

# Meta-analysis of Information Technology Implementation in Libraries

Rosiana Nurwa Indah<sup>1</sup>, Evi Zakiyah<sup>1</sup>, Grace Prima Apriani Sihombing<sup>1</sup>

<sup>1</sup>Universitas Terbuka, South Tangerang, Indonesia

e-mail: [rosiana.nurwa@ecampus.ut.ac.id](mailto:rosiana.nurwa@ecampus.ut.ac.id) (corresponding author)

## Abstract

*Technological developments have also changed the needs of library users significantly. Today's users want fast and easy access to information. In realizing this modernization of services, libraries must be able to adapt to current developments in information technology. This aims to ensure that libraries remain a valuable resource in the current digital era by designing better strategies to optimize the use of technology to improve the quality of services they have. Therefore, this research aims to find out a comprehensive picture of the application of information technology in various types of libraries in Indonesia. The method in this research uses meta-analysis. Based on research, it is known that articles related to the application of information technology in libraries have been implemented in several types of libraries, namely in public, special, school and college libraries. However, it is most widely applied in college libraries. The majority of forms of application of information technology in libraries are in the form of library management systems, namely in the form of GPT chat, library websites, QR Barcode, RFID, OPAC, and SLiMS. These various applications of information technology have an impact on making work in the library more efficient and easier, as well as providing better services to library users.*

**Keywords:** *Application of library technology, information technology, meta-analysis.*

## INTRODUCTION

The development of technology has changed the face of libraries. Libraries are no longer limited to physical collections but also include digital collections that can be accessed online. This is because one of the main purposes of the library is to provide services in the form of access to information [2]. The application of technology in libraries has become an increasingly relevant research topic along with the rapid development of Information and Communication Technology (ICT). The benefits of information technology in the library have many benefits, including changing the way of accessing and using information. This is because information technology according to Achebe in Olubiyo & Olubiyo [1] is described as the application of computers and technology to the acquisition, organization, storage, retrieval and dissemination of information.

The development of technology has also significantly changed the needs of library users. Today's users want quick and easy access to information. They also want a more interactive and personalized experience. The application of technology allows libraries to provide services that are more responsive and tailored to their users' needs. For example, sophisticated search engines and recommendation systems can help users find relevant

information more efficiently. In addition, through the application of technology such as computer-based library management systems, digital repositories, and e-learning platforms that are an integral part of modern library operations, libraries are also able to offer new services such as access to digital resources, online courses, and provide tools for collaboration. This shows that the application of information technology in the library aims to enable the library user community to obtain relevant information more quickly and efficiently, eliminate repetitive work, and improve the quality and range of services [3].

The application of information technology can help libraries better manage their collections. This includes storing, processing, and disseminating information. This is because one of the main benefits of implementing technology in libraries is to realize operational efficiency. Technology can automate many routine tasks, such as cataloging, circulation, and inventory management, so that library staff can focus on more strategic and value-added tasks. This not only improves productivity but also the quality of services provided to users. Another major benefit of implementing technology in libraries is accessibility. With technology, libraries can provide wider and more flexible access to information, allowing users to access resources from anywhere and at any time. This is especially important in the context of globalization and high mobility, where users may not always be able to physically visit the library [4].

The development of information technology poses a challenge for libraries because of the demand for modernization of library services. In realizing the modernization of this service, the library must be able to adapt to the development of information technology. This is so that the library remains a resource that can be utilized by the community. Valuable in today's digital era through designing better strategies to optimize the use of technology to improve the quality of services owned.

The various explanations of the application of library technology above show the urgency that libraries today need to apply technology in their implementation. This includes various types of libraries in Indonesia. Law No. 43/2007 on Libraries [5] explains that the types of libraries consist of national libraries, public libraries, school/madrasah libraries, college libraries, and special libraries. Basically, the users of various types of libraries are the community, students, students, teachers, lecturers, and employees [6] Therefore, it is necessary to conduct a study to understand the application of technology in Indonesian libraries, so that a comprehensive picture of the application of information technology in various types of libraries in Indonesia can be known. Thus, this study is entitled "Meta-analysis of Information Technology Implementation in Indonesian Libraries".

