

AUTHORSHIP PATTERNS OF LIBRARY AND INFORMATION SCIENTIFIC ARTICLES IN INDONESIA-ACCREDITED JOURNALS

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ABSTRACT

Research on authorship patterns identifies the direction of authorship trends in the field of knowledge. This research aims to determine the authorship patterns in four Indonesian library and information science journals with national accreditation SINTA 2 category from 2013 to 2020. The focus consists of publication, author and affiliate patterns, network, trend, and type of collaboration. To achieve this goal, this study uses a descriptive study with a quantitative approach through bibliometric techniques, especially co-authorship analysis. The study found that the increase and stability of publications were in line with the establishment of SINTA 2 accreditation. As many as 66% of authors who published more than one article often wrote collaboratively. The authors who produce the highest articles have published different articles in the four Sinta 2 journals and high academic positions. The authors serve as a center for collaboration. As many as 78% of institutions come from the library and information science. State Universities are the type of institution that produces the highest articles by 73%. Most of the articles in each journal are written by authors affiliated with the journal's managing institutions. Cumulatively, the authorship trend is a collaboration with a degree of 0.56. The trend has changed cumulatively from individual to collaboration since 2016. Most partnerships occur between authors from the same institution, with 73.17%.

KEYWORDS

Authorship, Collaboration, Bibliometrics, Library and Information Science, Indonesia

INTRODUCTION

Research on authorship patterns has grown along with the increase in scientific journal articles. These publications relate to scientific productivity, which is amplified through the important role of contribution from a single researcher or collaboration (Himawanto, 2015). Authorship patterns can describe the distribution of single and collaborative authors (Rahayu & Idhani, 2019). This pattern determines the development or evolution of authorship in a particular field of knowledge (Cheng et al., 2019).

Authors who contribute through scientific articles are increasing in Indonesia. The increase is related to the implementation of public services. One form of this is a knowledge service that can provide complete information in the context of comparison and produce a measurement scale that follows the dynamics of global discussions as a reference for formulating further research policies (Alamsyah, 2013; Ghazi & Hilmansyah, 2021; Hardiyansyah, 2017; Latif et al., 2019; Sari, 2016). One of the ways to improve knowledge services is through scientific publications. In Indonesia, postgraduate students or lecturers must publish papers in reputable national or international scientific journals (Ristekdikti, 2017, 2019c). To achieve those criteria, the Indonesian government began to apply for accreditation to assess, encourage, and improve the quality and management of journals. These journals will be indexed through SINTA and increase public access to the literature.

Since 2010, collaboration has become a trend in the international journal (Alagarsamy, 2021; Amusan & Adeyoyin, 2020; Chander & Prashar, 2019; Cheng et al., 2019; S. Das et al., 2021; Haq & Satti, 2019; Haque et al., 2019; Hazarika, 2021; Karkee & Sinha, 2020; Mukherjee, 2010; Onyancha, 2018; Sahoo et al., 2020; Saini & Verma, 2018; Ullah & Ameen, 2021; Veram et al., 2018; Vinay & B T, 2021; Yadav et al., 2017). Prieto-Gutiérrez & Segado-Boj (2019) showed that multi-country collaboration increased by 30% in LIS journals indexed by Scopus. Collaboration can increase the number of papers and the influence of researchers. Author networks are more complex and broaden the researcher's social circle (Kong et al., 2019). J. K. Singh, (2020) revealed that collaboration is increasingly popular among universities, organizations, and institutions to share resources, ideas, and experiences. These previous studies show that collaborative authors have increased in library science journals published outside Indonesia from year to year.

That condition contrasts with library and information science research in Indonesia, where single authorship has a higher percentage (Junandi, 2018; Rahayu & Idhani, 2019; Rahayu & Rachmawati, 2015; Saleh & Maulana, 2020; Utami & Sundari, 2019). On the other hand, Jurnal Kajian Informasi & Perpustakaan has a trend of collaborative authorship in 2013-2019 (Aulianto et al., 2019; Rohanda & Winoto, 2019). Meanwhile, the collaboration trend in BACA: Jurnal Dokumentasi dan Informasi has only occurred since 2018 (Aulianto & Nashihuddin, 2020). These results show differences in authorship trends between library science journals in Indonesia. Saleh & Maulana (2020) stated that the difference in these trends needs further research by expanding the scope of the journals studied.

Based on previous studies, there are differences in research trends outside Indonesia and Indonesia. Researches on authorship patterns also tend to discuss the research object from one or two journals from the same institution in Indonesia. This limited study has not been able to find comprehensive conclusions to compare journals. Even though SINTA indexes 27 library science journals in Indonesia, several are in the same category of accreditation (Badan Riset Inovasi Nasional, 2018).

The focus of previous studies tends to discuss articles and, author's distribution, the degree of collaboration. At the same time, affiliation patterns, changing trends, networks, and types of collaboration have not been revealed. On the other hand, efforts to conduct comparative authorship studies were not easy to do in the past. Until 2015, Indonesia did not have a national index system. So that researchers find it difficult to track similar journals.

In 2016, Ristekdikti has developed a national index system under the name SINTA. SINTA provides information on accreditation levels, citations, subject scope, institutions, and journals from Indonesia. The assessment accreditation process includes content and management. Furthermore, the ranking is divided into six categories in SINTA as follows (Direktorat Jenderal Penguatan Riset dan Pengembangan-Ristekdikti, 2018). Journal accreditation levels based on SINTA are categorized as follows:

Table 1. Accrediation of Indonesia Journal Based on SINTA category

SINTA 1	1 ST accreditation rank	Score $85 \leq n \leq 100$
SINTA 2	2 nd accreditation rank	Score $70 \leq n \leq 85$
SINTA 3	3 rd accreditation rank	Score $60 \leq n \leq 60$
SINTA 4	4 th accreditation rank	Score $50 \leq n \leq 60$
SINTA 5	5 th accreditation rank	Score $40 \leq n \leq 50$
SINTA 6	6 th accreditation rank	Score $30 \leq n \leq 40$

So there is an opportunity to research journals in similar fields of knowledge with the same accreditation rating. Previous studies have shown that bibliometrics, especially co-authorship analysis, is crucial for mapping authorship (Aulianto et al., 2019; Barik & Jena, 2019; Junandi, 2018; Prieto-Gutiérrez & Segado-Boj, 2019; Rohanda & Winoto, 2019; Saleh & Maulana, 2020). Degree of collaboration measurement uses Subramanyam's formula because it has a balanced standard. With this standard, researchers can identify changes in authorship trends.

Based on these problems, this present study will examine authorship patterns based on: publication, author, and affiliate patterns; networks; trend change, and types of collaboration. The scope of this research is a journal that only focuses on library and information science with the highest national accreditation in Indonesia. These journals include: 1) BACA: Jurnal Dokumentasi dan Informasi, published in 1986; 2) Berkala Ilmu Perpustakaan dan Informasi, published in 2003; 3) Jurnal Kajian Informasi & Perpustakaan, published in 2013; 4) Khizanah al-Hikmah: Jurnal Ilmu Perpustakaan, Informasi dan Kearsipan, published in 2013. The determination of SINTA 2 accreditation for these journals started in 2018 (Direktorat Jenderal Penguatan Riset dan Pengembangan-Ristekdikti, 2018). This research needs to identify the change in authorship trends, thus requiring years before and after accreditation. Therefore, 2013-2020 is the period for the object of research.

