

Digital Libraries during Covid-19 Pandemic: A Bibliometric Analysis and Information Mapping



Perpustakaan Digital pada Masa Pandemi Covid-19: Analisis Bibliometrika dan Pemetaan Informasi

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Abstract

Problem Statement: Regardless of the significant increase in the use of digital libraries during the Covid-19 pandemic, distribution of its publications has not been mapped as a form of scientific communication. **Purpose:** Therefore, this research aims to describe and map the information on digital libraries during the pandemic on international publications Scopus indexed. **Method:** The bibliometric assessment method was used to collect data from 66 publications on the Scopus database. The writer simultaneously used search keywords such as "Digital Library," "Electronic Library," and "Covid-19" to determine the publications from January 2020-June 2021. **Results:** The result showed that 23 (34.8%) out of 66 publications had high relevance to digital libraries during the pandemic, while 74% are scientific journal articles. The country with the largest contribution is the USA, while the largest publisher with only 35% open publications is Emerald. Meanwhile, the central topics in this research map include "Pandemic", "Covid", "Library", and "Services". **Conclusion:** The distribution of publications as a form of academic communication has not intertwined, as indicated by the absence of linkage between each author, thereby creating a high potential for studies and publications related to this topic. In addition to increasing the digital literacy of librarians and users, the transformation to high-tech virtual and digital services also stands as an adaptation effort.

Keywords: *Bibliometric Analysis; Covid-19; Digital Libraries; Electronic Libraries; Pandemic Era*

Abstrak

Permasalahan: Perpustakaan digital pada masa pandemi covid-19 ini semakin diminati oleh pengguna dan semakin menarik untuk dikaji oleh cendekiawan. Sementara itu sebaran publikasi tentang perpustakaan digital di masa pandemi belum dipetakan sebagai bentuk komunikasi ilmiah. **Tujuan:** Artikel ini bertujuan untuk mendeskripsikan dan memetakan informasi tentang perpustakaan digital di masa pandemi Covid-19 pada publikasi internasional terindeks scopus. **Metode:** Melalui metode penilaian bibliometrik, diperoleh data sejumlah 66 publikasi pada database Scopus. Penulis menggunakan kata kunci pencarian "Digital Library", "Electronic Library", dan "Covid-19" secara simultan untuk rentan waktu publikasi bulan Januari 2020 hingga Juni 2021. **Hasil:** Temuan penelitian bahwa terdapat 23 (34,8%) dari sejumlah 66 publikasi yang dipilih dengan validasi dan relevansi tinggi berkaitan dengan perpustakaan digital di masa pandemi Covid-19. Artikel jurnal ilmiah merupakan jenis publikasi yang mendominasi dengan jumlah 74%. Asal negara penyumbang terbesar yakni USA dan publisher terbanyak yakni Emerald. Sangat disayangkan hanya ditemukan sejumlah 35% publikasi open access. Topik sentral pada peta penelitian ini yakni "Pandemic", "Covid", "Library", dan "Sevices". **Kesimpulan:** Simpulan penulis bahwa sebaran publikasi sebagai bentuk komunikasi akademik belum terjalin, terlihat dari belum adanya keterkaitan masing-masing author, oleh karenanya potensi penelitian dan publikasi berkaitan dengan topik ini sangat tinggi. Adapun adaptasi yang perlu dilakukan perpustakaan di masa pandemi yakni bertransformasi ke layanan virtual dan digital berteknologi tinggi, disamping meningkatkan literasi digital pustakawan dan pengguna.