Similar research related to the topic in this study, the first research from Muis & Fendi in 2024 [7] entitled Application of Information Technology in Libraries. This research uses a literature review. The results showed that the application of information technology in the form of SLIMS (Senayan Library Management System) applications, online-based OPAC (Online Public Access Catalog) and website-based libraries

maximally in the library can provide excellent service to users. Second, research from Ilmi in 2022 [8] entitled “Ask Librarian: Application of Library Information Technology in Reference Services at Asian Public Libraries”. The method used is a qualitative approach through literature study. The results showed that (1) the impact of technological developments on reference services made it easier for users to ask questions through Ask Librarian for 24 hours to obtain the information needed; and (2) five types of virtual reference services were implemented that could be used by users, namely: (a) Internet Reference Request Service via email and/or form; (b) Live chat; (c) FAQ (Frequently Asked Questions); (d) Links to Other Library Reference Services; and (e) Calling a Librarian. Third, research from Anzor in 2018 [9] entitled Study Meta Analysis of Strategies and Utilization of Electronic Journals (e-journals) for Graduate Student University of Malang in Efforts to Produce Internationally Reputed Scientific Publications. The research method used is descriptive analytical, using single table analysis, cross table and statistical tests. The results showed that the information search strategy and the utilization of electronic journals (e-journals) for graduate students at the state university of Malang in efforts to produce internationally reputable scientific publications are very relevant.

The difference between the research that the researchers will review with the three previous studies above is that the method used in this study uses meta-analysis obtained from various scientific journals related to the application of information technology published in 2019-2024. In addition, the results of this study will explain a comprehensive picture of the application of information technology in various types of libraries in Indonesia. The picture includes a description of the application of information technology in various types of Indonesian libraries, the form of application of information technology, and the impact of the application of information technology.

## **METHODS**

This study uses meta-analysis. The definition of meta-analysis is an epidemiological study design that aims to systematically review and synthesize (combine) quantitative estimation results from a number of previous studies that answer the same research problems and can be combined (combineable) [10]. As for the definition of meta-analysis according to Anwar [11], meta-analysis is a statistical technique for combining the results of 2 or more similar studies so that a quantitative data alloy is obtained. Judging from the process, meta-analysis is a retrospective observational study, in the sense that researchers recapitulate facts without performing experimental manipulations. Based on these various studies, it is known that meta-analysis is a type of quantitative research that aims to analyze and combine the results of various previous studies or research related to the same topic or problem. Meta analysis can be used to address common problems such as central tendency, variability, and prediction in previous research results. In conducting meta-analysis, researchers will search and browse journal articles related to the topic to be studied. Once the data is collected, the researcher will conduct a content analysis to

identify and compare the findings from these sources. Thus, meta-analysis research can provide a more comprehensive picture and general conclusions about the topic under study.

In relation to research on the application of technology in libraries, meta-analysis techniques can be used to review and synthesize previous research findings on various applications of technology in libraries, such as the use of information systems, the use of artificial intelligence and web-based services. Through meta-analysis, researchers can find out the extent of the application of information technology according to the type of library, the form of technology used in the library, and the benefits obtained in the application of the technology.

The steps of conducting meta-analysis in this study are research procedures using Wilson & Kelley's meta-analysis steps [12] namely: 1) determining the topic to be studied, the topic in this study is to describe the application of information technology in Indonesian libraries; 2) determining the period of research results that are used as data sources in the study, namely published between 2019-2024; 3) looking for scientific journal articles related to the problems and topics studied and have a research location or not a literature review or meta-analysis; 4) reading the titles and abstracts of scientific journal articles to see the suitability of the content with the problem to be studied; 5) focus research on the problem, place and time of research, methods, data analysis techniques, and results; 6) categorize each study; 7) compare the results of all studies according to their categories; 8) analyze the conclusions found by reviewing the results of the research; and 9) draw conclusions of meta-analysis research on the basis of the seventh and eighth steps.

