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Nasa Zata Dina

Universitas Airlangga, Indonesia, nasazatadina@vokasi.unair.ac.id

Nyoman Juniarta

Université de Lorraine, France

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Research on Application of Information Technology for Library Information Service

Nasa Zata Dina^{1*}, Nyoman Juniarta²

¹Department of Engineering, Faculty of Vocational Studies, Universitas Airlangga, Indonesia

²Faculty of Informatique, Automatique, Électronique-Électrotechnique, et Mécanique,
Université de Lorraine, France

*Corresponding Author's Email: nasazatadina@vokasi.unair.ac.id

ABSTRACT

This paper aims to analyze and show the research trends on published research on information technology applications for library information services from 2011 until 2020. The papers are collected from SCOPUS and Web of Science databases. The study reveals 310 papers from various journals, and the total number of citations is 896 from 10 years. The data from 310 papers reveal that the most productive journal with the highest number of publications is “Library Hi Tech Journal”. The Library Hi Tech Journal published 24 papers for a particular topic. Meanwhile, China dominates other countries with the highest number of publications with 97 papers (29.66%), and tops the list among the most productive countries. It is found that the most visible words as keywords are “University” and “Digital” and it is followed by “Management”, “Mobile”, “Case”, “Data”, “Development”, and “Application”.

Keywords: Library Services, Technology Education, Information and Communications Technology Skills

1. INTRODUCTION

Libraries are places where information resources are provided for communities. In a library, there are many services offered by the library to the users. These Library Information Services (LIS) include cataloging, circulation, and collection development. In this era, the advancement of Information Technology (IT) has changed the way libraries operate. The previous library services were performed manually a few decades ago and have now been assisted using IT. As a result, librarians need to acquire IT skills to complete their work.

In general, IT Application on LIS includes the digital library and library automation (acquisition system, cataloging system, classification system, circulation system) (Bhanja et al., 2009). A digital library is a new form of the library fully equipped by collecting digital objects in electronic media formats such as file text, visual material, audio material, and video material (Pomerantz et al., 2007). While IT involvement in library automation refers to the use of the computer to automate libraries' procedures as support systems. The primary purpose of applying

IT on LIS is to enable the user community to obtain the relevant information faster so the efficiency increases in operations, eliminate the repetitive works, and improve the quality and range of services. Furthermore, the impact of IT application on LIS can be observed on information resources, services and people (Manjunatha, 2007). Rasul et al. (2011) assessed the service quality and user satisfaction after IT has been applied in a library and they concluded that there are three main features which librarian should give more attention: (1) adequacy of print resources; (2) electronic resources; and (3) IT Services. Other surveys, Rafique et al. (2021), Acheampong and Agyemang (2020), Ocran et al. (2020) did survey on how the students and librarians had responded to the utilization of information technology to enhance academic library services. The studies agree that librarians should build competencies in delivering manual to web and mobile technology platforms. In general, web and mobile technology services platforms are usually prepared to facilitate users reaching the library from any area, such as long-distance learning in universities or schools. Dina et al. [] developed a website for primary schools that provides essential services to librarians and students, such as automatic barcode generators for cataloging and processing books, digital lending services, digital data management, and automated digital reports. The system is expected to enable real-time library data services and effective and efficient library management.

Meanwhile, IT applications at the library are not limited to automating library activities using web and mobile technology. Recently, the term “smart library” is often used as a new era of a modern library. Conceptually, smart library has three essential elements: human, technology, and services (Cao et al., 2018). Hussain and Ahmad (2021) mentioned several technologies that are widely used by smart library: internet of things, artificial intelligence, augmented reality, blockchain technology, radio frequency identification, electronic resource management, integrated library system, and geographic information system. The smart library technology used will continue to develop following current technological developments. As an example, Tang (2021) developed an AR game to help first-year students learn their library through the game. The AR game made students interested in exploring the library virtually and familiarized them to understand library spaces, services, and librarians.