Kata Kunci: *Analisis Bibliometrika; Covid-19; Perpustakaan Digital; Perpustakaan Elektronik; Era Pandemi*

I. INTRODUCTION

Background. The emergence of COVID-19 pandemic in early 2020 had an adverse effect on industries all over the world (Al-Alami, 2021; Mok, 2021). A total of 153,187,889 positive cases have been recorded in approximately 223 countries in the world since the inception of this virus in Wuhan from late 2019 to early May 2021 (World Health Organization (WHO), 2021). In Indonesia, approximately 1,686,373 positive cases were confirmed on May 4, 2021, with the highest number of daily cases of 14,518 recorded on January 30, 2021 (Ministry of Health of the Republic of Indonesia, 2021). This number increased from June to September 2020, decreased in October, rose again in November 2020 to January 2021, and declined until early May 2021 (Ministry of Health of the Republic of Indonesia, 2021). Regardless of the increase in slope related to the graph of Covid-19 cases, the Government continues to set a policy prohibiting "*mudik*" or homecoming while implementing strict health protocols to control its spread in Indonesia (Nugraheny, 2021).

Furthermore, most regions have implemented Large-Scale Social Restrictions (PSBB) and Work From Home (WFH) policies due to the increase of confirmed positive cases in early 2020 (Hapsari et al., 2020; Perdana et al., 2021; Setiani & Yulianto, 2021). The pandemic has also encouraged public organizations to create innovations and improve electronic and digital services, including digital libraries (Salam, 2021; Suharti, 2020; Taufik & Warsono, 2020). This application increased in demand during the pandemic, enabling users to safely access academic information without physical contact (Damaris et al., 2020).

Problem. This study explored and delivered information related to digital libraries during the pandemic through various international publications. However, studies on specific academic communication related to digital libraries during the pandemic have not been conducted on international publications Scopus indexed.

Previous Literature Review. There has been no previous research on the distribution of international publications, however there has been some research about the distribution of global publications on library service quality (LSQ) in the last five decades 1972-2020 (Ashiq et al., 2021). Another study had measured the impact of published literature on digital libraries from 2002-2016 on ISI Web of Science database (Ahmad et al., 2018). Subsequently, the mapping was related to library and information science scientific development published in journals (Anyanwu, 2018; Anyaoku & Okonkwo, 2018; Brahma & Verma, 2019; Garg et al., 2019; Gaud et al., 2018; Lijina, 2018; Othman & Ismail, 2016; Sun & Yuan, 2020; Verma & Shukla, 2018). The bibliometric studies were published in various countries, including India (Gutiérrez, 2018; Kumar, 2018; Srivastava et al., 2021), and distributed in Spain, Pakistan, South Africa, Korea, etc (Ajibade & Mutula, 2020; Alcaide, 2021; Choi & Yang, 2018; Siddique et al., 2021). Currently, there is no research which mapped the distribution of specific international publications (Scopus indexed) related to digital libraries during the Covid-19 pandemic era.

State of The Art. Although bibliometric research on digital libraries has been widely carried out, bibliometric research on digital libraries during the Covid-19 pandemic has not been carried out. Therefore, this study will analyze digital library research publications during the Covid-19 pandemic using a bibliometric approach and will be examined by using visualization of VosViewer software.

Purpose. Therefore, this study was carried out to determine the communication of world scholars in sharing information and knowledge in dealing with the pandemic through international publications since the initial case on November 17, 2019, in Hubei, China, using digital libraries. Furthermore, this research aims to find out the authors that published their

research on digital libraries during the pandemic, the most cited works, the countries that published the most research, and other important information.

