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## Open Access Journals in the Member States of the Association of Southeast Asian Nations

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### Abstract

This study portrays the status of Open Access Journals in the ten countries joining the Association of Southeast Asian Nations. Integrating the data from the ASEAN Citation Index, Directory of Open Access Journals, and Scopus, each captured from wider to narrower angles, this work could take a better full-length portrait of such journals including some relevant information in the region. In the first index, the nine countries registered 587 journals, over 50% not listed in the second index. In the second index, the six member states published 1,623 journals of which 39% adopted Creative Common BY. For about two decades they have shown publication and registration growth rates over double than the world has. Indonesia could dominate in all but the third index. In Scopus, the journals in the region averaged below the global averages of all bibliometric indicators but Scholarly Output. Despite this, three countries were above the global average in eight indicators. Over 40% of the 98 journals were ranked in Quartile 2. Such a marked contrast between the number of journals indexed in the second index and that in the third one could lead to the better intra- and inter- collaborations to give the scientific productivity higher visibility and impact.

**Keywords:** Open Access Journals, ASEAN, Citation Index, DOAJ, Scopus

### Introduction

Open Access Journals (OAJs) are a dream come true. With Open Access Repositories, another child of Open Access movement, they were born to the marriage of researchers' dissatisfaction with limited (more precisely pay walled) access to and share of scientific articles, the advancement of digital technologies along with the fierce global competition in the science publication (Costa & Leite, 2016). Conceived through the three initiatives in the early third millennium, i.e., the Budapest Open Access Initiative, Bethesda Statement on Open Access Publishing, and Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (Masten & Ashcraft, 2017), OAJ share the clear manifestation of freedom to read,

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use, and reuse quality scientific work as voiced by The International Council for Science (Sub-Group of the ICSU Executive Board, 2014). The freedom as “the basic ethos of science” and the explicit along within here benefits enjoyed by many parties from research funding bodies to the general public have been driving OAJs “almost inevitable” in the arena of scientific publishing (Björk, 2017, p. 252). Especially in developing countries, the dream of more independence from international journals with high rejection rates, less (English) language and quality barriers in scientific publishing, and greater scientific output could also be fulfilled by publishing more OAJs (Meneghini, 2012).

A dream come true could gain ground, especially in researchers, because of such licensing agreements as the Creative Commons (CC) licenses. As much simpler and more practical “standardized legal instruments”, CC licenses open “the circulation and access to intellectual works both on and off the Internet” as widely as possible for prospective users (Branco & Britto, 2014, p. 14). The licenses thus close all or some of the exclusive rights under copyright to the publishers. Otherwise, as the copyright owners, some publishers bar neither prospective readers with no subscription access from accessing the articles nor the authors from disseminating their own articles (Margoni & Peters, 2016). These could reduce the scientific outputs’ possible readership and recognition. The CC licenses grant the authors the copyrights of their articles ranging from CC BY, the least restrictive one allowing anyone to do almost anything with the articles as far as the credit properly given, to CC BY-NC-ND, the least permissive one that lets others download, read, and share the articles with proper attribution but not for commercial and derivative use (Kreutzer, 2014). All of the six license types have energized OAJs since its conception (Ghane & Niazmand, 2016). It is then unlikely that OAJs could be examined with no attention to the CC licenses.