LITERATURE REVIEW

Bibliometric: Co-authorship Analysis

Bibliometric analysis is an integral part of research evaluation methodology in scientific and applied fields. The methods used are increasing when studying various aspects of science and how to measure the position of an institution (Ellegaard & Wallin, 2015). The analysis refers mathematically and statistically to the patterns in the publication and use of documents (Widuri & Prasetyadi, 2018). Bibliometric methods provide a better understanding of the research evolution and help measure the impact of authors and publications (Ullah & Ameen, 2021). Bibliometric indicators serve to evaluate the results of scientific research, are broadly helpful for assessing the interaction between science and technology, scientific mapping, tracking or tracing the development of new knowledge in specific fields, and provide a competitive advantage in making strategic decisions plans (Tupan, 2016). Bibliometrics aims to evaluate research results, track evolution, and base policy research planning (Hazarika, 2021).

Sulistyo-Basuki said that bibliometrics could explain the process of written communication; one of them is by recognizing the direction of authorship in documents (Sulistyo-Basuki, 2016). Bibliometric studies concentrating on authorship patterns can describe the degree of a concerted effort of a particular group of authors (S. Das et al., 2021). Authorship analysis can determine the institution where the author works (Pattah, 2013). Bibliometric assessment can include contributor pattern, article or geographic distribution, main productive author, level of collaboration (Hazarika, 2021; Natakusumah, 2014).

Collaboration

Collaboration is a form of interaction in fostering effective communication, sharing competencies and other resources to develop knowledge (P. K. Das, 2013). Collaboration between researchers affects article quantity, research performance capacity, and assessing the position of researchers (Kademani et al., 2005). Collaboration can happen between research institutions, industry, and the government (Tupan & Rachmawati, 2018). Research collaboration can be divided into three types: 1) Internal, collaboration of the same or different departments within one institution; 2) Domestic, occurs between two or more institutions in one country. 3) International, collaboration between institutions from two or more countries (Maryono & Surajiman, 2017).

Bahr and Zemon reveal the benefits of collaborative authorship in increasing the contribution of academic librarians in the professional literature (Bahr & Zemon, 2000). Another benefit of co-authoring analysis is that it becomes a strategic planning tool for research programs and organizational capacity building (Morel et al., 2009). The frequency of the author's collaboration with other authors will determine the degree of collaboration (Pattah, 2013).

RESEARCH METHODS

This study aims to determine the pattern of authorship based on publication, author and affiliate patterns, network, degree, and type of collaboration. It requires a descriptive method (Suryani & Hendryadi, 2015) with quantitative data using bibliometric analysis, especially co-authorship. This research requires a bibliographic component of the author's name and affiliation. Each author does not have the same opportunity as a sample, so this study uses total sampling. This research data collection uses digital data archiving techniques (Pratama, 2017).

Researchers downloaded 517 articles from the websites of four journals from 2013-to 2020. There are no journals that only focus on library and information science that meet the criteria of SINTA 1. SINTA 1 is the highest national ranking that requires a journal indexed by Scopus or Web of Science (Direktorat Jenderal Penguatan Riset dan Pengembangan-Ristekdikti, 2018). This condition causes the highest accreditation rating of library and information science journals at SINTA 2 in Indonesia. The details of the four journals are as follows in Table 2.

This study applies the five steps of Zupic & Čater's (2015) bibliometric research, consisting of 1) Research Design, 2) Compilation of Bibliometric Data, 3) Analysis; 4) Visualization, 5) Interpretation. Analysis of this research using Microsoft Excel, Mendeley, and VOSViewer software. Excel serves to recap and calculate all components in each present research focus. On the other hand, the researchers also made adjustments to 3 other valid data sources. First, to determine the highest author's academic position, use SINTA's author data (SINTA, 2021) and Indonesian librarian data (Perpustakaan Nasional Republik Indonesia, 2021). Second, the list of College coordinators from PDDikti (Pangkalan Data Pendidikan Tinggi, 2021). The third is the directory of Indonesian universities' that have the department of library, information, and archives science (BANPT, 2019). The data processing results are used to identify each pattern that is formed.

Then the researchers carried out two-step of modifications to clean the data. First, the researchers completed several bibliographic data in names and affiliations that were not included in the article metadata through Mendeley. Then the data processing results through

VOSViewer produce a list of names and affiliations along with the number of documents and TLS (Total Links Strength). It turns out that there are still multiple names and affiliations. The double condition occurs because there is a non-uniformity in the writing of the name and affiliation. Therefore, the researchers compiled the Thesaurus to modify data as the second step. Thesaurus serves to clean up overlapping author names and affiliations. Next, the researchers included the Thesaurus via VOSViewer.

Table 2. Journal as Object and Sources of Research Data

No	Journal Name	Publisher	Total Vol.	Total Issue	Number of Articles
1	BACA: Jurnal Dokumentasi dan Informasi	Pusat Data dan Dokumentasi Ilmiah Lembaga Ilmu Pengetahuan Indonesia	8 (Vol. 34-41)	16	114
2	Berkala Perpustakaan Ilmu dan Informasi	Library of Universitas Gadjah Mada	8 (Vol. 9-16)	16	129
3	Jurnal Kajian Informasi & Perpustakaan	Departement of Library at Universitas Padjadjaran	8 (Vol. 1-8)	16	132
4	Jurnal Ilmu Prpustakaan , Informasi, dan Kearasipan	Departement of Library Science at Universitas Islam Negeri Alaudin	8 (Vol.1-8)	16	142

Data processing through VOSViewer generates a list of authors, affiliations, and countries along with each item's number of articles, Links, and TLS. The author list uses full counting, while the affiliate and country collaboration list uses fractional counting. Links show an author has collaborated with how many other authors, and TLS shows the total strength of these links (Van Eck & Waltman, 2018). At the same time, one institution/country can collaborate with them itself.

Meanwhile, Fractional counting produces an accurate TLS value. So, the TLS of the institution/country will identify the frequency of collaboration with others. Thus the difference between the number of collaboration documents and TLS from each institution/country will indicate the frequency of collaboration with them itself (internally). The collaboration network uses LinLog/Modularity as a layout and clustering method to spread views. On the other hand, calculation of the degree of collaboration uses the Subramanyam formula as follows (Subramanyam, 1983):

$$C = \frac{N_m}{N_m + N_s}$$

C = Degree of collaboration
 N_m = Number of articles written in collaboration
 N_s = Number of articles written individually
 $0 \leq C < 0,50$ = Trend is single
 $0,50 < C \leq 1$ = Trend is collaboration

RESULTS AND DISCUSSION

BACA: Jurnal Dokumentasi dan Informasi (BJDI) obtained SINTA 2 accreditation in 2018 (Ristekdikti, 2018a). The same thing happened to the Berkala Ilmu Perpustakaan dan Informasi (BIP) (Ristekdikti, 2018b). On the other hand, publications Jurnal Kajian Informasi & Perpustakaan (JKIP) and Khizanah al-Hikmah: Jurnal Ilmu Perpustakaan, Informasi dan Kearsipan (KHJPIK) obtained SINTA 2 accreditation in 2019 (Ristekdikti, 2019a, 2019b).

Publication Pattern

SINTA 2 accreditation has two effects, according to Figure 1. First, Berkala Ilmu Perpustakaan dan Informasi and Jurnal Kajian Informasi & Perpustakaan experience a consistent number of publications. Second, the number of publications of BACA: Jurnal Dokumentasi dan Informasi and Khizanah Al-Hikmah: Jurnal Ilmu Perpustakaan, Informasi dan Kearsipan are increasing. Sri Junandi as editor in chief of BIP explained that this journal has consistently published ten articles per issue due to the availability of articles since being accredited with SINTA 2. Aulianto et al., (2019) reveals that Jurnal Kajian Informasi & Perpustakaan editors have begun consistently publishing 14 titles each year since 2017. BACA: Jurnal Dokumentasi dan Informasi has also prepared SINTA 2 accreditation since 2016 (Aulianto & Nashihuddin, 2020). On the other hand, several causes of differences in the number of publications each year are the number of articles sent to journal editors and articles that pass assessment according to the criteria (Junandi, 2018).