II. METHODS

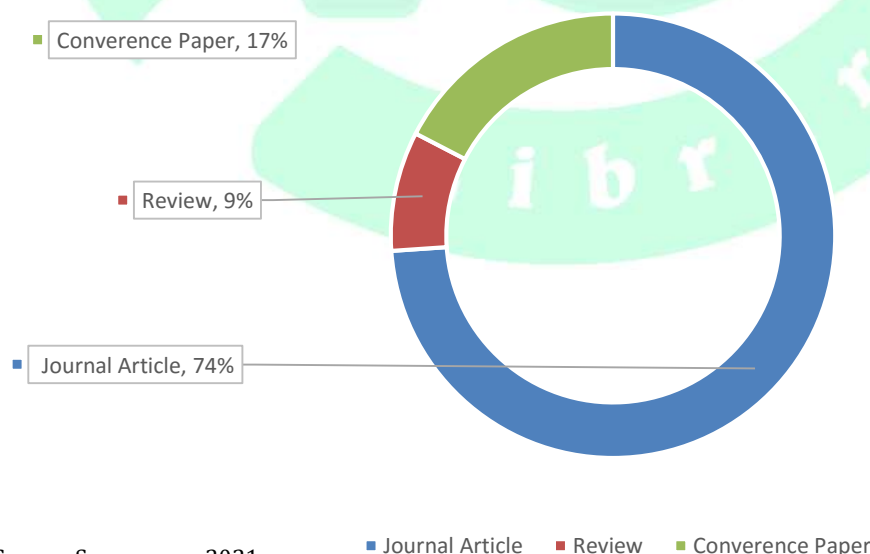
The bibliometric method comprising several stages such as determining keywords, searching, selecting articles, validating, and analyzing data was used to carry out this research. Furthermore, the data was obtained from international publications on Digital Libraries during the pandemic and sourced from the Scopus database which was acquired through the PublisherPerish (PoP) application on June 25, 2021. Scopus was chosen because it is one of the largest peer-reviewed literature databases in the world (Van Nunen et al., 2018). The study found 66 publications from the bibliographic data searches by using the combination of keywords such as "Digital Library," "Electronic Library," and "Covid-19" (using double quotes) in publications from January 2020 to June 2021. This period obtained a serious attention from the World Health Organization in early 2020. Moreover, there are 23 (34.8%) out of 66 articles selected by the author based on their relevance to digital libraries during the pandemic. The author validated data in the form of title, abstract, several publications, type of publication, core journal, publisher, citation, theme map, author, affiliation, country of origin, and other bibliographic data using Microsoft Excel 2016. Furthermore, by checking the URL of each publication and for the ease of citation, bibliographic data were rechecked on Mendeley. The data collected were analyzed using VOSViewer software to map the relationship between author and related publication theme.

III. RESULTS AND DISCUSSION

International Publications related to Digital Libraries during the Covid-19 Pandemic. The result showed 23 relevant articles consisting of 17 (74%) journals, 2 (9%) reviews, and 4 (17%) conference papers. The trend of growth in the number of publications related to digital library topics during the pandemic is increasing. It is proved by the result that there are 11 articles in 2020 and 13 articles in 2021, although the data from 2021 is only until the middle of the year. Thus, the increasing number of publications related to digital libraries during the pandemic in the last two years has provided growth potential for this research.

Figure 1.

International Publications related to Digital Libraries during the Covid-19 Pandemic



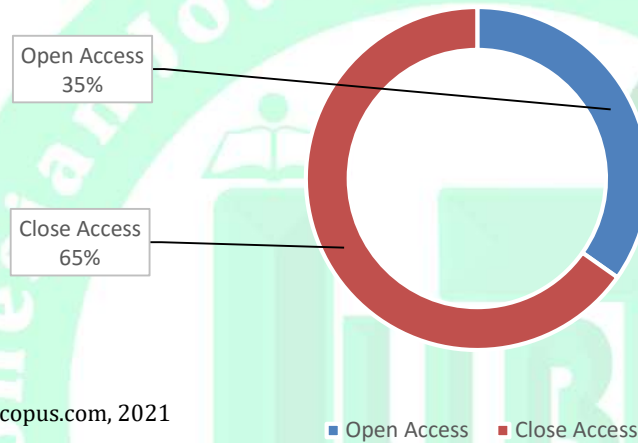
Source: Scopus.com, 2021

Figure 1 shows that journal articles dominate international publications as a means for researchers to communicate academically. The international journals are considered for publication due to their rapid focus on certain sciences. Moreover, it provides unlimited access to a wide range of academic knowledge and information during the pandemic.

Distribution of Open Access Publications related to Digital Libraries during the Covid-19 Pandemic. There were only 8 (35%) articles with open access publications, while the remaining 15 articles (65%) were closed access which required a subscription fee to access the full text. However, open access publications allow authors to read, download, cite and communicate academically.

Figure 2.