Empowered by a free open source software application, Open Journal Systems (<https://pkp.sfu.ca/ojs/>), not surprisingly, OAJs have blossomed. Martin (2020, p. 4) noted “... publishing houses appearing almost overnight and spawning hundreds of new journals within a very short space of time”. Studying the development of OAJs, Laakso Welling, Bukvova, Nyman, Björk & Hedlund (2011) saw that OAJs increased from 2 in 1993 to 4,767 in 2009. The data sheet they provided shows that from the pioneering to consolidation eras, OAJs grew aggressively over 23000% with an average annual and compound growth rates of more than 40%, respectively. OAJs have bloomed recently in not only such developed countries in Group of Seven as United States, Canada, and the United Kingdom (Kamble, Patil, & Kumbar, 2018) but also such developing ones in Developing 8 or D-8 Organizations for Economic Cooperation as Egypt, Indonesia, and Iran (Ghane & Niazmand, 2016). Interestingly, even such Higher Education Institutions in D-8 countries as two Iranian universities published more than 50 OAJs respectively (Habibzadeh, 2019). In Indonesia, OAJs increased significantly by 50% in three years only, i.e. from about 8,000 in the first quarter of 2017 to about 15,000 in the first one of 2020 (Indonesia Institute of Sciences, 2020), approximately a 50 percent increase in three years only. Such a huge growth in the quantity of OAJs, however, has raised considerable concern about their quality. For instance, Jue (2018), the then associate editor of a South Korean molecular medicine journal, was questioned by his colleague about his journal quality, “Don’t they just publish papers used to satisfy the degree requirements of graduate students and for the promotion dossiers and research grant applications of professors?” (p. 70). Habibzadeh (2019, pp. 1–2) replied to the awkward question, “... merely published for enjoying the prestige and bringing promotion credit for the institution and the faculty members”.

The quality issue of OAJ has led researchers such as Erfanmanesh (2017) and AlRyalat et al. (2019) to compare OAJ and non-OAJ indexed in the Scopus database. Whereas in the former study, OAJ were lower than non-OAJ in both quantity and quality, i.e., 17% and statistically significant less citation metrics, i.e., citedness rate, CiteScore, Source Normalized Impact per Paper (SNIP), and SCImago Journal Rank (SJR), in the latter one, OAJ were higher than non-OAJ in the first three metrics but lower in the number of articles published by the journals in three years before the metric. Such inconclusive evidence for the quality of OAJ has made the relevant indexing services, either calculating impact factors such as Scopus or not such as Directory of Open Access Journals/DOAJ (Astaneh & Masoumi, 2017), almost inevitable when addressing the quality of OAJ. Erfanmanesh, Tahira, and Abrizah (2017) concluded that the number of journals indexed in one or more citation databases could tell the scientific performance of a certain country. The journal indicators such as the subscription-based Journal Impact Factor (JIF) by Clarivate Analytics and the free CiteScore are usually based on the frequency of citations received by an article published in a single journal. They could be used to assess the presence of OAJ.

As previously stated, in recent years, OAJ have been on the increase globally, including in Southeast Asia where ten out of eleven countries in the region, i.e., Brunei Darussalam, Cambodia, Myanmar, Indonesia, Lao People's Democratic Republic, Malaysia, Philippines, Singapore, Thailand, and Viet Nam, joined the Association of Southeast Asian Nations (ASEAN). With a population of over 650 million people in an area of 4,5 million square kilometers and the regional Gross Domestic Product reaching nearly US\$3 trillion, taken as group, the ASEAN member states have become one of the global powerhouses, e.g. the world sixth-largest economy in 2016 (ASEAN Secretariat, 2018). With the averagely nearly US\$95 billion for educational expenditure and about 12 million students in approximately 7 thousand Higher Education Institutions (Share Eu Asean, 2019), could ASEAN also be a powerhouse in the scientific publication?

Some findings have highlighted considerable progress on the scientific productivity in the region. From 3,465 in 2000 to 6,813 publications in 2008, the ten counties demonstrated an increase of nearly 100 % (Peña, 2012). Besides, the last two decades have seen a huge growth of 600% in Scopus-indexed publication by the ASEAN member states, i.e., from over 6 thousand to more than 250 thousand articles, but much slower growth of around 100% and 300% in the world and Asia (Sombatsompop, 2014). All member states also constantly strive to improve academic performance and research productivity in the global area of higher education, for example by mandating an article published in a science journal as a requirement for the undergraduate and graduate final examinations in Indonesia (Wiryanan, 2014). In this view, ASEAN countries collectively could emerge as one of the scientific publishing empires in the world.

