online book recommendation services (E3 and E23) were 45.14 on the aspect of the conventional function and 53.90 with respect to the digital function, implying that the book recommendation service was digitized.

The element of user services scored 94.99 for duplication service for material (F8), 82.37 for no support for business service (F9), and 74.34 for providing education based on the offline material (F11); it scored 65.90 on the aspect of the conventional function, implying that it was conventional.

The element of library program services scored 89.43 for offering cultural programming offline (G3), 88.57 for offering the library programs offline (G5), and 86.34 for offering offline reading programs (G4); it scored 77.38 on the aspect of conventional function and 20.89 for the digital function, and thus it was determined to be conventional.

As the element of the service space scored 92.69 for no experience room for high-tech devices (H6), 92.47 for library promotion using poster and bulletin board (H7), 89.84 for providing the world's best library service in physical form (H11), and 89.43 for providing an offline meeting room (H4), it was overall determined to be conventional; meanwhile, the averages were significantly high to be considered digitized with scores of 86.80 for providing wireless Wi-Fi (H23) and 73.48 for providing many seats for using computers and laptops (H22). The service space area was deemed to be more conventional than digital with a 69.44 average score for the former and 27.05 score for the latter.

The element of SNS service scored 90.06 for direction services to the location of the library using offline tools (I5), 88.38 for bibliographic information sharing the service of a comprehensive list system (I3), and 85.17 for book searching services using the list (I9). As the averages were 79.41 to be conventional and 17.08 to be digital, it was determined still to be conventional.

The element of organization and employees scored 80.25 for hierarchical organization (J1) and 52.90 for offline workload (J9). It also scored 80.88 for learning by oneself to be socially integrated (J27) and 70.14 for being user-centered (J22). The averages in the organization and employees in the library scored 45.31 as to being conventional and 54.03 with respect to being digital, implying that the levels of digitization of the organization and employees were similar.

The averages in device providing service were pretty similar with a score of 53.00 for conventional and 44.79 for the digital aspect, putting them in both categories. Scores of 95.98 for scanner (K2), 92.30 for printer (K3), 85.99 for providing desktop and laptop computers, iPad, e-book device, etc. (K21) and 85.84 for digital camera (K24), with respect to providing the devices, clearly placed them in the digital category.

The element of next generation service produced scores of 94.76 for no support for situation recognition technology-based service (L6), 94.55 for no support for augmented reality-based service (L5), and 92.53 for no support for utilizing Google glass (L4), with the average in all of the conventional items scoring higher than 85.00. As the next generation service was evaluated as 90.89 to be conventional and 7.09 to be digital, the libraries tended rarely to provide the next generation services such as cloud, situation recognition service, and semantic web.

The libraries as a whole scored 75.63 for indicating that the library had stronger physical attributes (M2), 73.29 for indicating that the library had more conventional characteristics (M1), 72.88 for indicating that it is a conventional library (M9), and 72.28 for indicating that the library is collection-centered (M5). A score of 59.73 would be considered to be conventional and 40.18 to be digital, so the performances and services in the libraries were still determined to be conventional (Table VII).

4.3 Evaluation of the digitization level according to the element of library

The digitization level according to the elements of a library was assessed by evaluators, who belonged to the library. Among the elements of the library, the next generation services scored 90.89, the SNS service 79.41, and the library program service 77.38, and were determined to be conventional. Classification and cataloging, which scored 70.66, acquisition 67.25, and organization and employees 54.03, were determined to be digitized. Conversely, the book collection (66.09), circulation services (54.72), reference services (65.64), user services (65.90), library program services (77.38), space services (70.88), the SNS service (79.41), device providing services (53.00), the next generation service (90.89), and what our library is (59.73) were considered to be conventional. The digitization level was similar in the circulation service, the organization and employees, and the device providing service, but the next generation service was evaluated overwhelmingly to be conventional. As the responding libraries scored 62.91 for being conventional and 35.06 for being digitized, they were mostly evaluated as being conventional (Table VIII).