The need for IT Applications in the library arises to reduce the effort and time required for these works. It has contributed to the improvement in the provision of quick, quality services in the libraries. Therefore, an analysis is needed to look back at the historical growth during the past ten years. In this paper, to better understand the IT application on LIS publications and how it is evolving, we have analyzed the research and publication trends from leading databases. The following are some of the objectives of this research:

- To find out the growth pattern and average citation of research publications on LIS Application.
- To point out the most productive journal of LIS Application.
- To show the most productive countries and schools on LIS Application.
- To determine the top ten highest number of citations and publications.
- To map the keywords based on the frequency of occurrences.

The rest of this paper is divided into three sections: methodology, result and discussion, conclusion.

2. METHODOLOGY

The authors collected the bibliographic information of all research on the application of information technology for library information service publications from WoS and Scopus databases. Then, we compiled a list of journal and proceeding papers published from these databases. For the present study, we did not consider papers of other types published, e.g., such as opinion papers, book reviews, brief communication, and letters to the editors. The search keywords used were “information technology” and “library information service”. There were 310 publication papers from WoS and Scopus which covered the period from 2011 to 2020. In the data cleaning stage, record’s title’s, author’s name, abstract, journal’s title, and publisher were carefully checked, duplicates and irrelevant records were deleted from our database. A total of 310 papers relevant to the application of information technology for library information services were considered for analysis.

3. RESULT AND DISCUSSION

3.1 Growth pattern and number of IT application on library information service publications

Table 1 shows the chronological distribution of publications with the keywords “IT Application on LIS” in scientific journals and proceedings for ten years. The total number of publications is 310 papers. The information of number of papers (NP) and citations (CT) per year are written in Table 1. Citations refer to the number of times a paper is cited by other papers (Aksnes et al., 2019). Generally, citations are used as performance indicators in research systems. Furthermore, the number of citations reflects the impact of the research or its quality.

The highest number of publications was on 2016 (NP=41, CT=89), while the lowest was on 2012 (NP=19, CT=50). The detail of each publication per year is shown in Table 1. The

Average Citation Per Paper (ACPP) has its peak in 2011. The result is due to the reasons that older papers get more time to accumulate more citations. The exciting information from Table 1 is the second-highest citation was earned in 2018. There were 161 citations of 40 papers. It can be concluded that the number of citations is influenced by the older published year and the number of accumulated papers in that year. The publication year of IT Application on LIS versus CT and NP is depicted in Fig. 1. It shows the trend and pattern on the research topic.

Table 1. Annual prediction of papers on IT application on Library Information Service

Year	NP	CT	ACPP	Percentage
2011	25	213	8.52	7.62%
2012	19	50	2.63	5.79%
2013	21	76	3.62	6.40%
2014	23	74	3.22	7.01%
2015	39	110	2.82	11.89%
2016	41	89	2.17	12.50%
2017	39	67	1.72	11.89%
2018	40	161	4.03	12.20%
2019	39	37	0.95	11.89%
2020	24	19	0.79	7.32%

