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Digital library: Lecturers' perceptions of facilitating learning resources in the industrial era 4.0

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Abstract

This research explores lecturers' perceptions of digital libraries as a learning resource for the industrial era 4.0 that can be used anytime and anywhere to solve the low interest in developing lecturers because of the difficulty of accessing references to conventional libraries, which require lecturers to visit the library building. Data was collected through semi-structured interviews with 15 lecturers, and data analysis was performed using thematic analysis. The analysis results found four main themes: benefits, challenges, recommendations, and positive and negative impacts of digital libraries. The research concluded that the existence of a digital library can make it easy for lecturers to browse the references needed quickly, easily, and flexibly just by entering the library's website page. This research contributes to solving the problem of lecturers in Indonesia over the limited learning resources in conventional libraries that are difficult to access online and require particular visiting time because they have to come directly during library operating hours. Therefore, support from the government, university leaders, and the wider community is needed to develop a digital library system to facilitate lecturers in Indonesia having adequate learning resources for the industrial era 4.0.

Keywords: Digital library, Education human resources, Indonesia, Learning resources.

Contents

Contribution of this paper to the literature
This research contributes to solving the problem of difficult learning resources using conventional libraries so that research results can be used as input and reference to improve digital libraries to develop the quality of lecturers in Indonesia.

1. Introduction

COVID-19 hit Indonesia in mid-February 2020 and had an impact on changes in the learning system (Alpian, Syarif Sumantri, Yufiarti, & Sri Wulan, 2022; Yarrow, Masood, & Afkar, 2020). People's perspective on the urgency of technology and information (Nyagadza, Pashapa, Chare, Mazuruse, & Hove, 2022; Rasmitadila et al., 2020) as well as learning resources that are used as references in the self-development of lecturers after the COVID-19 pandemic (Mafugu & Abel, 2022; Shum, Motta, & Domingue, 2000). The library building that has the function of providing references and learning resources could not be used during the pandemic as there were conventional procedures in place that required lecturers to come directly to visit during working hours to borrow or access references online in the library room only. Therefore, the library, originally a learning resource center to find references and a means of publishing research results and lecturers' papers (Kim, 2018; Kurdi & Jamous, 2022; Panezi, 2014) became deserted without visitors due to room closures and zoning areas in order to prevent the spread of COVID-19. Meanwhile, the self-development of lecturers with their duties in teaching, research, and service must still be carried out even during the COVID-19 pandemic, facilitated by easy access to reference reading sources from the library.

The difficulty of lecturers visiting the library building makes it necessary to create another alternative to fulfilling learning resources that are easily accessible nationally, such as digital libraries (Hall, 2021). Digital libraries provide broad access for lecturers to be able to surf and access the library anytime and anywhere (Chen & Lin, 2014; Chowdhury, 2002; Shum et al., 2000). Several studies were conducted, including at the University of Spain, which provided online learning through digital library media used during the COVID-19 pandemic, which had an impact on the more flexible lecturers in carrying out learning activities (Vijayalakshmi, Manimegalai, & Sasidhar, 2019). Meanwhile, in the UK, the presence of digital libraries has an impact on widening the gap in the self-development of lecturers (Chowdhury, 2002; Noble, 2021). Lecturers who can use digital libraries as learning resources can quickly advance their careers. In contrast, lecturers who are not ready for technological developments become staggered and need help to develop themselves. In Chile, digital libraries can be a medium and provide benefits to facilitate lecturers conducting teaching and research because it is easy to access references through digital libraries (Borgman, 1999, 2006; González, López, Calle-Arango, Montenegro, & Clasing, 2022).

Furthermore, Australia is a country that implemented digital libraries as learning resources for lecturers before the COVID-19 pandemic hit the world. From 2010 to2015, research was conducted on the impact of using digital libraries, stating that lecturers who use digital library facilities as learning resources produce more scientific papers than lecturers who do not use digital libraries (Bakr, Massey, & Massa, 2016). To aid lecturers in communicating their classroom instruction, the central government of Sweden has regulated digital libraries on a national level (Lund & Nybacka, 2021). The COVID-19 pandemic has also changed library services in America from offline to online, involving lecturers in various activities (Ibacache, Koob, & Vance, 2021). The Indian government also started a national digital library in 2016 to aid in the dissemination of knowledge and research findings from lecturers to the general public (Mondal, Das, & Das, 2021). Meanwhile, digital libraries in Saudi Arabia also have a significant role as a learning center for disseminating information and research results from lecturers (Bainbridge, Jones, McIntosh, Witten, & Jones, 2008; Gangwani, 2020; Jones, Cunningham, McNab, & Boddie, 2000).