5. Conclusions and future research

5.1 Conclusion

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

| Code | Conventional | | Element of the library | Digital | | Code |
|-------|--------------|-------|---|---------|-------|-------|
| | Sum | Mean | | Sum | Mean | |
| A1 | 2,167 | 41.32 | Acquisition | 3,033 | 58.68 | A21 |
| A2 | 1,646 | 31.57 | | 3,599 | 69.31 | A22 |
| A3 | 1,305 | 24.87 | | 3,895 | 75.13 | A23 |
| A4 | 1,845 | 35.74 | | 3,355 | 64.26 | A24 |
| A5 | 1,644 | 31.65 | | 3,586 | 68.88 | A25 |
| Total | 8,607 | 33.03 | | 17,468 | 67.25 | Total |
| B1 | 4,307 | 83.19 | Collection (physical online collection) | 903 | 16.99 | B21 |
| B2 | 2,979 | 58.86 | | 2,121 | 40.22 | B22 |
| B3 | 1,708 | 35.88 | | 2,792 | 63.05 | B23 |
| B4 | 2,538 | 53.11 | | 2,062 | 45.48 | B24 |
| B5 | 3,031 | 59.87 | | 1,769 | 36.72 | B25 |
| B6 | 4,785 | 77.46 | | 1,115 | 22.53 | B26 |
| B7 | 3,140 | 61.03 | | 1,960 | 38.97 | B27 |
| B8 | 3,380 | 65.86 | | 1,620 | 32.85 | B28 |
| B9 | 4,073 | 80.75 | | 827 | 17.70 | B29 |
| Total | 27,589 | 64.00 | 17,836 | 34.95 | Total | |
| C1 | 1,885 | 36.72 | Classification and cataloging | 3,115 | 61.68 | C21 |
| C2 | 783 | 15.28 | | 4,362 | 85.42 | C22 |
| C3 | 1,688 | 32.78 | | 3,512 | 67.22 | C23 |
| C4 | 1,420 | 27.67 | | 3,680 | 72.33 | C24 |
| C5 | 1,425 | 28.79 | | 3,275 | 66.67 | C25 |
| Total | 7,201 | 28.25 | 17,944 | 70.66 | Total | |
| D1 | 4,635 | 92.64 | Circulation service | 365 | 7.36 | D21 |
| D2 | 2,805 | 56.35 | | 2,095 | 42.10 | D22 |
| D3 | 1,435 | 31.40 | | 2,965 | 64.37 | D23 |
| D4 | 1,210 | 23.74 | | 3,780 | 73.29 | D24 |
| D5 | 1,575 | 33.87 | | 3,025 | 63.17 | D25 |
| D6 | 3,880 | 81.39 | | 920 | 18.61 | D26 |
| D7 | 3,088 | 63.67 | | 1,812 | 36.33 | D27 |
| Total | 18,628 | 54.72 | | 14,962 | 43.60 | Total |
| E1 | 3,857 | 74.21 | Reference service | 1,243 | 24.28 | E21 |
| E2 | 3,145 | 60.61 | | 1,955 | 38.23 | E22 |
| E3 | 2,305 | 45.14 | | 2,695 | 53.90 | E23 |
| E4 | 2,980 | 64.74 | | 1,320 | 28.21 | E24 |
| E5 | 3,845 | 83.52 | | 555 | 11.60 | E25 |
| Total | 16,132 | 65.64 | 7,768 | 31.25 | Total | |
| F1 | 3,662 | 72.13 | User service | 1,438 | 27.87 | F21 |
| F2 | 3,577 | 70.67 | | 1,523 | 29.33 | F22 |
| F3 | 3,587 | 70.78 | | 1,433 | 27.55 | F23 |
| F4 | 2,915 | 57.46 | | 2,085 | 40.93 | F24 |
| F5 | 2,220 | 43.59 | | 2,780 | 55.14 | F25 |
| F6 | 2,555 | 49.94 | | 2,445 | 48.67 | F26 |
| F7 | 2,480 | 48.67 | | 2,520 | 49.56 | F27 |
| F8 | 4,660 | 94.99 | | 240 | 4.88 | F28 |
| F9 | 3,870 | 82.37 | | 630 | 12.87 | F29 |
| F10 | 3,012 | 59.95 | | 1,988 | 38.75 | F30 |
| F11 | 3,715 | 74.34 | | 1,185 | 23.28 | F31 |
| Total | 36,253 | 65.90 | 18,267 | 32.62 | Total | |
| G1 | 2,340 | 49.45 | Library program service | 2,360 | 49.01 | G21 |
| G2 | 3,840 | 79.02 | | 1,010 | 20.20 | G22 |
| G3 | 4,050 | 89.43 | | 450 | 9.90 | G23 |