NP: Number of Publications

CT: Citations

ACPP: Average Citation Per Paper

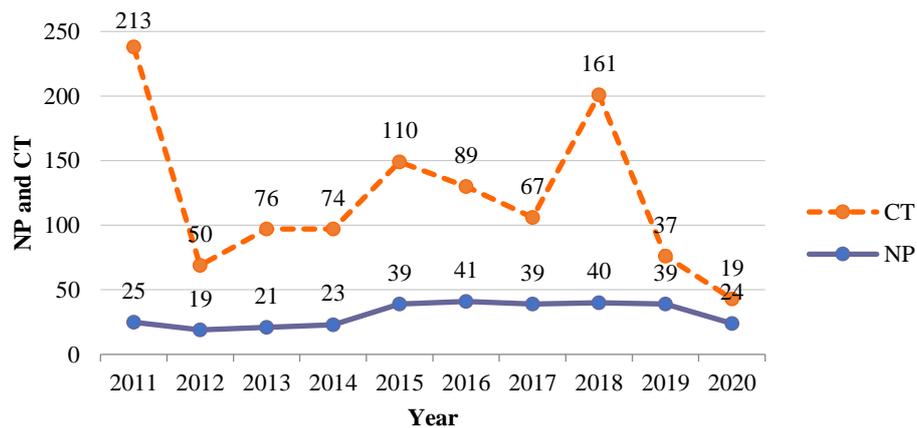


Figure 1. Annual prediction of papers on IT application on Library Information Service

3. 2 Most Productive Journals

The total 310 research papers on IT applications from the domain of the LIS are distributed over 212 journals. Table 2 provides the top ten most influential journals with the corresponding quartile and Scimago Journal Rank (SJR). SJR is an indicator that is used as free journal metric. The algorithm used in SJR is similar to PageRank Algorithm. SJR indicator measures how much influence scientific journals have by counting the number of citations and the sources of citations (Bornmann & Marx, 2016). SJR divides journals into four quartiles based on the relevancy of the journal to the scientific society. The journals are distributed by four quartiles: quartile 1, quartile 2, quartile 3, and quartile 4. Quartile 1 is the highest while quartile 4 is the lowest. The most reputable journals belong to quartile 1.

The results demonstrate that the most influential and productive journal is the “Library Hi Tech” (Quartile 1) with NP 24, followed by the “Electronic Library” (Quartile 1) with an NP 19. Table 2 shows the top ten influential sources among 212 journals. Figure 2 reflects the publication source with the numbers of papers published in these top-ranked journals. Further, it is observed that Applied Science, Materials Science and Information Technologies in Industry has a high SJR score = 0.706 even though it is on Quartile 2. So it can be interpreted that the reasons for citation are not always the quality of the journal or the number of publications, instead, it is the quality of research and relevance of the work that fetches more citations.

Table 2. Top ten sources/journals on IT apps on library

Rank	Sources	NP	Quartile	SJR
1	Library Hi Tech	24	1	0.541
2	Electronic Library	19	1	0.554
3	Library Management	7	2	0.552
4	Desidoc Journal Of Library & Information Technology	5	2	0.514
5	Aslib Journal Of Information Management	4	1	0.558
=6	Profesional De La Informacion	3	1	0.698
=6	Journal Of Academic Librarianship	3	1	0.889
=6	Information Development	3	1	0.452
=6	Evidence Based Library And Information Practice	3	3	0.393
=6	Applied Science, Materials Science And Information Technologies In Industry	3	2	0.706