This study also found that journals from universities had more articles than journals from non-university. Obtaining SINTA 2 accreditation impacts consistency in the journals and increases the number of publications. This condition is because accredited journals must have at least ten titles each year (Direktorat Jenderal Penguatan Riset dan Pengembangan-Ristekdikti, 2018). This research identified that the number of authors participating in four Indonesian LIS journals increased after the SINTA 2 accreditation was established.

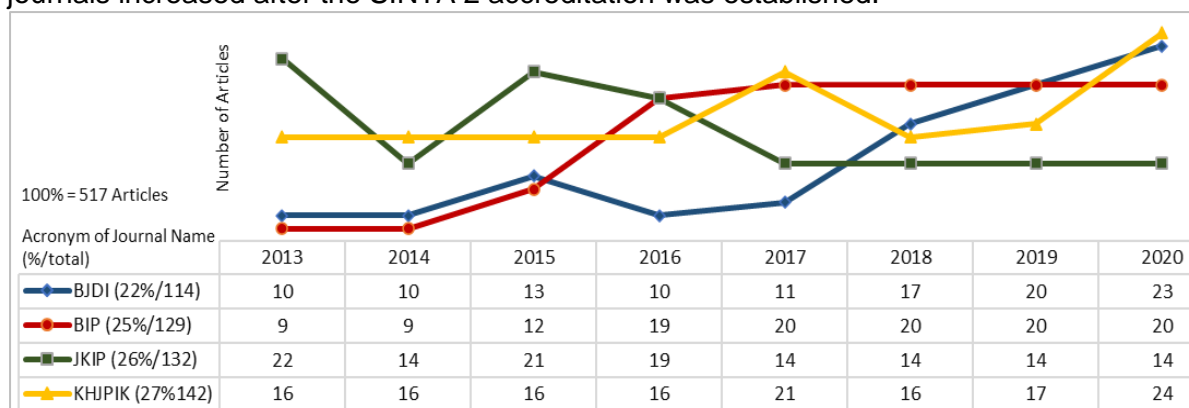


Figure 1. Distribution of Articles

Author Pattern

Based on Figure 2, the names of authors who wrote articles single & collaboration have the same pattern with 10-12 in all four journals. Cumulative calculations recognize the same name from multiple journals, so they do not overlap. The number of authors who write singles and collaborations increases while authors writing only singly or in collaboration has decreased cumulatively. This condition occurs because authors who write singly in one journal also write collaboratively in other journals, and vice versa. The findings identify that several researchers publish different articles in four journals.

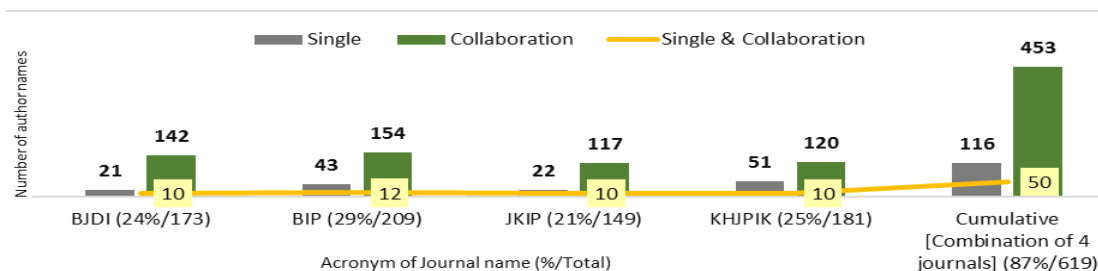


Figure 2. Distribution of Single Author and Collaboration

Figure 3 shows that authors who wrote articles with ten titles and more cumulatively had three distinct characteristics. First, the researcher wrote more articles only in collaboration (6 authors). Second, researchers write more often in collaboration (5 authors). Third, researchers write more individually (1 author). Although there are three characteristics, these authors also share three common patterns. First, all of these authors have collaborated. Second, authors who produce the highest articles have contributed in two to four LIS journals SINTA 2. The third pattern is that these authors have high academic positions, such as Assoc. Professor, Senior Lecturer, Pustakawan Ahli Utama and Pustakawan Ahli Pertama.

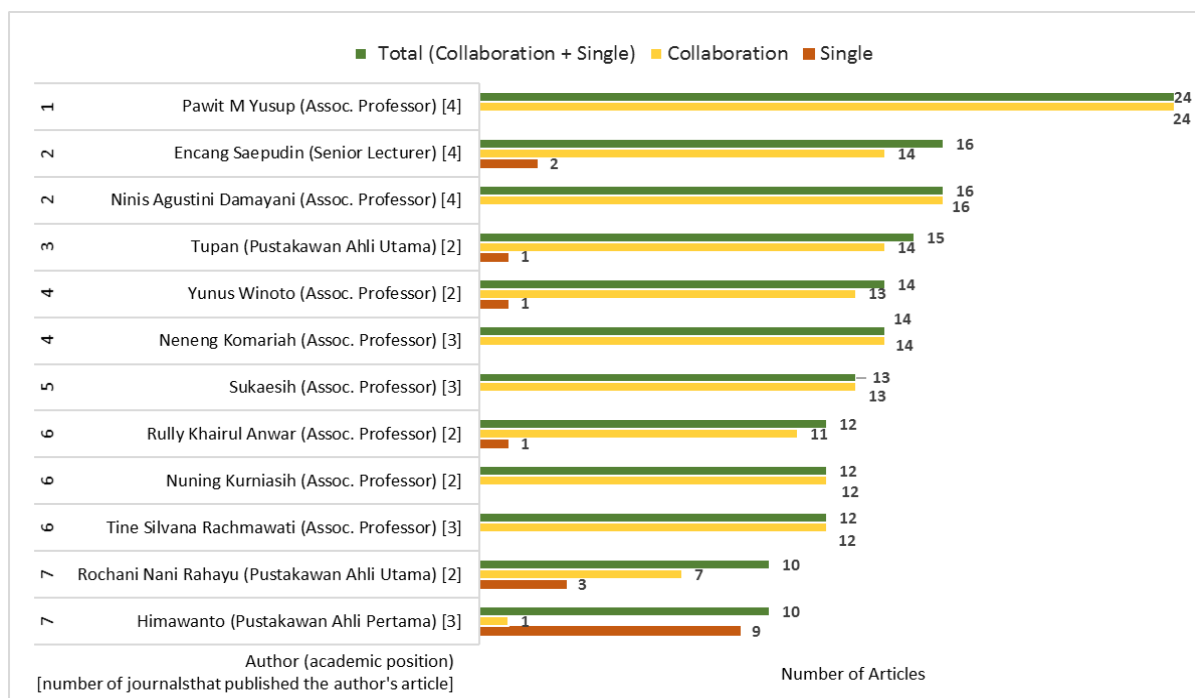


Figure 3. Authors with the highest number of articles cumulatively

Figure 4 shows the pattern of authors who produced papers with more than one title. Authors produce more articles individually by 19%. On the other hand, some authors have a balanced frequency in producing articles collaboratively and individually by 15%. The findings identify that collaboration supports authors to produce more articles (66%). Kong et al., (2019) also found that collaborating researchers produced more articles.