Digitization
level of
Korean
libraries**397**

Table VII.
Evaluation for the
digitization level
according to items in
the elements
of library

(continued)

| LHT 34,2 | Code | Conventional | | Element of the library | Digital | | Code |
|-------------|--------|--------------|--------------------------|----------------------------|---------|-------|-------|
| | | Sum | Mean | | Sum | Mean | |
| 398 | G4 | 3,740 | 86.34 | Space service | 460 | 10.96 | G24 |
| | G5 | 4,170 | 88.57 | | 430 | 9.10 | G25 |
| | G6 | 3,360 | 71.49 | | 1,240 | 26.16 | G26 |
| | Total | 21,500 | 77.38 | | 5,950 | 20.89 | Total |
| | H1 | 2,455 | 49.40 | | 2,545 | 48.87 | H21 |
| | H2 | 1,250 | 26.52 | | 3,750 | 73.48 | H22 |
| | H3 | 630 | 12.57 | | 4,370 | 86.80 | H23 |
| | H4 | 4,130 | 89.43 | | 80 | 1.57 | H24 |
| | H5 | 2,940 | 64.23 | | 1,560 | 30.73 | H25 |
| | H6 | 4,380 | 92.69 | | 20 | 0.45 | H26 |
| | H7 | 3,870 | 76.68 | | 1,130 | 21.36 | H27 |
| | H8 | 3,890 | 86.63 | 510 | 10.74 | H28 | |
| | H9 | 4,200 | 87.50 | 400 | 8.36 | H29 | |
| | H10 | 4,510 | 88.40 | 490 | 9.64 | H30 | |
| | H11 | 3,955 | 89.84 | 245 | 5.56 | H31 | |
| | Total | 36,210 | 69.44 | 15,100 | 27.05 | Total | |
| | I1 | 3,560 | 81.26 | SNS service | 740 | 15.52 | I21 |
| | I2 | 3,440 | 78.68 | | 670 | 14.95 | I22 |
| | I3 | 4,150 | 88.38 | | 450 | 9.54 | I23 |
| | I4 | 4,240 | 83.46 | | 670 | 12.81 | I24 |
| | I5 | 4,230 | 90.06 | | 370 | 7.67 | I25 |
| | I6 | 4,165 | 82.89 | | 690 | 14.14 | I26 |
| | I7 | 3,760 | 76.66 | | 720 | 14.98 | I27 |
| | I8 | 2,600 | 55.11 | | 1,900 | 40.79 | I28 |
| | I9 | 4,160 | 85.17 | | 650 | 12.81 | I29 |
| | I10 | 3,850 | 79.85 | | 850 | 17.93 | I30 |
| | I11 | 3,825 | 76.08 | | 1,075 | 21.54 | I31 |
| | I12 | 3,780 | 75.30 | | 1,120 | 22.32 | I32 |
| | Total | 45,760 | 79.41 | 9,905 | 17.08 | Total | |
| | J1 | 4,125 | 80.25 | Organization and employees | 875 | 18.18 | J21 |
| | J2 | 1,525 | 29.86 | | 3,575 | 70.14 | J22 |
| | J3 | 2,080 | 40.87 | | 2,920 | 57.99 | J23 |
| | J4 | 2,295 | 45.51 | | 2,805 | 54.49 | J24 |
| | J5 | 2,610 | 51.15 | | 2,430 | 48.56 | J25 |
| | J6 | 2,070 | 44.68 | | 2,430 | 54.37 | J26 |
| | J7 | 940 | 18.77 | | 3,860 | 80.88 | J27 |
| J8 | 2,205 | 43.81 | 2,685 | | 54.93 | J28 | |
| J9 | 2,675 | 52.90 | 2,407 | | 46.72 | J29 | |
| Total | 20,525 | 45.31 | 23,987 | 54.03 | Total | | |
| K1 | 645 | 12.55 | Device providing service | 4,385 | 85.99 | K21 | |
| K2 | 4,800 | 95.98 | | 100 | 1.82 | K22 | |
| K3 | 4,600 | 92.30 | | 300 | 5.49 | K23 | |
| K4 | 380 | 11.18 | | 3,320 | 85.84 | K24 | |
| Total | 10,425 | 53.00 | 8,105 | 44.79 | Total | | |
| L1 | 4,450 | 88.23 | Next generation service | 550 | 9.70 | L21 | |
| L2 | 4,470 | 87.57 | | 530 | 10.38 | L22 | |
| L3 | 4,510 | 88.73 | | 490 | 9.30 | L23 | |
| L4 | 4,710 | 92.53 | | 290 | 5.40 | L24 | |
| L5 | 4,810 | 94.55 | | 190 | 3.38 | L25 | |
| L6 | 4,820 | 94.76 | | 180 | 3.16 | L26 | |