On the other hand, several Indonesian researchers have also reviewed research stating that the number of book collections and articles accessed in Indonesia is minimal and limited, making lecturers work hard to find references in various digital libraries (Hasugian, Nasution, Subhilhar, & Muda, 2019). Other studies state that digital libraries are beneficial in increasing the knowledge and interest of lecturers in developing themselves (Chowdhury, 2002; Kiran & Singh, 2008) because it makes it easy to find references (Chowdhury, 2002) and get information quickly and dynamically (Alshawi et al., 2021; Bainbridge et al., 2008; Ilahi, Widiaty, Wahyudin, & Abdullah, 2019; Smeaton & Callan, 2005; Suwarto, Setiawan, & Machmiyah, 2022). So, in the end, the number of lecturers who publish research results increases annually.

A digital library is an information technology designed as a source of digital knowledge (Bainbridge et al., 2008; Jones et al., 2000; Shum et al., 2000). A digital library is an information storage and retrieval system that manipulates digital data in a medium (text, image, sound, static, or dynamic) on the Internet (Borgman, 1999; Ilahi et al., 2019; Smeaton & Callan, 2005). Information technology-based digital libraries are essential and valuable as learning resources so that reading materials are easily accessible to readers (Abdul Karim & Hasan, 2007; Kim, 2018; Oakleaf, 2010). The presence of digital libraries can increase interest and reading habits as an information bank or lecturer reading resource center to fulfill the tasks of teaching, research, and community service(Ilahi et al., 2019; Nyagadza et al., 2022; Shum et al., 2000). Digital libraries are a solution for universities to maintain the quality and standard of educational services amid industrial-technological developments (Bainbridge et al., 2008; Hussain, 2020; Lekan, Aigbavboa, Babatunde, Olabosipo, & Christiana, 2022).

Based on this background, this study aims to examine lecturers' perceptions of digital libraries as a source of learning for the industrial era 4.0. The question of this research is how lecturers perceive digital libraries as a source of learning in the industrial era of 4.0.

1.1. Era 4.0 Digital Library

A digital library is a learning resource that utilizes Information and Communication Technology (ICT) and the web to provide access to digital information resources and services (Bainbridge et al., 2008; Chowdhury, 2002; Smeaton & Callan, 2005), which is used to maintain the content and data of learning resources (Amato, Gennaro, Rabitti, & Savino, 2004; Ross, 2012). To achieve sustainable development, especially in the field of education in the era of the industrial revolution 4.0 (Lekan et al., 2022; Nyagadza et al., 2022). Digital libraries facilitate books in

the form of electronic books (e-books) (Hyman, Moser, & Segala, 2014), making it easier for readers to be able to find and read reading materials anytime and anywhere (Borgman, 1999, 2006; Chowdhury, 2002; Kim, 2018).

1.2. Digital Library in Indonesia

Every university in Indonesia is required to have a library that will provide services for the quality development of lecturers and students. The Government of the Republic of Indonesia provides national library standards regulated in Law Number 43 of 2007 concerning libraries, which states that library standards consist of library collection standards, facilities and infrastructure standards, library service standards, library personnel standards, implementation standards, and management standards (National Library of the Republic of Indonesia, 2015). The national library standard is a reference in the implementation of conventional libraries in Indonesia by requiring the library building as one of the full standards that must be met. Furthermore, the rapid development of science and technology has an impact on the need for universities to make changes to adapt to the conditions of the industrial era 4.0 (Lekan et al., 2022; Smeaton & Callan, 2005), which transforms digital libraries into learning resources that suit the needs of universities to be in line with the concepts of e-learning development, e-research (Marlina & Purwandari, 2019) and creating information literacy in higher education (Chowdhury, 2002).

2. Methodology

2.1. Research Design

Aquasi-qualitative approach with a simple research design was used in this research. Quasi-qualitative research is research with the main aim of describing a situation by its problem objectively (Cropley, 2019). The deductive approach and the positive influence used in the presentation of theories have an impact on quasi-qualitative research (Bungin, 2020). Quasi-qualitative research is suitable for identifying sources of information that can be expressed descriptively.