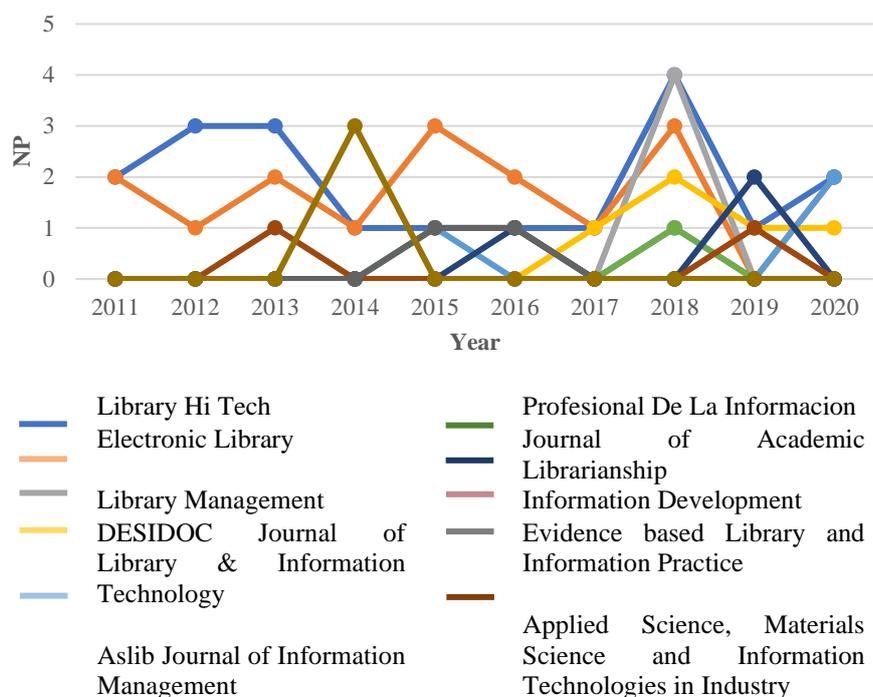


Figure 2. Top 10 sources/journals on IT apps on library

3.3 Most Productive countries and organization produced papers on IT Application on Library Information Services

The countries where the corresponding authors are from were examined, a total of 310 papers spread over 61 countries. The geographical distribution of the most productive countries that have produced research on IT Applications on LIS is also presented in Figure 3. It is observed that China dominates other countries with the highest share of 29.66 % (97) and tops the list among the most productive countries. This is followed by USA (34), and Rusia (24). The number of papers from each organization is lead by Jilin Agriculture University (7) and it is followed by Russian National Public Library for Science and Technology (5). The top five most productive organizations can be seen in Table 3.

Table 3. Top 5 Most Productive Countries

Country	Name of Organization	Number of Paper
China	Jilin Agricultural University	7
Rusia	Russian National Public Library for Science and Technology	5
South Africa	University of Kwazulu Natal	5
Rusia	Russian Academy of Sciences	4
China	Wuhan University	3