Based on Figure 5, Collaboration often takes place between the two authors on BACA: Jurnal Dokumentasi dan Informasi; Berkala Ilmu Perpustakaan dan Informasi; and Khizanah al-Hikmah: Jurnal Ilmu Perpustakaan, Informasi dan Kearsipan. Different things happened to the

Jurnal Kajian Informasi & Perpustakaan. In this journal, collaborations have been more frequent between the three authors since the first of publication.

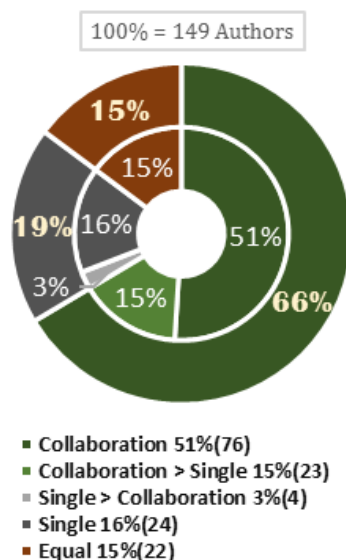


Figure 4. Comparison of authors who wrote more than one title individually or collaboratively

Year	BACA: Jurnal Dokumentasi dan Informasi					Berkala Ilmu Perpustakaan dan Informasi							Jurnal Kajian Informasi & Perpustakaan				Khazanah al-Hikmah: Jurnal Ilmu Perpustakaan, Informasi dan Kearsipan									Σ
Σ Authors	2	3	4	5	6	2	3	4	6	7	9	11	2	3	4	2	3	4	5	6	8	9				
2013	2	1						1					1	11												16
2014	2	2												14												18
2015	3	3											4	6	2		3	1				1				23
2016	2	2	1			7	2						1	15	1		1	2								34
2017	3	2				6		1				1	4	9			5	4								35
2018	4	2	2	3		6	9				1		3	3			5	2	1		1		1			43
2019	8	4	2	1		7	6	1		1			3	9			7	2	2							53
2020	9	7	2	2	1	5	4	3	1	1			6	4			6	11	1	2						65
Total	33	23	7	6	1	31	22	5	1	2	1	1	22	71	3	27	22	4	2	1	1	1				287
%	11%	8%	2%	2%	0%	11%	8%	2%	0%	1%	0%	0%	8%	25%	1%	9%	8%	1%	1%	0%	0%	0%				100%

Figure 5. Distribution of the number of authors in a collaboration

Author Collaboration Network

Figure 6 shows a collaboration map from the cumulative measurement of four library and information science journals SINTA 2. There are 500 names of authors who have collaborated. The collaboration formed 98 clusters; 3 of them are connected. The red cluster is a network of researchers from Universitas Padjadjaran and other institutions collaborating with this University. The collaboration of these authors forms the most extensive network.

On the other hand, the Universitas Padjadjaran's research network is related to the blue cluster. This connection occurred when Yusup, Setianti, Auliato collaborated on the topic of ISSN in 2017. The blue cluster is a network of researchers from the Pusat Data dan Dokumentasi Ilmiah-Lembaga Ilmu Pengetahuan Indonesia (PDII-LIPI). On the other hand, the blue cluster is related to the green cluster. This connection occurred when Yaniasih, Tupan, Yoganingrum, and Rachmawati collaborated on library performance in 2016. The connection was strengthened when Royani, Tupan, Kusumaningrum conducted joint research on bibliometrics in 2019. Several PDII-LIPI researchers collaborated with Universitas Indonesia and Institut Pertanian Bogor authors. That network forms a green cluster.

Author networks are formed mainly because of the similarities in affiliation. However, these networks can form different clusters for two reasons. First, because of the different tendencies of the research subjects. Second, because of differences in faculties or departments within the same institution. On the other hand, two board networks are created from different institutions. Researchers from various scopes of science and different institutions can form a yellow cluster network because they discuss the topic of open access. Then a network of authors from various Malaysian universities formed a light blue cluster that discussed bibliometrics. The difference in the extent of the author network formed in library science research within the scope of the SINTA 2 accreditation journal is influenced by several things. This study identified the causes of these differences consist of differences in the level of collaboration and the number of authors involved.

The authors of Universitas Padjadjaran form the most expansive network because they have a high frequency of collaboration. In addition, collaborations also often occur with three authors at this University. The present research finds that the authors who produce the highest articles act as collaboration centers. These authors link with other authors to form a collaborative network, especially those with the same affiliation. In addition, some of these authors also have the potential to be liaisons to other wider networks.

Affiliate Pattern

Another finding is the relationship pattern between the number of publications (Figure 1), authors (Figure 2), and institutions (Figure 7). Journals with a high number of articles do not necessarily have many authors and institutions. Berkala Ilmu Perpustakaan dan Informasi has the number of articles in the third position but has the highest number of authors and the number of institutions in the second position. This condition identified that although the number of articles was less, the authors' names and contributing institutions were more diverse than in the other three journals. A similar pattern also occurs in BACA: Jurnal Dokumentasi dan Informasi. Although the number of this journal is in the fourth position, the number of authors' names is in the third position, and the number of institutions is in the fourth position.

Khazanah al-Hikmah: Jurnal Ilmu Perpustakaan, Informasi dan Kearsipan has an almost commensurate pattern between the number of articles and authors. The journal has the highest number of articles, the number of authors in the second place, and the number of institutions in the third position. This condition shows that many journal articles are accompanied by various names of authors and participating institutions.

A different pattern occurs in the Jurnal Kajian Informasi & Perpustakaan. The number of articles and institutions in this journal is relatively high, even though the number of authors' names contributes less. This condition because most of the articles were written by the same author. Then, these authors produce a significant number of articles in collaboration with authors affiliated with other institutions.

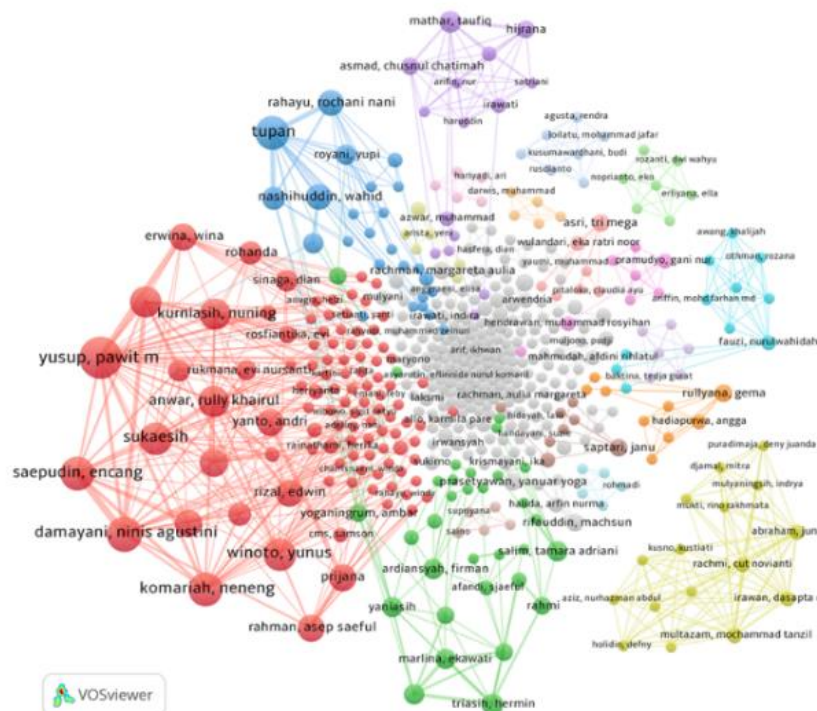


Figure 6. Collaboration Network of Authors within the scope of Library and Information Science Journals SINTA 2