The Accessibility of International Journal related to Digital Libraries during Pandemic

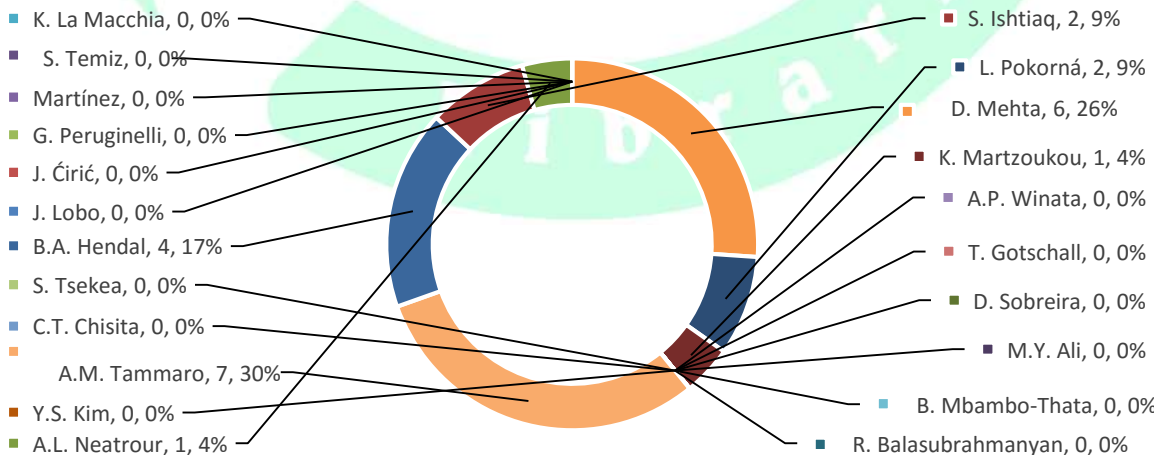


Source: Scopus.com, 2021

Citation and Communication between Authors. Tammaro's article, which has the highest impact on academic communication with seven (7) citations (Tammaro, 2020), is an open-access article. This was followed by Mehta and Hendal's articles with 6 and 4 citations (Hendal, 2020; Mehta, 2020). This low number of citations might be caused by closed access to publications which makes the academic communication from previous studies lack of contradiction, support, and citation.

Figure 3.

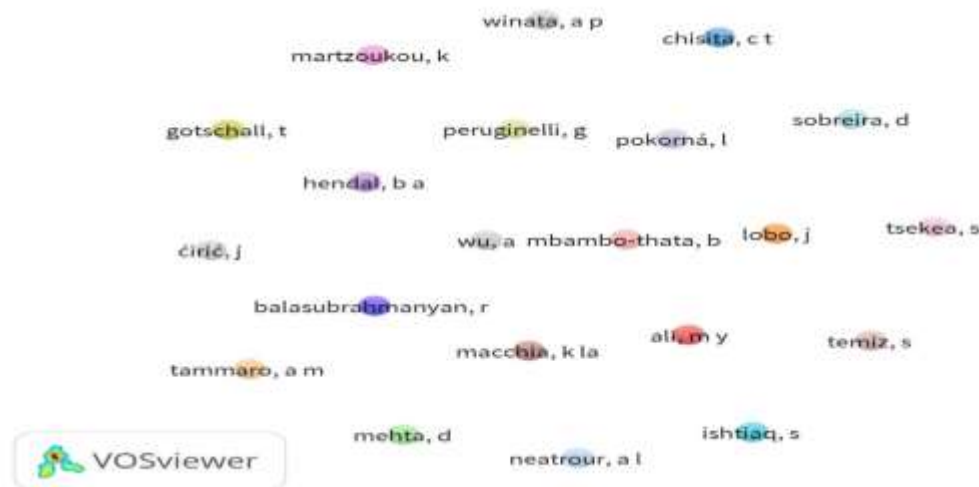
Number of Citation Per Author



Source: Scopus.com, 2021

Figure 4.