Table VII.

(continued)

Table VII.

| Code | Conventional | | Element of the library | Digital | | Code |
|-------|--------------|-------|------------------------|---------|-------|-------|
| | Sum | Mean | | Sum | Mean | |
| L7 | 4,615 | 90.70 | Our library is | 385 | 7.38 | L27 |
| L8 | 4,570 | 90.04 | | 430 | 8.00 | L28 |
| Total | 36,955 | 90.89 | | 3,045 | 7.09 | Total |
| M1 | 3,695 | 73.29 | | 1,405 | 26.84 | M21 |
| M2 | 3,825 | 75.63 | | 1,265 | 24.17 | M22 |
| M3 | 3,140 | 61.80 | | 1,970 | 38.41 | M23 |
| M4 | 3,070 | 60.18 | | 2,030 | 39.82 | M24 |
| M5 | 3,665 | 72.28 | | 1,415 | 27.37 | M25 |
| M6 | 1,525 | 29.63 | | 3,575 | 70.37 | M26 |
| M7 | 1,885 | 36.54 | | 3,215 | 63.46 | M27 |
| M8 | 2,685 | 55.34 | | 2,165 | 44.31 | M28 |
| M9 | 3,610 | 72.88 | | 1,380 | 26.91 | M29 |
| Total | 27,100 | 59.73 | | 18,420 | 40.18 | Total |

| Sum | Conventional | | Element of the library | Digital | |
|---------|--------------|---|------------------------|---------|------|
| | Sum | Mean | | Sum | Mean |
| 8,607 | 33.03 | Acquisition | 17,468 | 67.25 | |
| 27,589 | 64.00 | Collection (physical online collection) | 17,836 | 34.95 | |
| 7,201 | 28.25 | Classification and Cataloging | 17,944 | 70.66 | |
| 18,628 | 54.72 | Circulation service | 14,962 | 43.60 | |
| 16,132 | 65.64 | Reference service | 7,768 | 31.25 | |
| 36,253 | 65.90 | User service | 18,267 | 32.62 | |
| 21,500 | 77.38 | Library program service | 5,950 | 20.89 | |
| 37,110 | 69.44 | Space service | 15,100 | 27.05 | |
| 45,760 | 79.41 | SNS service | 9,905 | 17.08 | |
| 20,525 | 45.31 | Organization and employees | 23,987 | 54.03 | |
| 10,425 | 53.00 | Device providing service | 8,105 | 44.79 | |
| 36,955 | 90.89 | Next generation service | 3,045 | 7.09 | |
| 27,100 | 59.73 | Our library is? | 18,420 | 40.18 | |
| 319,344 | 62.91 | Total | 144,691 | 35.06 | |

Table VIII.
Evaluation for the
digitization level
according to the
element of library

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 purpose of this study is 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. Part II is comprised of the evaluation results of the last five items among the 13 evaluation elements. And, if we were to summarize and present the results, they are as follows.

First, the rate of providing library services utilizing the SNS service scored significantly low with 17.08, and the element of next generation service also scored significantly low with 7.09.

Second, the organization and employees of the library showed slightly more digital characteristics; the item of learning by oneself to be socially integrated scored significantly high with 80.88.

Third, in evaluating whether our library was overall digital or conventional, many evaluators concluded their libraries to be more conventional; the average score was 59.73 for being conventional and 40.18 for being digital.