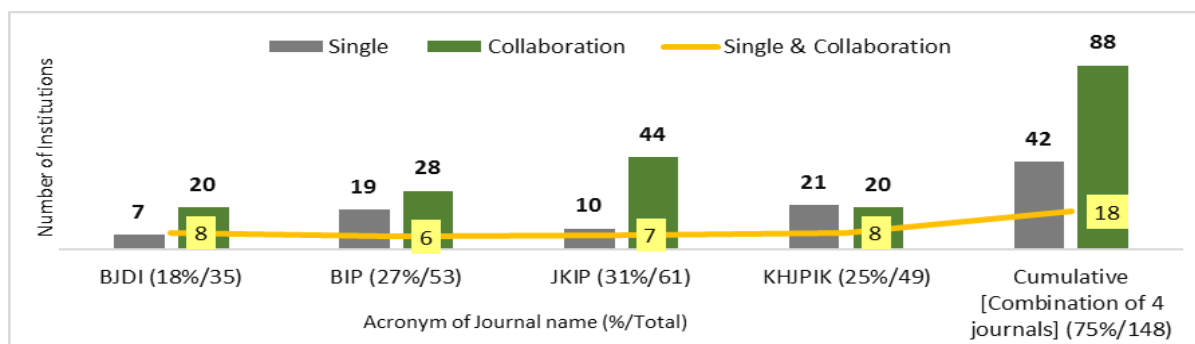


Figure 7. Distribution of Number of Institutions in each journal

Distribution of Institutions by Classification of Non-College and Colleges

Author affiliation is divided into three categories in Figure 8. College consists of libraries, departments, and faculties under the College's auspices. BACA: Jurnal Dokumentasi dan Informasi has a higher percentage of non-college institutions. This difference occurs because this journal is from a non-university compared to the other three. An interesting thing happened in collaboration between non-college and College. Jurnal Kajian Informasi & Perpustakaan is a journal from universities but has more collaborations between non-college and College. This condition occurs because the Universitas Padjadjaran often collaborates with authors affiliated with non-college institutions, especially in 2014. Cumulatively, Colleges produced the highest articles both singly (39%) and collaboratively (34%). Most academics or students currently studying are affiliated with universities, so the chance of research frequency is higher.

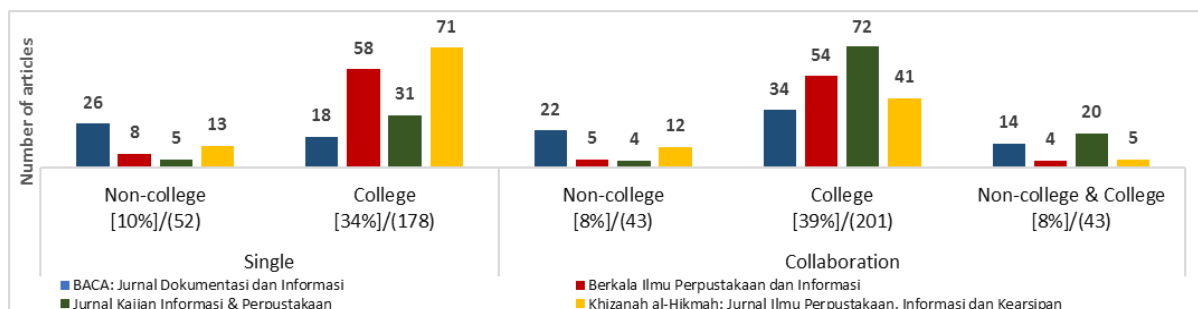


Figure 8. Distribution of Institutions by category of non-college and College

Distribution of Non-College Institutions

Most non-college institutions consist of libraries. An interesting finding is that non-library institutions also contribute to the library and information science journal SINTA 2. These institutions consist of Research Centers (19%), Enterprises (11%), Banks (1%), and Other Institutions (4%). This condition is because the research center is mainly from the LIPI, related to one of the journals affiliated with that institution. On the other hand, Universitas Padjadjaran, which has a library science education base, often collaborates with non-university institutions, especially authors affiliated with Enterprise. Cumulatively, Special Libraries have the highest contribution (46%).

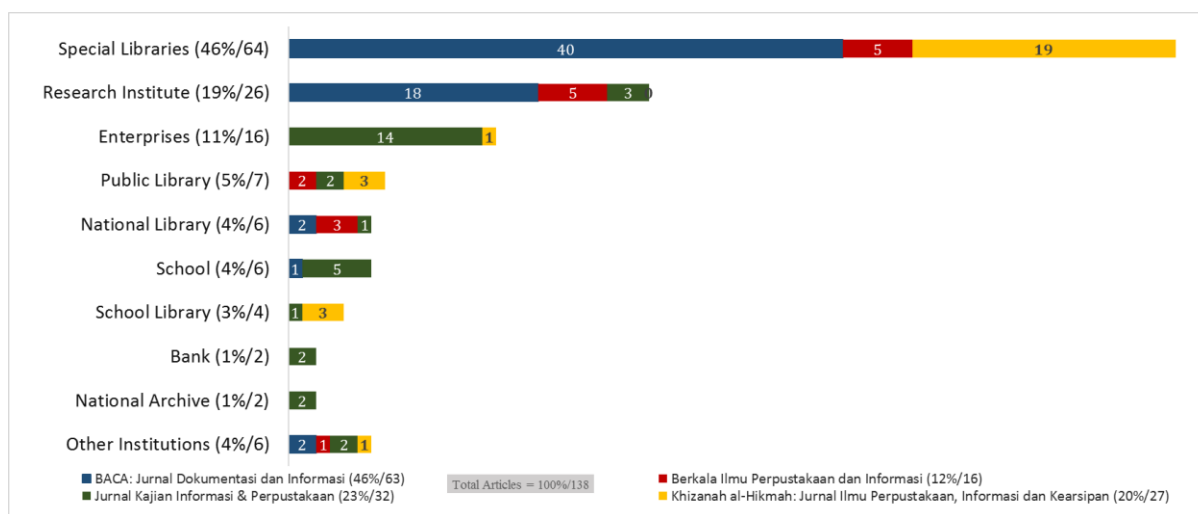


Figure 9. Distribution of Non-College Institutions

Distribution of Colleges by the Coordinator

The Colleges consist of 1) PTN (Perguruan Tinggi Negeri), under government guidance; 2) PTA (Perguruan Tinggi Agama), its functional development is under the Ministry of Religion; 3) PTS (Perguruan Tinggi Swasta), established or organized by the community by forming a legal entity with a non-profit principle and 4) PTK (Perguruan Tinggi Kedinasan), under the guidance of specific ministries, in the present study is the Ministry of Health, and the Ministry of Energy and Mineral Resources. The "from outside Indonesia" category applies to Universities from outside Indonesia.

Figure 10 shows that authors from PTN produced more articles cumulatively. This pattern occurs because library science education and library institutions are mostly within the scope of PTN. The 48 colleges with library science majors are 25 PTN, 16 PTA, and 7 PTS (BANPT, 2019). Thus, most of SINTA 2's LIS research occurs in the scope of PTN and PTA. However,

it is possible that research in Library Science also comes from private universities because PTS has a percentage of 6% single and 3% collaboration. PTK also has a contribution (1%). Thus, LIS research within the scope of SINTA 2 accreditation takes place in various higher education sectors.