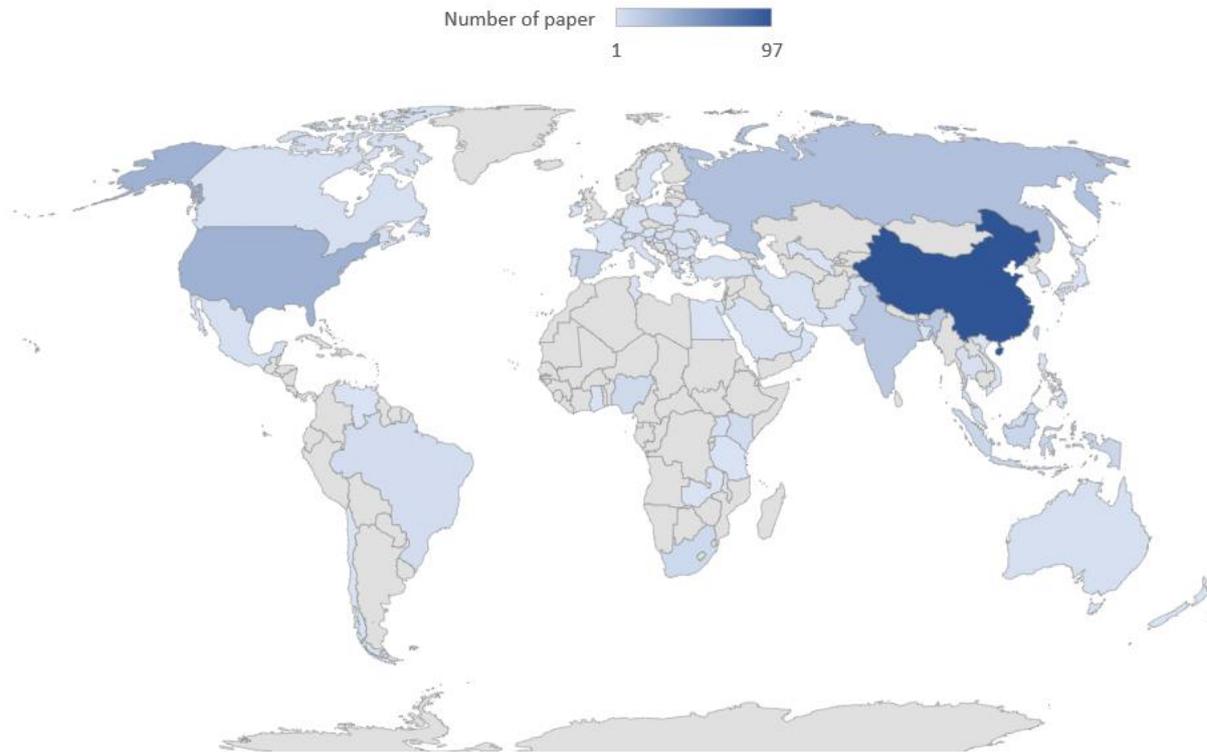


Figure 3. Country

3. 4 Top ten highest number of citation and publication

Listing references in publications is a convention for acknowledging the importance of previous work by scholars, and citation analysis is an existing method used to calculate the influence of particular papers, authors, periodicals, mapping a correlation between two quoted and cited documents. Table 4 shows the rank list of most cited papers with their respective citations from the SCOPUS and WoS database in the literate of Application of IT for LIS.

Table 4. Top 10 Most Cited Papers on IT Application on Library

Rank	Title	Authors	Source Title	Year	Citation
1	Student attitudes towards mobile library services for smartphones	Paterson, Lorraine; Low, Boon	Library Hi Tech	2011	57
2	Factors influencing users' satisfaction and loyalty to digital libraries in Chinese universities	Xu, Fang; Du, Jia Tina	Computers In Human Behavior	2018	42
3	Information sharing as a means to reach collective understanding A study of design scholars' information practices	Pilerot, Ola; Limberg, Louise	Journal Of Documentation	2011	39

Table 4. Top 10 Most Cited Papers on IT Application on Library (cont.)

Rank	Rank	Rank	Rank	Rank	Rank
4	The cultivation of scientific data specialists Development of LIS education oriented to e-science service requirements	Si, Li; Zhuang, Xiaozhe; Xing, Wenming; Guo, Weining	Library Hi Tech	2013	23
5	Exploring Gender Differences in SMS-Based Mobile Library Search System Adoption	Goh, Tiong-Thye	Educational Technology & Society	2011	19
6	Assessing users satisfaction with web digital library: the case of Universiti Teknologi MARA	Masrek, Mohamad Noorman; Gaskin, James Eric	International Journal Of Information And Learning Technology	2016	18
=7	Factors Affecting Acceptance of Mobile Library Applications: Structural Equation Model	Rafique, Hamaad; Anwer, Fozia; Shamim, Azra; Minaei-Bidgoli, Behrouz; Qureshi, Muhammad Ahsan; Shahaboddin Shamshirband	Libri-International Journal Of Libraries And Information Studies	2018	16
=7	Exploration of usage behavioral model construction for university library electronic resources	Chang, Sung-Shan; Lou, Shi-Jer; Cheng, Shuenn-Ren; Lin, Chin-Lang	Electronic Library	2015	16
=7	The design and implementation of a Mobile Library APP system	Pu, Ying-Hung; Chiu, Po-Sheng; Chen, Tzung-Shi; Huang, Yueh-Min	Library Hi Tech	2015	16
=7	Assessing effects of information architecture of digital libraries on supporting E-learning: A case study on the Digital Library of Nature & Culture	Chen, Chih-Ming; Lin, Shang-Tzu	Computers & Education	2014	16

numbers of papers on IT application on LIS, followed by the “Electronic Library”. China tops the list among the most productive countries with the highest share (29.66%), followed by the USA, Russia, and Taiwan. Regarding the top-cited and referred papers on IT application on LIS within the corpus, a paper by Paterson and Low in 2011 has received the highest number of citations =57 citations.

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