## RESULTS AND DISCUSSION

In this research, researchers collected various journals related to the application of information technology in Indonesian libraries which were published in scientific journals. Search for articles using the publish or perish application with a search range of 100 articles by entering the keywords application of technology in libraries. The scientific articles found were then selected by taking various articles related to the application of technology in libraries and were not research using literature review or documentation methods. Based on the criteria applied, 15 relevant articles were obtained with the following data:

**Table 1.** List of Articles on The Application of Information Technology in Libraries

Article Code	Journal Name	Article title
A1	Jurnal Pustaka Ilmiah	Ask Librarian: Penerapan Teknologi Informasi Perpustakaan pada Layanan Referensi di Perpustakaan Umum Asia
A2	Jurnal Informasi dan Komputer	Penerapan Metode Extreme Programming Pada Sistem Informasi Layanan Perpustakaan SMP Negeri 3 Negara Batin Berbasis Web Mobile

<b>A3</b>	Jurnal Multidisipliner Kapalamada	Optimasi Pelayanan Perpustakaan Menggunakan Teknologi RFID di UPT Perpustakaan ITB
<b>A4</b>	Jurnal Technopreneur (JTech)	Penerapan Teknologi Rest Api Pada Aplikasi Perpustakaan Digital Politeknik Gorontalo
<b>A5</b>	Journal of Information Technology and Computer Science (INTECOMS)	Implementasi Sistem Informasi E-Library Berbasis Web Pada Perpustakaan SMA N 1 Binjai
<b>A6</b>	BIBLIOTIKA: Jurnal Kajian Perpustakaan dan Informasi	Pengaruh Perkembangan Teknologi Informasi Terhadap Layanan Perpustakaan IAIN Tulungagung
<b>A7</b>	BACA: Jurnal Dokumentasi dan Informasi	Pemanfaatan teknologi Scispace untuk meningkatkan layanan literature review di perpustakaan
<b>A8</b>	Jurnal Teknologi Sistem Informasi	Sistem Informasi Perpustakaan Berbasis Web pada Perpustakaan Fakultas Saintek UINSU
<b>A9</b>	Tik Ilmeu: Jurnal Ilmu Perpustakaan dan Informasi	Peran Teknologi ChatGPT dalam Optimalisasi Layanan Referensi bagi Mahasiswa di Perpustakaan Universitas Prima Indonesia
<b>A10</b>	Jurnal Ilmiah Teknologi dan Rekayasa	Aplikasi Sistem Informasi Perpustakaan SMPN 11 Depok Dengan Qr Code
<b>A11</b>	Jurnal Informasi dan Teknologi	Layanan Multikampus Inter Library Loan (ILL) di Perpustakaan Institut Teknologi Bandung Kampus Jatinangor
<b>A12</b>	Pustaka Karya: Jurnal Ilmiah Ilmu Perpustakaan dan Informasi	Pemanfaatan teknologi informasi pada layanan perpustakaan dengan senayan library management sistem (slims) (studi kasus: perpustakaan pribadi "andalus library")
<b>A13</b>	Bharasumba: Jurnal Multidisipliner	Perkembangan Dan Peran OPAC pada Aplikasi CIP (Cerah Informasi Pustaka) untuk Temu Kembali Informasi di Perpustakaan Universitas Tridinanti Palembang
<b>A14</b>	Jurnal Teknik Informatika	Aplikasi Website Perpustakaan Berbasis QR-Code
<b>A15</b>	JUPI (Jurnal Ilmu Perpustakaan dan Informasi)	Analisis Penerapan Teknologi Informasi Oleh Mahasiswa Program Praktik Kerja Lapangan (PKL) di Perpustakaan SMA Muhammadiyah Mataram