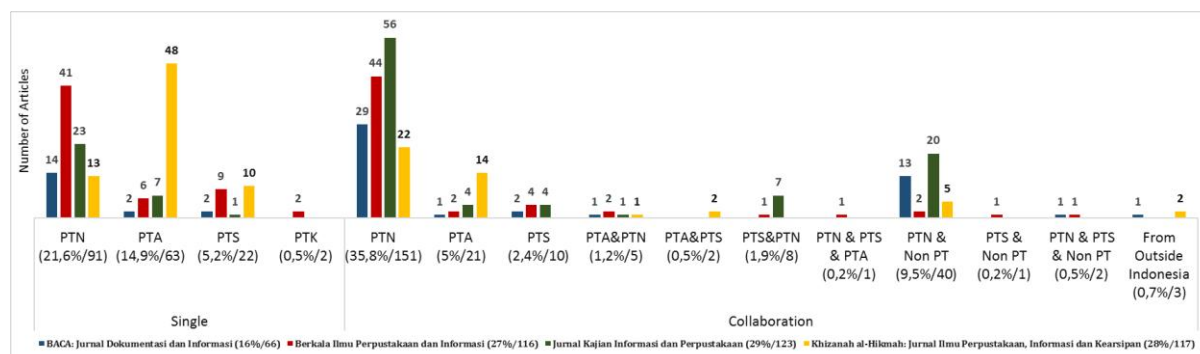


Figure 10. Distribution of College by the coordinator

Distribution of Institutions based on the scope of knowledge

The institutions based on the scope of science consist of 4 groups. First, library and information science consist of a)University libraries, b)Department of library, information, and archives in College, c)Non-college libraries, including national, public, special, and school libraries.

The second is Other Sciences. This research covers (d)the department of economics, agricultural, industrial technology, communication, regional innovation, sociology, statistics, and cultural studies. e)Non-college in non-library science, including the plant research center, PT Chevron Pacific Indonesia, Training Center, the Biological Research Center and the Innovation Research Center. The third is a collaboration between the first and the second group. Fourth is No Description, an institution with general information, such as only the university's name, so that the scope of knowledge is not identified.

Figure 11 shows that 78% of institutions contributing to the four SINTA 2 journals come from library and information science. Meanwhile, non-library science institutions contributed 7%. However, 10% of the institutional scope was not identified. Institutions within the scope of library science have also collaborated with institutions in other fields (5%). The collaboration between the department of library science and the department in other fields contributed 0.6%. This collaboration occurs because the two departments are in the same university. On the other hand, the department library science in university also collaborates with non-university institutions from other fields (4.3%).

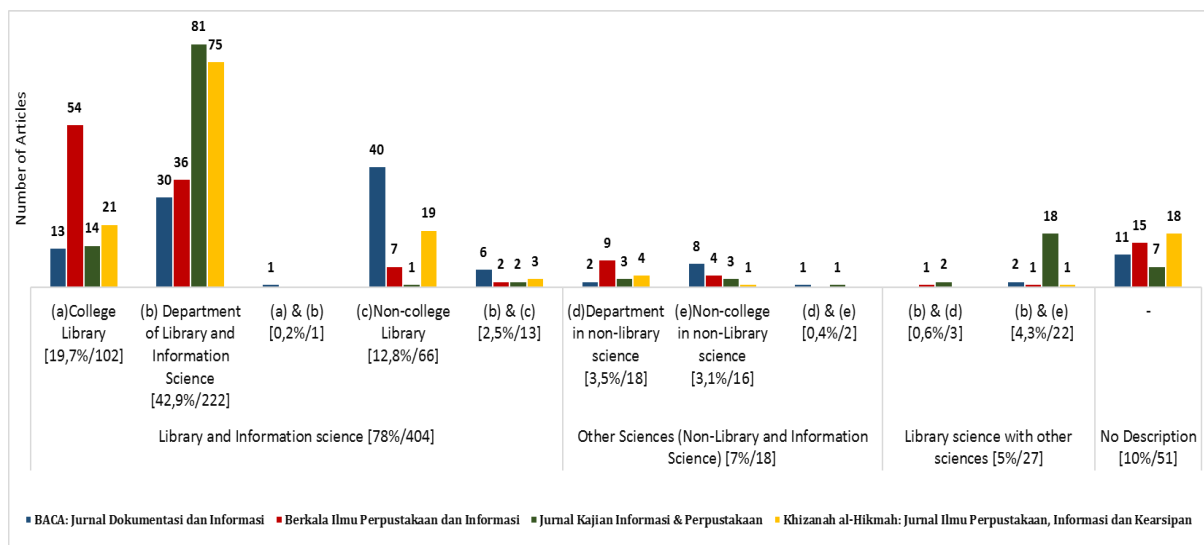


Figure 11. Distribution of institutions by the scope of knowledge

Based on this finding, the department of library science in university has a more significant opportunity to collaborate with institutions in other fields. On the other hand, College libraries and non-college libraries have never collaborated with institutions in other fields. Cumulatively, library and information science institutions have the highest contribution of 78% in the research scope of SINTA 2 library and information science journals.

Distribution of Institutions that produce the highest articles cumulatively

Figure 12 shows nine institutions that produced more than ten articles, 6 of them produced more articles collaboratively. The six institutions are Universitas Padjadjaran, Lembaga Ilmu Pengetahuan Indonesia, Universitas Indonesia, Universitas Diponegoro, Universitas Brawijaya and Institut Pertanian Bogor. This finding indicates that authors from these six institutions often write scientific articles collaboratively.

Different things happened to 3 other institutions consist of Universitas Gadjah Mada, UIN Alauddin Makassar and UIN Sunan Kalijaga Yogyakarta. Cumulatively, these universities produced more articles singly. This finding indicates that most of the authors from these three institutions more often write scientific articles individually.

Universitas Padjadjaran, Universitas Gadjah Mada, Universitas Indonesia, UIN Sunan Kalijaga Yogyakarta, Universitas Diponegoro and Universitas Brawijaya are institutions that produce articles in four journals. This fact identifies that several articles by authors affiliated with the institutions are spread throughout the library and information science journals of SINTA 2. This distribution cannot be separated from the existence of library science study programs at these universities.

The library and information science journals SINTA 2 have a similar pattern regarding the affiliation of the highest article-producing authors. Authors affiliated with the managing institution of each journal have a high contribution role. Saleh & Maulana, (2020) also found that the institution that contributed the most to the Visi Pustaka journal was the same as the managing institution from the National Library of Indonesia.