2.2. Participants

Participants in this study were 15 lecturers in four faculties at private universities in Indonesia. The four faculties consist of the faculties of Social Sciences, Political Science, and Computer Science, the Faculty of Islamic Religion and Teacher Education, the Faculty of Agriculture, and the Faculty of Economics. The four faculties were selected based on the faculty with the most users, access, and frequent entry to digital libraries. Purposive sampling techniques were used by conducting online interviews with lecturers who access the digital library at least four times a week to find references in articles, e-books, and other support in completing teaching, research, and lecturer service assignments. Descriptive data on demographic characteristics, including gender, age, length of teaching, and education level, are in Table 1.

Table 1. Respondent profile.

Respondent profile	Frequency	Presented (%)
Gender		
Female	8	53
Male	7	47
Age		
20-29	3	20
30-39	7	47
40-49	2	13
50-59	3	20
Years of working as a teacher		
1-5 years	6	40
6-10 years	6	40
11-15 years	0	0
16-20 years	0	0
20 years and above	3	20
Education level		
Bachelor	0	0
Master	9	60
Doctor	6	40

2.3. Data Collection

Data collection was conducted through in-depth interviews with 15 lecturers. The interview guide was developed based on the concept of exploration (Kumar, 2011) and the acquisition of meaning about digital libraries. Four aspects were asked in the interview: benefits, challenges, recommendations, and the positive and negative impacts of the presence of digital libraries. Media and education experts had validated the interview guidelines used through expert validation tests. The semi-structured interview was conducted for 15 days, from 05 to September 19, 2023 for 2-3 hours with 15 respondents through the Zoom Meeting application. Researchers conducted interviews every day with one respondent. At the time before the interview began, the researcher conveyed a statement to the respondent that the answers would be guaranteed confidentiality.

Furthermore, the interview results were written, and transcripts were made from each respondent to make an initial code based on the similarity of themes (Braun & Clarke, 2019). Interviews were conducted to obtain more in-depth and meaningful data (Miles, Hubermen, & Saldana, 2014).

2.4. Instrument

The instrument used in this study consists of open-ended questions that ask lecturers to convey their ideas or opinions about digital libraries to facilitate lecturers' learning resources in the industrial era 4.0. based on their experience so far. Here are the questions that were given to the lecturers:

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(1) Based on your understanding, explain the benefits of digital libraries for lecturers.
(2) Based on your understanding, explain the challenges of using a digital library system!
(3) Based on your understanding, give recommendations on what is given for developing digital libraries!
(4) Explain the positive and negative impacts of a digital library.

2.5. Data Analysis

Data was analyzed using deductive and thematic analysis to identify, evaluate, and create themes (Braun & Clarke, 2019; Miles, Huberman, & Saldaña, 2014). Responses from each respondent were coded using keywords so as not to overlap. The NVivo 12 program facilitated the coding and categorization of research. The interview data was entered into nodes, and cases were grouped into specific codes. Thematic maps showed the organization of concepts according to various levels; potential interactions between concepts were then developed. The analysis team then discussed all the codes and categorizations and integrated between codes to simplify each code. This deductive technique made it easier to identify themes that respondents gave in response to the researcher's questions. See Figure 1.