Information Technology Implementation by Library Type

**Table 2.** Number of Articles Containing the Application of Information Technology Based on Library Type

<b>Library Group</b>	<b>Number of Articles</b>
College Library	10
Public Library	1
School Library	3
Specialized Library	1

Based on the table above, there are 15 articles that meet the criteria and are categorized based on the library group, from the table it is concluded that the articles that write a lot related to the application of technology in the library are the types of college

libraries, and the second lot is from school libraries. The application of technology in higher education libraries has become the most common compared to other libraries because it is one of the things that support learning and research. Technology allows students and academic staff to access digital resources such as e-books, online journals, and electronic databases from anywhere at any time.

#### Forms of Information Technology Implementation in Indonesian Libraries

Based on 15 articles that meet the research criteria, it is known that the library has implemented various forms of information technology. There are 7 forms of information technology application in libraries according to Sucahyo in Nurdi [15] namely library management systems, online catalogs, digital lending services, plagiarism detection software, technology-equipped study rooms, RFID (Radio Frequency Identification) systems, and social media. The library management system in the form of library management software allows the library to manage book collections and other media, track loans and returns and facilitate communication with users through automated messages and notifications. Online catalogs allow users to search for books and other media online, saving the time and effort required to search for books manually. Some libraries offer digital lending services for e-books, audiobooks, and other digital resources, which can be accessed by users from anywhere with an internet connection. Plagiarism detection software: College libraries use plagiarism detection software to help students and faculty identify plagiarism in academic writing. Technology-equipped study rooms: Some libraries offer technology-equipped study rooms such as computers and printers, which make it easier for users to conduct research or other academic tasks. RFID (Radio Frequency Identification) systems: RFID systems are used in some libraries to automatically track books and other media, making borrowing and returning easier. Social media: Some libraries use social media to communicate with users, advertise programs and events, and promote book collections and other media. Based on the results of the discussion in 15 from the article, it is known that the application of information technology in the library is as follows:

**Table 3.** Forms of Technology Application

Article Code	Forms of Technology Implementation	Description
A1	Library management system	Ask Librarian
A2	Library management system	Library Information System based on web with Extreme Programming (XP) method
A3	RFID (Radio Frequency Identification) System	RFID
A4	Library management system	REST-API and QR (Quick Response) Code feature contained in on mobile apps
A5	Library management system	WEB-BASED E-LIBRARY



<b>A6</b>	Online catalog	OPAC (Open Public Access Catalogue) and SLiMS (Senayan Library Management) applications. System)
<b>A7</b>	Library management system	Scispace technology is an AI-powered platform used to simplify the process of understanding of scientific work
<b>A8</b>	Library management system	Web-based
<b>A9</b>	Library management system	CHAT GPT
<b>A10</b>	Library management system	QR Code and API
<b>A11</b>	Library management system	Services website library based INTER LIBRARY LOAN
<b>A12</b>	Library management system	SLiMS (Senayan Library Management System)
<b>A13</b>	Library management system	OPAC at CIP (Sunny Information Library) as an information retrieval system at library
<b>A14</b>	Library management system	QR-Code feature on application library data collection website
<b>A15</b>	Library management system	Senayan Library Management System (SLIMS) Version 9 Bulian

Based on the results of table 2, it is known that the application of information technology in the library is in the form of a library management system, and an RFID (Radio Frequency Identification) system. This is because for now the library management system is used in the realization of a digital library so that it can be accessed online anywhere and anytime.