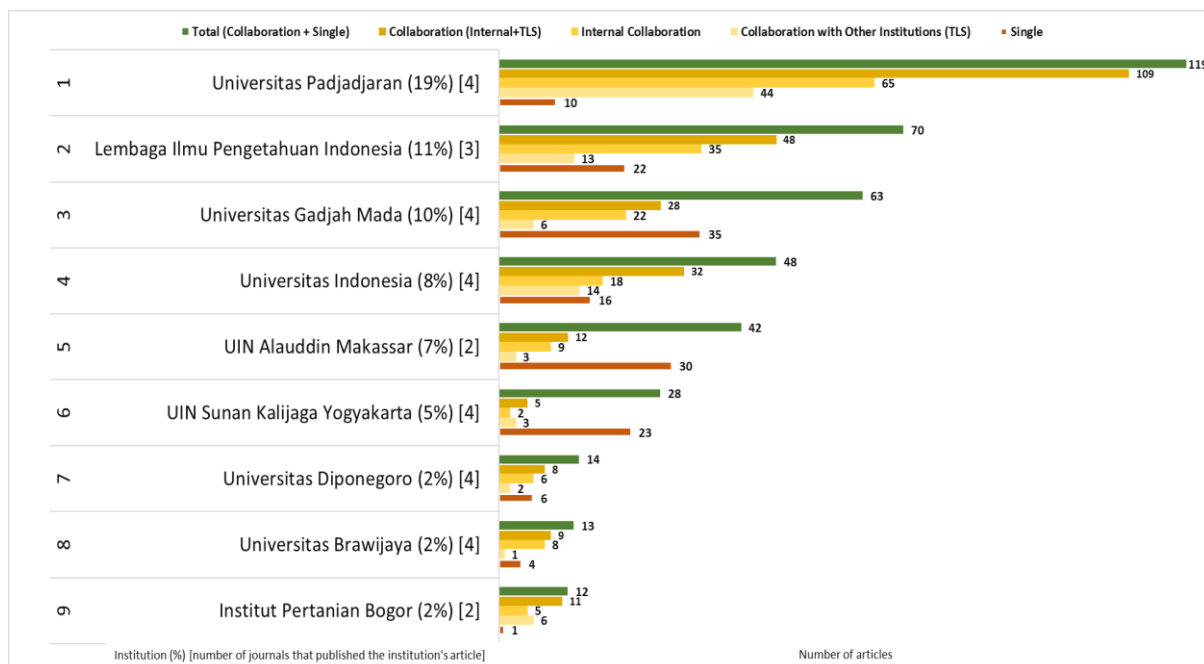


Figure 12. Distribution of Institutions that Produce the Highest Articles

Affiliated Network

Cumulatively, the collaboration of the 105 author's institutions forms 28 clusters based on Figure 13. Collaboration within the Universitas Padjadjaran forms the most expansive network (red cluster). Then this university collaborated with the network of the Lembaga Ilmu Pengetahuan Indonesia and Universitas Indonesia (blue cluster). Furthermore, Universitas Indonesia collaborated with the National Library of Indonesia (Perpustakaan Nasional Republik Indonesia). On the other hand, the National Library of Indonesia collaborates with the Universitas Harapan Nasional Surabaya and Sinergi Visi Utama Yogyakarta. Then the two institutions collaborated with the Universitas Muhammadiyah Yogyakarta. Furthermore, this University collaborated with the Universitas Gadjah Mada network (green cluster).

The collaboration network identifies the potential for several institutions as a liaison for collaboration on a national and international scale. Central collaboration institutions are fundamental partners for training, capacity building and institutional strengthening (Morel et al., 2009). Universitas Padjadjaran, Institut Teknologi Bandung, Lembaga Ilmu Pengetahuan Indonesia, Universitas Indonesia and Institut Pertanian Bogor have opportunities as central for a more comprehensive network. Figures 12 and 13 show that these institutions have higher domestic collaboration than other institutions, especially in the West Java region.

On the other hand, Universitas Gadjah Mada and UIN Sunan Kalijaga Yogyakarta have potential as liaison institutions in the Central Java region. However, the institutions in the two regions are indirectly related. This linkage occurs because the National Library of Indonesia, located in the West Java region, collaborates with the Universitas Muhammadiyah Yogyakarta located in the Central Java region.

However, the link does not extend to universities with library and information science departments in other areas. Universities in other areas that appear in present research are Universitas Brawijaya (East Java) and UIN Alauddin Makassar (Sulawesi). The collaboration network of the two universities is still separate. The Universitas Indonesia has the opportunity

Figure 14 shows countries that contribute collaboratively are Indonesia, Malaysia, Australia and the UK. Indonesia produced the highest collaboration articles (284 titles) with a Total Links Strength of 4. Thus, collaboration among Indonesian countries resulted in 280 article titles. Furthermore, Indonesia collaborates separately with the University of Sidney, the National Library of Australia, the UK's University of Exeter and the Universiti Teknologi Mara Malaysia that are identifies international collaboration.

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Figure 14. State Collaboration Networks within the scope of SINTA accredited library and information science journals SINTA 2

Trends of Collaboration

Cumulatively, the degree of collaboration between library science journals accredited as SINTA 2 is 0.56 in 2013-2020. This value indicates that collaboration authorship is higher than single authorship but with almost the same amount. In Figure 15, the researchers identified the condition's cause by analyzing the degree of collaboration each year. The analysis results found that changes in authorship trends were the cause of almost the same number of conditions. From 2013-2017, the library and information science journals SINTA 2 mostly had a single authorship trend. Then the trend changed to collaborative authorship in 2018-2020. However, the Jurnal Kajian Informasi & Perpustakaan has a different pattern. The value of the collaboration degree of the journal has range from 0.55 to 0.93 since 2013 to 2020. This value indicates that the authors tend to collaborate since the first publication of the Jurnal Kajian Informasi & Perpustakaan.

The point of trend change indicates a different year when using a cumulative calculation. From 2013 to 2015, the cumulative graph is below the balance graph. This finding indicates that the trend is single authorship during that year. Then the trend changed to collaborative authorship in 2016. This cumulative calculation identifies that collaborative research began to spread across four SINTA 2 library and information science journals in 2016. Although collaborative authorship has not dominated most SINTA 2 library science journals, in that year, the level of collaborative authorship was almost the same as that of single authorship.

The change in trend coincided with the determination of SINTA 2 accreditation. However, the

change was not related to the number of authors from journal editors and the accreditation criteria policy. Journals that obtain accreditation have eligibility from aspects of substance, management, periodicity and dissemination (Direktorat Jenderal Penguatan Riset dan Pengembangan-Ristekdikti, 2018, pp. 4–25). There are no special provisions regarding the number of authors involved in one article title. Researchers found that one of the drivers of collaboration, based on some of the information contained in the 2016's article, is the implementation of research grants.

Identifying authorship trends also reveals differences in trends between library and information science research in Indonesia and outside. The trend of collaborative research has occurred in Pakistan and India since 2008 (Haq & Satti, 2019; Karkee & Sinha, 2020; Prieto-Gutiérrez & Segado-Boj, 2019; Saini & Verma, 2018; J. K. Singh, 2020; K. Singh et al., 2021; Srivastava et al., 2021; Ullah & Ameen, 2021; Yadav et al., 2017). The same trend has occurred in Nigeria since 2013 (Amusan & Adeyoyin, 2020). The trend has also occurred in international journals since 2010 (Alagarsamy, 2021; Barik & Jena, 2019; Chander & Prashar, 2019; D. Das, 2021; Haque et al., 2019; Mukherjee, 2010; Onyancha, 2018; Sahoo et al., 2020; Veram et al., 2018; Vinay & B T, 2021). Thus, this study found that Indonesia had a single author trend before 2016. Then after that year, the trend changed to collaboration. On the other hand, the trend of collaborative authorship in library and information science abroad had occurred before 2016.