Map of Academic Communication between Authors



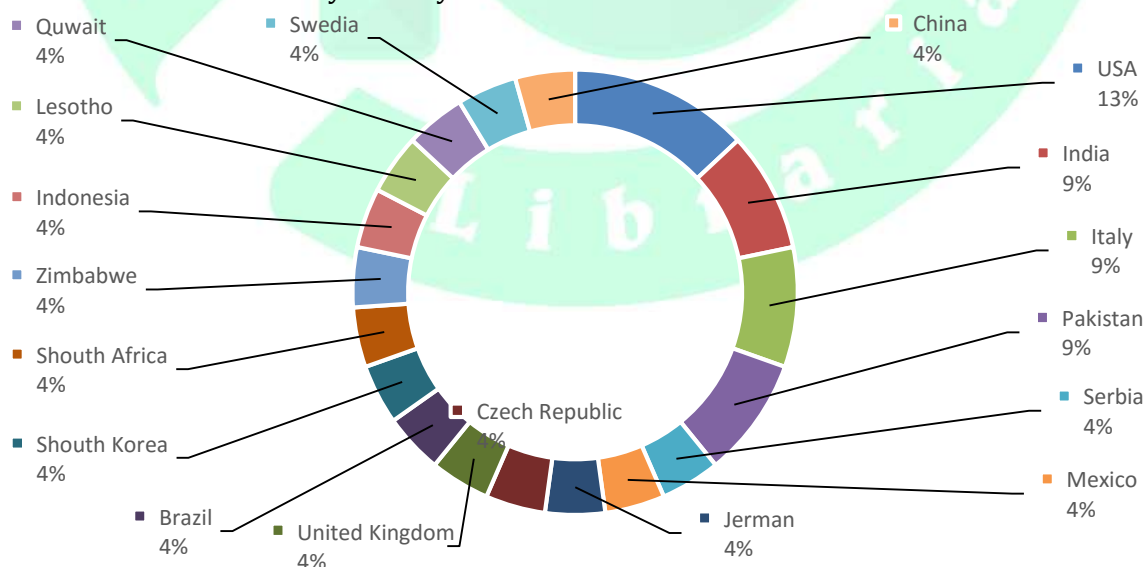
Source: primary data processed by researchers, 2021

Figure 4 indicate that open access facilitates authors to share information and knowledge in an academic form. Its existence enables rapid dissemination of information, thereby affecting the speed of librarians as technical implementers to adjust digital library services during the pandemic. However, the time and number of publications in the database is less than 1.5 years and is related to the number of potential articles to be researched.

Productivity by Country of Origin. Countries participating in the publication process are Americas, Europe, Asia, and Africa. However, the biggest percentage comes from America and Europe since both accounts for the world's largest publications. USA is the most productive country which contributes to scientific articles with a percentage of 13% (<https://www.scimagojr.com/>). This is followed by India, Italy, and Pakistan with a percentage of 9% and other countries with the same percentage of contributions, which is 4%.

Figure 5.