3. Results

The application of digital libraries can be studied from four aspects:benefits, challenges, recommendations, and positive and negative impacts. The pictures of the four aspects are shown in Figure 1:
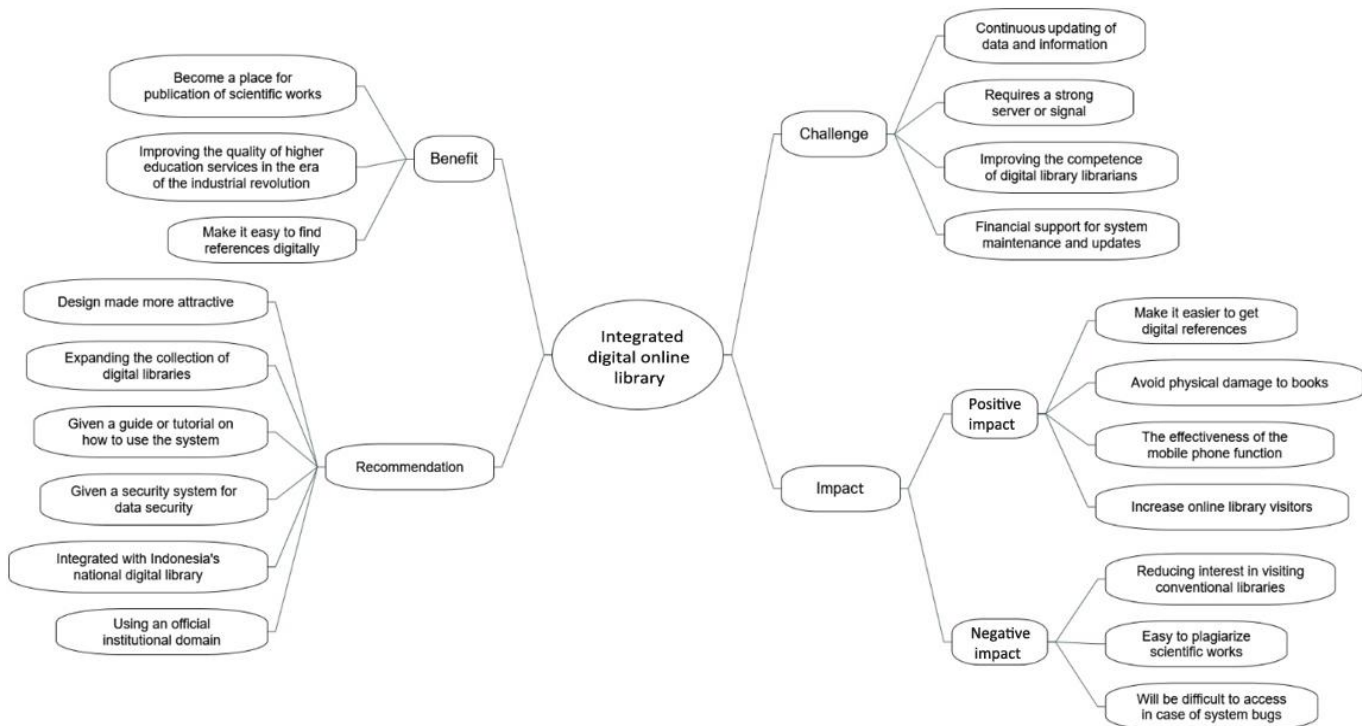

Figure 1. Implementation of digital libraries.

3.1. Benefits of Digital Libraries

The study results presented three themes about the benefits of digital libraries to facilitate lecturer learning resources in the industrial era 4.0. The first theme is about the benefits of using digital libraries. The lecturers stated that:

Digital libraries can provide lecturers with a place to publish scientifically rich results (Lecturer 6).

Digital libraries can facilitate the downstream publication of lecturers' work (Lecturer 8).

The second benefit of a digital library is that it can be a place to publish lecturers' scientific work. Besides being able to be used as a repository for papers when applying for a lecturer functional promotion, digital libraries can also be a medium for lecturers to publish reference books, textbooks, articles, and copyrights.

The third benefit is that through the digital library, lecturers can find references to make written works quickly and easily without directly visiting the physical library, which is arranged with visit times only in the morning and evening. As the digital library system has been integrated with university journals, lecturers will quickly search for literature as needed. They can immediately do free library services online after checking the availability of books through the system. This can make it easier for lecturers to develop themselves and improve the quality of higher education services in the era of the Industrial Revolution 4.0. Some lecturers stated that:

Through the digital library, lecturers can easily access various references anytime and anywhere (Lecturer 1).

The availability of a digital library can make it simpler for lecturers to find references to books and digital articles without being time-constrained (Lecturer 10).

3.2. Challenges of Implementing Digital Libraries

The existence of a digital library presents challenges for lecturers and library system managers. Among them has to update data and information continuously. The update comes from improving the application fields and increasing the number of reference collections according to the needs of all university users. In addition, universities also need to prepare solid servers and signals for the system's sustainability so that all stakeholders can access digital libraries smoothly. Some lecturers stated that:

The challenges faced by digital library managers include having to adjust the application contents according to the needs of stakeholders by constantly increasing the number of the latest reference collections (Lecturer 5).

Universities also need to setup reliable servers and signals so that everyone can access the digital library system effectively (Lecturer 7).

Furthermore, because librarians manage digital libraries, efforts to improve librarian competence are also challenging in implementing digital libraries. Librarians must be given training and various other self-development activities to have qualified competencies. The last challenge is the financial support for maintaining and updating system data, which must be constantly updated. Financial support from universities will significantly determine the survival or failure of the digital library system that is being developed. Lecturers 4 and 6 said:

Financial support is needed for the maintenance and updating of data and systems in the implementation of digital management (Lecturer 6).