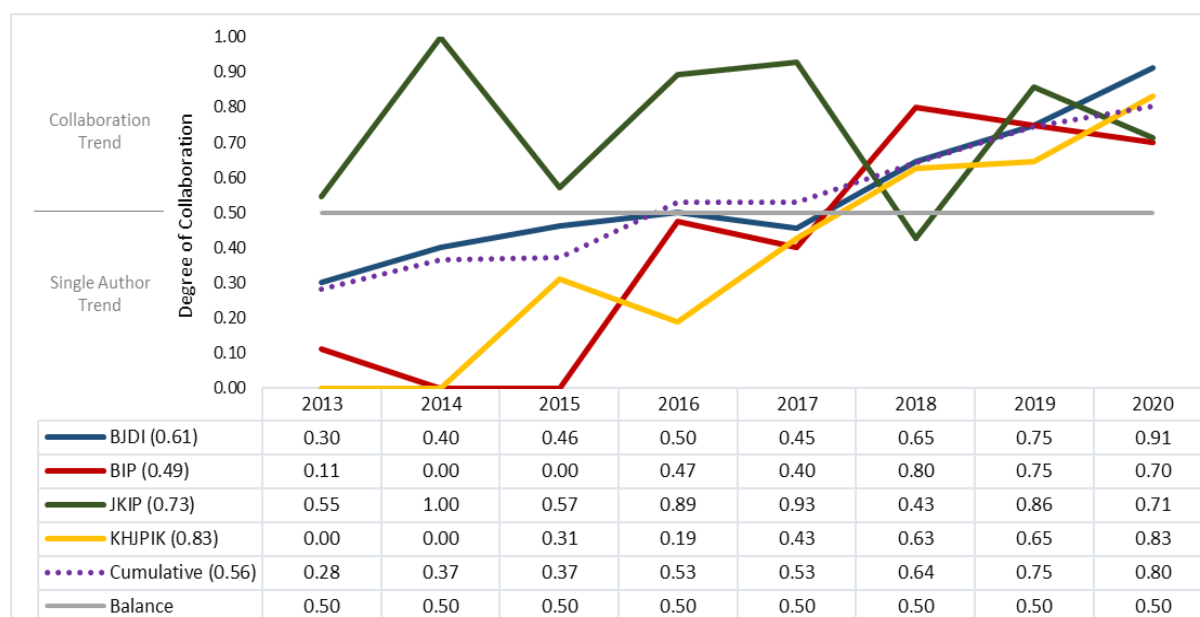


Figure 15. Degrees of Collaboration

Types of Collaboration

Based on the type, research collaboration is divided into three in Figure 16. The international collaboration resulted in 1.39%. The collaboration occurred in BACA: Jurnal Dokumentasi dan Informasi, and Berkala Ilmu Perpustakaan dan Informasi. Research collaboration between countries in SINTA 2 accredited journals is still rare. In comparison, international collaboration opens up opportunities for increasing the diversity of topics, visibility of journals/articles, and obtaining higher citations (Maryono & Surajiman, 2017; Rusdi et al., 2020). On the other hand, the unification of a universal scale of interest is not a simple matter (Himawanto, 2017). So it is necessary to prepare various components and opportunities for collaboration between

Indonesia and other countries.

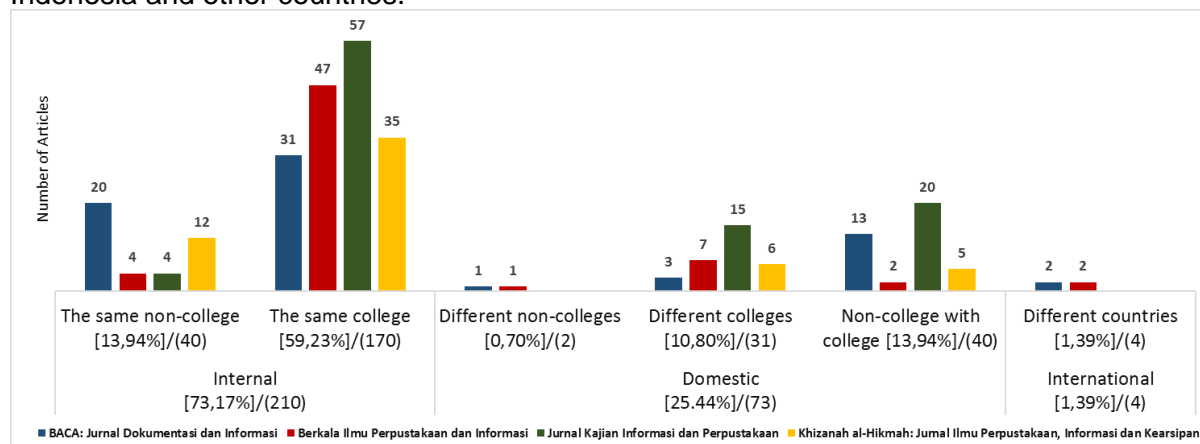


Figure 16. Distribution of Collaboration Types

On the other hand, the lack of collaboration between countries provides space for Indonesian researchers to increase the frequency of publication in the highest accredited library science journals. Domestic collaboration has a percentage of 25.44%. It identified that collaboration between affiliated authors from different institutions occurred but only a quarter of the way. Most of these domestic collaborations occurred when Universitas Padjadjaran researchers collaborated with affiliated researchers in enterprise and non-university institutions. In addition, researchers from the PDII-LIPI have also collaborated with researchers affiliated with universities. Despite these conditions, more than half of Indonesian researchers collaborate internally. As many as 73,17% of collaboration takes place between researchers from the same institution. Thus, research collaboration in Library and Information Sciences SINTA 2 mostly occurs internally.

Internal collaboration also occurs in some libraries and information science research outside Indonesia. Research in the sub-Saharan African region indexed by the Web of Science is more often carried out collaboratively within the same institution(Onyancha, 2018). Internal collaboration also dominates research in ASIA countries on the Web of knowledge(Mukherjee, 2010) and international(Prieto-Gutiérrez & Segado-Boj, 2019).

CONCLUSION

Stability and increase in the number of article publications began in 2017. This condition coincided with establishing SINTA 2 accreditation for the four journals in 2018-2019. Collaboration influences authors to produce more articles. Most authors who produce articles with more than one title write collaboratively and have high academic positions. In addition, authors who produce articles with more than ten titles cumulatively have published different articles in all library and information science journals accredited by SINTA 2. The author's collaboration network is mostly connected because of the similarities of the author's institutions. The network may form different clusters due to the tendency of the research subjects and differences in departments or faculties.

PTN produces the higher articles. This condition is because library science education in Indonesia is mostly at state universities. More than half of the institutions come from the scope of the library, information, and archives science. Producers of most articles in each journal are researchers affiliated with the journal managing institution itself. Universitas Padjadjaran,

Institut Teknologi Bandung, Lembaga Ilmu Pengetahuan Indonesia, Universitas Indonesia and Institut Pertanian Bogor have opportunities as liaisons for a wider network. In addition to having a high frequency of internal collaboration, these institutions have higher domestic collaborations than other institutions. Then Universitas Indonesia also has the potential to increase international collaboration because it has written with Australia and Malaysia.

SINTA 2 Library and Information Science journals have a trend of collaboration, but the number of single authors is almost equal. Changes in trends that coincided with the establishment of SINTA 2 accreditation in 2018 were one of the causes of this condition. On the other hand, increasing collaboration does not go hand in hand with collaboration between different institutions. Most collaborations take place within the same institution.

Based on the findings of this study, collaboration can be considered in research development policies because it increases the frequency of research and expands networks. The researchers, through data cleaning, still found some inconsistency in the writing of the author's names and affiliations. This condition can be an evaluation for authors and journal editors to improve the consistency of the inclusion of article bibliographic data to increase the accuracy of the measurement. The inclusion of the profession of each author is still minimal. Of the 517 titles, only 152 articles (29%) describe the author's profession. This limitation causes an analysis of the collaboration pattern based on the author's profession that has not been carried out. Researchers have searched through the SINTA and PDDikti databases, but most authors have not been found. Thus further research on authorship by profession is highly recommended.

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