Furthermore, the study analyzed the digital libraries according to the elements and library types; considering a slight difference, they showed digital and as well as conventional characteristics with a similar rate. As a result of comparing the averages to measure the digitization level according to the elements of a library, three elements such as acquisition, classification and cataloging, and the organization and employees section were determined to be more digitized; the digitized level and the conventional level of the acquisition were, respectively 67.25 and 33.03, of the classification and cataloging, respectively 70.66 and 28.25, and of the organization and employees, respectively 54.03 and 45.31. Other items showed significantly conventional characteristics with the most significant tendency being shown in the next generation service, which scored 7.09 for the digital characteristics and 90.89 for the conventional characteristics. The SNS service with 79.41 conventional to 17.08 digital, the library program service at 77.38-20.89, and the space service at 69.44-27.05 followed closely but less significantly behind.

In response to the request questions based on the results, first, in total 92 items of conventional and digital elements were symmetrically extracted to finally determine 184 factors as suggested in the Table III in pursuit of finding elements that characterized the conventional and the digital libraries.

Second, based on reviewing the previous research, it was found that a good amount of research was performed to extract the elements of the digital library. Jochumsen *et al.* (2012) compared the characteristics of the virtual and physical libraries according to the four dimensions of experience, involvement, empowerment, and innovation; Jochumsen *et al.* (2012) compared the physical and virtual libraries, the individual user-centered and the local community-centered, the book and the creation libraries, and the portal and the archive libraries according to the four dimensions. In addition, researchers such as Hendrix (2010), Singh and Sharma (2015), Yoon (1997), Nam (2011), and Noh (2014, 2015, 2016) worked to determine the characteristics of a digital library; however, none of studies were performed to comprehensively extract the elements of the conventional and the digital libraries symmetrically as in this study, and none of studies ever developed the index of evaluating the digitization level to actually perform the evaluation. Additionally, the researchers claimed that the libraries having both characteristics must choose one side or the other in considering the effectiveness, rather than that the digital library was more effective than the conventional library.

Third, in evaluating the digitization level of the target libraries in this study, some items in the elements of the digital and conventional libraries still showed more conventional characteristics by 62.91 percent than the digital characteristics by 35.06 percent.

Fourth, based on the axis for comparison of the 13 items, the highest digitization level of the elements was in acquisition by 67.25 percent and the lowest was the next generation service. In other words, tasks that could be replaced by the next generation service were still performed by conventional method. Thus, most of the items scored

more than 30 percent but the items of the next generation service and the SNS service scored relatively low with scores of 7.09 and 17.08, respectively.

To summarize the answers in response to the research questions based on the results: first, the elements that characterized the conventional and the digital libraries were finally determined by analyzing all kinds of literature and through consultation with experts. Accordingly, 92 factors were suggested for each of the conventional and the digital elements based on the axis with 13 items.

Second, up to now, some research was performed in pursuit of extracting the elements of a library according to the literature review, but comprehensive research was never performed as in this study. The research indicated that the libraries obtained one of the conventional or digital characteristics independent of the situation, rather than that the digital library was more effective than the conventional library.

Third, in evaluating the chosen libraries used as the examples, it was observed that the libraries had more conventional characteristics among the elements of the digital and conventional libraries. Also based on the axis used for comparison of 13 items, elements such as the next generation service, the SNS service, and the library program service were more conventional, but elements such as classification and cataloging, acquisition, and the organization were more digitized.

5.2 Future research

This study selected the conventional and the digital elements of library in analyzing the literature and examples to evaluate the digitization level of the library based on the result; however, even though it was performed according to the consultation with experts, it is relatively limited to more wide-scope application as it was performed by an individual researcher. Therefore, in the future research at the national level should be performed to suggest the developmental direction of the library.

Furthermore, this study did not perform the evaluation for the digitization level of all libraries in the country but only of 19 public libraries, 16 university libraries, and 17 special libraries. It cannot say that the research results represent the digitization level of all types of libraries in the country. Consequently, it might be meaningful to perform future research for evaluating the digitization level of all libraries across the country at the national level. Also, after evaluating the digitization level, it would be helpful to politically establish strategies and more projects to develop the future-oriented libraries.

To cope with the environmental changes surrounding libraries and reflect the users' demands for libraries being future oriented, the libraries should evaluate their level in various aspects and continuously perform research to seek the developmental direction of the libraries. Even though this study sought to develop the questionnaire for evaluating the digitization level of library for the first time in the country, it should be modified and reinforced to reflect the times as well as new researchers' perspectives.

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