Number of Publications by Country

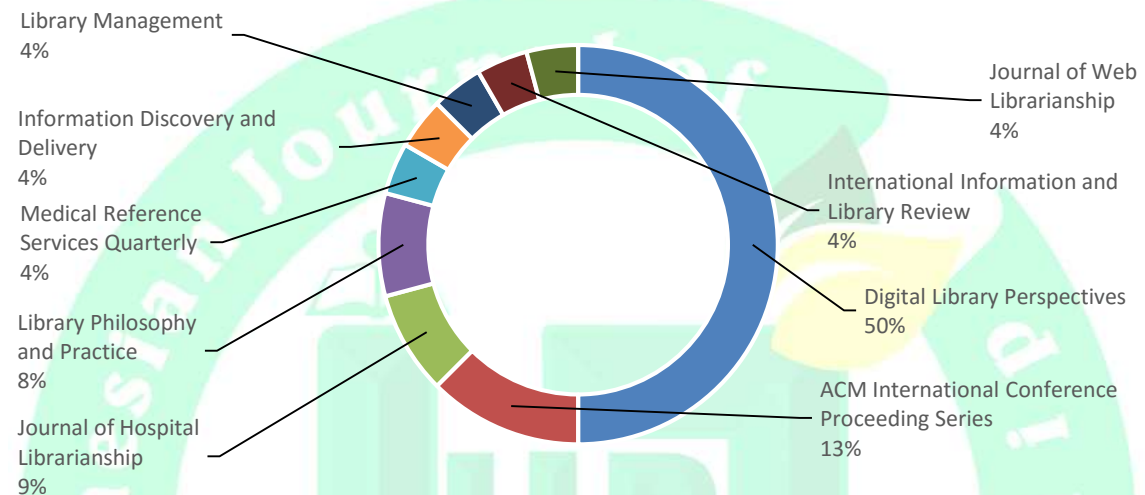


Source: Scopus.com, 2021

Source of International Journal/Proceeding Publications Related to Digital Libraries during the Covid-19 Pandemic. Most of the articles on Digital Libraries during pandemic were published by Emerald (13), followed by Taylor & Francis and the University of Nebraska-Lincoln (3), Institute of Electrical and Electronics Engineers (3), and Elsevier (1), as shown in Figure 5. However, Emerald has many social science publications related to this study, including library and information science.

Figure 6.

Percentage of Publications on International Journal

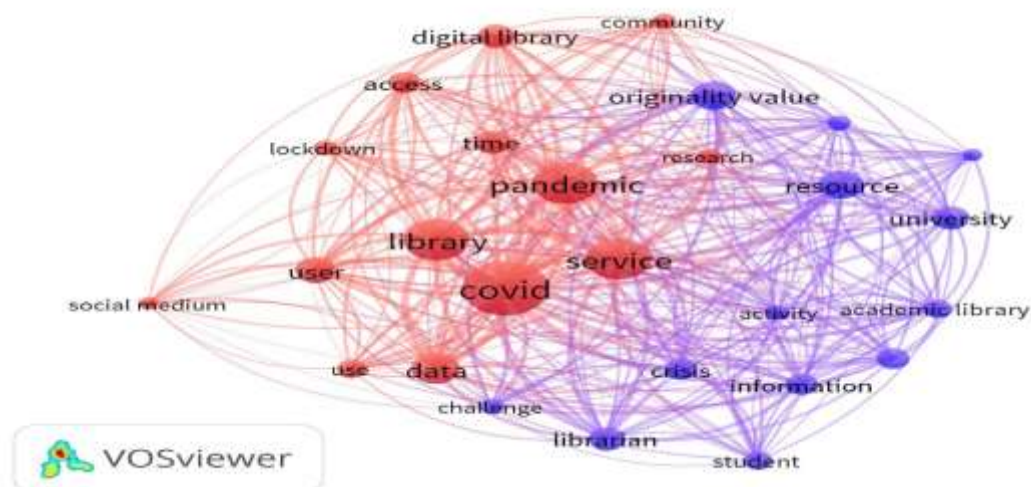


Source: Scopus.com, 2021

Map of Article Theme Based on Title and Abstract Analysis Related to Digital Libraries during Covid-19 Pandemic. The Vosviewer data text analysis consisting of article's title and abstract was used to identify the central topic. Furthermore, Pandemic, Covid, Library, and Services were the center of this research, indicating that the four terms are closely related.

Figure 7.

International Publications Theme Mapping Related to Digital Libraries during Pandemic.



Source: primary data processed by researchers, 2021

Based on **Figure 7**, it can be seen that there are two large keyword clusters generated. Cluster 1 (red color) consists of 14 items with the most prominent keywords are covid, library, and pandemic services. Meanwhile, other keywords that often appear are access, community, data, digital library, lockdown, research, social medium, time, use, and user. Cluster 2 (purple color) consist of 13 items with the most prominent keywords are university, originality value, and resources. Moreover, other keywords that often appear in cluster 2 are academic library, activity, challenge, crisis, digital services, information, learning, librarian, student, and university library. The term "Covid" was mentioned 21 times, while Pandemic, Library, and Services appeared 16 times. The strength of the relationship between Covid X Pandemic, Covid X Services, Covid X Library, Library X Services, and Library X Pandemic X Covid are 15, 15, 14, and 11. The relationship showed that these subjects are often discussed altogether. "Sevices" includes in the dominant keyword because this research is closely related to how to provide library services during covid-19 pandemic. So, the topic of library science study that looks active is related to the library service area.