Another challenge arises from digital library managers and librarians, who must constantly develop themselves through training and so on to develop their competencies and skills (Lecturer 4).

3.3. Recommendations for the Implementation of Digital Libraries

Digital libraries provide many benefits for universities, lecturers, and students, as well as the library itself. All users and managers receive positive and negative impacts. Therefore, recommendations are needed that can be used as input in system development efforts. The lecturers stated that:

Due to the demands of the development of science and technology, the content and design of digital libraries must be made very attractive to captivate visitors' hearts (Lecturer 2).

Increasing library collections can be one of the best alternatives for library visitors (Lecturer 3).

A digital library must be designed to be very attractive, filled with various book references and articles, and store contents according to user needs. Through diverse content, it can attract many library visitors. Then, because Indonesia has a national library that is used as a barometer of library literature, it is better for the digital library developed to also be integrated with the Indonesian national library. If integrated, visitors will be directly connected to the national library service and quickly get the references needed. Meanwhile, a reliable system is needed to store all data correctly for data and information security. Creating a chat column and an email that goes to the visitor's mobile number is also necessary to verify registration. Furthermore, it is also necessary to create a virtual reading room that visitors can use and provide information to librarians about the number of library visitors currently there for a certain period of time.

The use of the official domain of higher education institutions is crucial if the university that owns the digital libraries is to directly benefit from them. Through the official account of the college, it will be able to improve the service and quality of the college. Lecturers 14, 8, and 9 said:

We recommend that the digital library be integrated with the Indonesian National Library to make it easier for visitors to find more references as needed (Lecturer 14).

Providing security to digital library software can reduce the misuse of data and information (Lecturer 8).

The use of the official domain of the university can provide benefits for the university itself (Lecturer 9).

Furthermore, to facilitate access to the system, it should be given a guide or tutorial on how to use the digital library. This is the opinion of Lecturer 25, who stated:

To make it easier for users to use digital libraries, it is necessary to have a guide or tutorial on using digital libraries (Lecturer 25).

3.4. Impact of Implementing Digital Libraries
3.4.1. Positive Impact

Digital libraries have a positive impact on facilitating lecturer learning resources in the industrial era 4.0. Lecturers can more easily access digital references to help improve self-development. Data and information from digital libraries are needed to complete lecturer duties. The existence of a digital library can also prevent physical damage to books that users usually borrow. Lecturers 2 and 6 stated that:

Through the digital library, lecturers are given convenience in finding references to complete the tri dharma assignments of lecturers in universities (Lecturer 2).

Digital references downloaded from the digital library have an impact on avoiding physical damage to books in the library room (Lecturer 6).

The presence of digital libraries can also increase the number of library visitors online because they can be accessed anytime and anywhere according to the time visitors have through their mobile phones. The increase in library visitors also increases university services to facilitate the self-development needs of lecturers.

Digital libraries can attract visitors to increase the number of online library visitors (Lecturer 3).

The existence of a digital library makes the function of mobile phones more effective (Lecturer 10).

3.4.2. Negative Impacts of Implementing Digital Libraries

In addition to positive impacts, negative impacts occur when digital libraries are implemented in universities. Among them is that the website will be difficult to access if there is a system bug, so it is necessary to anticipate strengthening the system as early as possible. In addition, the existence of a digital library can reduce visitors' interest in coming directly to the library building. It can also provide opportunities to plagiarize scientific papers quickly from their data bank references. Some lecturers stated that:

If there is a system bug, the server will be challenging to access (Lecturer 11).

With the existence of a digital library, it will reduce interest in visiting the library building (Lecturer 6).

The presence of digital libraries provides opportunities for plagiarism of scientific papers (Lecturer 8).

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4. Discussion

The benefit of a digital library is that it can provide free services to visitors by providing high-quality references according to user needs (Chowdhury, 2002; Sarmin Panut & Abdullah, 2021; Smeaton & Callan, 2005; Sumardi et al., 2021; Zulkifli, 2014). Thus, lecturers can access digital libraries more often (Gangwani, 2020; Kiran & Singh, 2008) to retrieve necessary data and information (Bainbridge et al., 2008; Kurdi & Jamous, 2022). This is due to the needs of lecturers in the fourth industrial revolution (Katyeudo & de Souza, 2022; Lekan et al., 2022) and the communication revolution (Niqresh, 2018), who are expected to have work according to the field of expertise (Nyagadza et al., 2022).