#### **Impact of Information Technology Implementation in Indonesian Libraries**

Based on 15 articles that meet the research criteria, it is known that the application of information technology in libraries in Indonesia has a positive impact on libraries. The impact of the application of information technology in the library according to Supriyanto & Muhsin in Khoiriyah & Haq [14] namely (1) streamlining and simplifying work in the library, (2) providing better services to library users, (3) improving the image of the library, and (4) developing national, regional and global infrastructure. Based on the research results from 15 articles fulfilling the criteria, it is known that the impact of the application of information technology in Indonesian libraries falls into 3 out of 4 categories, namely streamlining and simplifying work in the library, providing better services to library users, and improving the image of the library. This is in accordance with the following table:

**Table 4.** Impact of Information Technology Implementation in Indonesian Libraries

Article Code	Streamline and simplify work in the library	Provide better service to library users	Improve the image of the library	Development of national, regional infrastructure and global
A1		Impact of on service improvement through Ask Librarian service for 24 hours so that users can Ask and get the information they need		
A2		Impact of on service improvement through the development of a web-based library information web system-based library information system development with Extreme Programming (XP) method is expected to accelerate the service delivery. Management administrative data library and speed up borrowing transactions and book return		
A3		The impact of on service enhancement through RFID technology allows users to self-serve, which provides advantages in acceleration process borrowing and return of collections library		
A4	Make it easy to manage an organized library system so that it can help readers and staff library in monitoring borrowing from members and			



	book collections.		
<b>A5</b>	Provide ease of doing borrowing and returning books quickly, knowing the fines for delay returns, and can view books in form e-book		
<b>A6</b>		The impact of information technology on improving library services in attracting visitors and making it easier to search. library materials	
<b>A7</b>		The impact of Impact on service improvement through Scispace Technology is able to accommodate literature review service needs, especially at the search stage and literature selection	
<b>A8</b>	Library A multi-user system that can assist library staff in managing visitor data, book data, member data, and membership data. Data and borrowing data, book returns, and making report easily and quickly.		
<b>A9</b>		The impact of on improving reference services through ease of access to information, efficiency and practicality of searching for information for	

		<p>students</p>		
<b>A10</b>		<p>Impact The impact on improving services through the application of QR codes so that access to library services in the form of login process into system to easy</p>		
<b>A11</b>		<p>The impact of on service improvement through the INTER LIBRARY LOAN Library website service (ILL) making it easy for students to borrow and return books without having to have to Go to ITB Central Library, which is located quite far from the ITB campus. located in Jatinangor</p>		
<b>A12</b>	<p>Provide Time and labor efficiency in library management for librarians because SLiMS is easy to understand and implement</p>			
<b>A13</b>		<p>Impact on service improvement through via the application of OPAC in the CIP (Sunny Information Library) application in accessing information about the availability of documents, library materials, and data</p>		

	<p><b>A14</b></p> <p>STIE Library Website Application XYZ based QR Code, make things easier library officer jobs for data collection book, data collection library membership and transaction data collection borrowers and Book returns. A free and easy-to acquire application at apply in supporting management activities libraries</p> <p><b>A15</b></p> <p>by librarians, both in field processing and in the field of services so that it is more effective and efficient</p>	<p>in the library quickly and accurately in or out of the library, outside the library</p>		
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Based on Table 3 above, it is known that the impact of the application of information technology in the library is only in two dimensions of the four existing indicators. These indicators are indicators of streamlining and simplifying work in the library, and indicators of providing better services to library users. In the indicator of streamlining and simplifying work in the library, the incoming articles totaled 6 articles, namely article codes A4, A5, A8, A12, A14, and A15. As for the indicator of providing better services to library users, there are 9 articles, namely article codes A1, A2, A3, A6, A7, A9, A10, A11, and A13. This shows that the application of information technology in the library has an impact on improving library services. This is because according to Breeding [16] the application of technological infrastructure in the library is used in the collection of resources and the provision of services in the library.

## CONCLUSION

Based on the research, it is known that articles related to the application of information technology in libraries have been applied in several types of libraries, namely in public, special, school and college libraries. But the most applied in the type of college library. The majority of information technology applications in libraries are in the form of library management systems, namely in the form of GPT chat, library websites, QR

Barcode, RFID, OPAC, and SLiMS. These various applications of information technology have an impact on streamlining and simplifying work in the library, as well as providing better services to library users.

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