Impact and Adaptation of Digital Libraries during Pandemic. COVID-19 pandemic brought digital libraries into the limelight and provided more benefits than before. According to Ćirić, there is approximately 130% increase in the rate of digital library usage and in the rate of user's average reading time in Njegoš public library in Knjaževac Serbia (Ćirić, 2021). The transformation of library services has shifted to virtual and digital (online) trends (Hendal, 2020; Mbambo-Thata, 2021; Tammara, 2020; Temiz, 2020; Winata, 2021), and showed higher stability (Balasubrahmanyam, 2021). Furthermore, digital library provides legal information services on COVID-19 (Peruginelli, 2021), offers more free content, obtains personal collections, and provides open online services to ensure continuous learning, research, and teaching (Chisita, 2021). The pandemic has also encouraged faculty and student involvement in academic activities through digital resources (Macchia, 2021). Consequently, Libraries at the University of Utah encourage communities and people in the State to build their digital collections to be used by wider community (Neatrou, 2020).

The University of Central Florida Health Sciences Library has effortlessly made digital library transitions to remote reference, programming, and instruction services, as it was supported by its 98% online-available collection (Gotschall, 2021). In addition, virtual services have emerged, such as online references, research consultations, LibChat-LibAnswers, integration of digital content into LMS, etc (Mehta, 2020). Moreover, Peking University Library innovates various modes of data literacy services, recommends data resources, and provides digital lectures in collaboration with database suppliers. It also provides online data visualization processing services through conference applications and improves online library data quality (Wu, 2020). The pandemic has opened up opportunities to establish library services with modern and up-to-date digital technology (Ali, 2020).

Subsequently, several important findings were found, such as an increase in the use of smartphones in accessing digital libraries (Ćirić, 2021). Furthermore, library promotion and distribution of academic information were achieved through social media (Gmiterek, 2021; Lobo, 2021; Martínez et al., 2021; Sauti, 2021; Sobreira, 2020; Tammara, 2020). Content digitization was conducted en masse, and the access to digital content is sufficient to protect copyright (Pokorná, 2020). Libraries become most important unit in providing academic information on online distance learning models in UK and Zimbabwe (Martzoukou, 2020; Tsekea, 2021). Presently, technology utilization is prioritized with future service innovations based on big data, Internet of things (IoT), artificial intelligence (AI), virtual reality (VR), 3D printing, and automated robots (Kim et al., 2021). Therefore, the ability and usability of the Digital Library is likely to grow rapidly in the future (Mehta,

2020).

In addition to tools and technology, another important element that supports digital libraries is human. Both users and librarians need to have good digital literacy skills to ensure the optimal use of the tools prepared. According to (Lobo, 2021), academic library in Goa, India, is more focused on increasing the role of digital literacy users in mastering E-databases and E-resources. Similarly, public libraries in Mexico are more focused on improving the digital competence of librarians (Martínez et al., 2021). It is in line with Ishtiaq et al. who carried out a research stated that the improvement of the librarians' digital skills is a top priority. (Ishtiaq et al., 2020).

IV. CONCLUSION

In conclusion, there is no correlation between the distribution of publications and citations as a form of academic communication. This is indicated by the absence of linkages between authors to cite each other, therefore, the possibility for research and publications related to this topic is high. According to the author, libraries need to upgrade their resources with better digital technology due to high need of knowledge and information during the pandemic. Also, libraries need to prepare servers with a better capacity to increase data download speed and improve services. Therefore, they need to innovate and improve the quality of online services as well as enhance the digital skills of librarians and users to keep up with technological advances.

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