Digital libraries can facilitate lecturers to respond faster to the development of science (Borgman, 2006; Ross, 2012) because they can collaborate in creating a good climate of self-development (Hyman et al., 2014; Naidoo, 2020) and a manifestation of a critical and creative attitude towards the development of technology and information in the world (Chowdhury, 2002; Husain, 2021; Manurung, Purwadi, & Sugiharto, 2022). Digital libraries are also a solution to the difficulty of lecturers getting hard-copy references to books and articles to complete scientific papers (Bainbridge et al., 2008; Kim, 2018; Panezi, 2014; Widyasari et al., 2019). However, the improvement and development of skills by system managers and librarians is the main requirement in developing digital libraries (Ross, 2012; Xie & Stevenson, 2014), where librarian must attend various trainings, utilize technology and information, and promote cooperation with stakeholders (Amato et al., 2004). Librarians also always update data and information, including library collections that must be updated at any time continuously (Moore & Trysnes, 2021; Ortega, 2018). This is because, in the end, the number of library collections and system managers and librarians will be operators in providing user services (Kucirkova & Cremin, 2018; Narca, 2021).

Furthermore, in order to maintain and update data and information on the digital library, financial support is needed (Chowdhury, 2002; Connolly, Guthrie, Prochaska, & Dillon, 2009) from the college (Kurdi & Jamous, 2022)system development team or the central government (Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia). Many universities in developing countries are unable to develop digital libraries, among them because there is not enough budget to maintain digital libraries (Bainbridge et al., 2008; Chowdhury, 2002).

In order to make it easier for users to use digital library applications, the existence of tutorials or guides for using the system is essential to help users who cannot operate information technology systems (Gonçalves, Moreira, Fox, & Watson, 2007; Moore & Trysnes, 2021). Meanwhile, in order for data and information to be stored safely, it is necessary to secure a strong library system (Amato et al., 2004; Lekan et al., 2022; Sosa-Sosa & Hernandez-Ramirez, 2012). Hence, stealing and abusing are difficult (Nyagadza et al., 2022; Pazos, Ruiz, & Pérez, 2020). This will protect managers and librarians from significant damage and losses to the developed system.

The content users require should be available in the digital library design in order to make it more appealing and attract more users (Benson-Goldberg & Erickson, 2021; Xie, Babu, Joo, & Fuller, 2015). This is important for the system's usefulness to be more effective.

Additionally, there is a need for learning resources in national digital libraries that can work with the Indonesian National Library to increase the number of lecturer publications. The importance of collaboration to share expertise and projects has expanded access to increasing library collections (Chowdhury, 2002; Kaufman, 2012).

Digital libraries have been able to accelerate the dissemination of lecturers' scientific publications (Panitch & Michalak, 2012; Yuanxi Fu, 2020) and provide other added values for the usefulness of library websites in everyday life (Al-Faresi & Patel, 2012; Hyman et al., 2014). Lecturers can easily and quickly access the digital library anytime and anywhere (Amato et al., 2004; Borgman, 2006).

The presence of a digital library is a solution to reducing physical contact when borrowing and borrowing books in the library building (Chowdhury, 2002). This is also very useful for lecturers when accessing literature. Meanwhile, the negative impact of digital libraries is that they can spread invalid knowledge (Saputra & Al Siddiq, 2020) and provide opportunities for the plagiarism of scientific papers (Yuanxi Fu, 2020) because of the easy access to writing through an open-access website.

5. Conclusion

From the lecturer's point of view, digital libraries are needed to provide adequate learning resource facilities in the industrial era of 4.0. Digital libraries are useful for facilitating lecturers' publication of scientific papers and making it easier for lecturers to find literature for teaching materials for teaching, research, and community service. However, the presence of digital libraries can also have a negative impact because it can facilitate the process of plagiarizing the work of others. Therefore, universities need to have a good security system in order to control data well. Furthermore, in order to overcome challenges in the industrial era 4.0, universities must update reference collections continuously in order to keep the latest literature, allocate budget for maintenance, and update server systems on an ongoing basis.

From the lecturer's point of view, digital libraries are needed to provide adequate learning resource facilities in the industrial era of 4.0. Support from the government, university leaders, and the education community is needed to develop system sustainability to impact and significantly improve lecturer publications. The results of this research are expected to be the basis for the government and universities in Indonesia to improve digital libraries as a learning resource that is easily accessible to increase the publication of research results, services, and lecturers' writings.

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