Previous studies, however, have tended to deal with the status of OAJ in only one of the ASEAN member states. As a matter of fact, in the academic publishing arena, those countries have a lot in common. In two studies (Tecson-Mendoza, 2015; Wiryanan, 2014), for example, besides emphasizing many efforts into meeting international standards of scholarly periodicals, both of the Filipino and Indonesian called for each government to support the improvement of scientific journal quality by providing managerial, editorial, and financial aids. As OAJ in the two countries, Malaysian OAJ also faced the problem of low visibility (Koleini, Parto, Arastoopoor, & Siamak, 2013). Besides, in 2013 the ASEAN Citation Index (ACI) was

established to improve the quality of academic journals, which in turn could give the ASEAN scientific productivity higher visibility (ACI Secretariat, 2019). Further work is needed to establish whether the index provides information on the Open Access status of a certain journal.

Previous work has failed to address the presence of OAJs in the ASEAN member states. Janairo and Janairo (2018), for example, addressed how the existence of journals published by the ASEAN member states was scarcely studied. However, the two Filipinos just assessed and ranked ASEAN journals based on the journal metrics of Scopus. Degelsegger-Márquez & Remøe's (2019) analyzed the role of the ASEAN level for science, technology and innovation. The blossoming OAJs in the ASEAN member states, nevertheless, did not draw the Austrian and Norwegian's attention. Despite the shared problems and spirit, there has been little discussion on the performance of ASEAN-published journals in the global learned publication. Therefore, OAJs by the ASEAN member states as a whole should receive considerable attention.

As was mentioned, very little is known about the comprehensive picture of scholarly journals in ASEAN. Moreover, much less is on the OAJs, CC licenses used, and assessment of their presence. To fill in the lacuna, conceptually replicated from Ghane and Niazmand (2016), this paper, therefore, aims to shine a light on the OAJs publishing scene in the ASEAN countries. Simply put, this work provides an overview of OAJs in the ten countries.

### Research questions

The exponential expansion of OAJs in the ASEAN member states, the varied types of CC licenses, presence of the journals in ACI, DOAJ, and Scopus, along with the performance of the journals in Scopus have raised the following questions:

1. What are the leading ASEAN member states publishing OAJs?
2. How are the annual and compound annual growth rates of OAJs in the ASEAN member states related to the years of OAJs publication and DOAJ registration?
3. What is the most frequently used type of CC licenses granted by OAJs of the ASEAN member states in DOAJ?
4. How well is the performance of OAJs by the ASEAN member states based on the eight journal indicators in Scopus?

The Method section will discuss how to answer the questions.

### Methodology

Through the viewfinder outlined in the Introduction, this study captured the data from three sources, i.e. ACI (<https://www.asean-cites.org/>), DOAJ (<https://doaj.org/>), and Scopus (<https://www.scopus.com/>). All of the data were downloaded on June 25, 2019. By running Microsoft Excel 2016 (<http://office.microsoft.com/excel>), the descriptive statistics and figures were prepared following Salkind (2017).

The first set of data was about the journals indexed in ACI per April 2019. All of the journals have fulfilled such requirements for the ACI inclusion as being peer-reviewed and published for at least 3 years in one of the ten ASEAN member states (Thai-Journal Citation Index Centre, 2018).

The next one consisted of the journals recorded in DOAJ on June 22, 2019. They also have met the DOAJ inclusion requirements ranging from the coverage to Open Access statement (DOAJ, 2019). Downloaded from one of the largest abstract and citation databases in academic

periodicals, the third set of data was composed of journals indexed in Scopus per April 2019 and CiteScore metrics 2011-2018.

To better portray the status of OAJ published by ASEAN, it began by viewing them from ACI, the official journal indexing database for the ASEAN member countries. After focusing on the global and regional share of OAJ published by ASEAN countries, this study spotted the global and regional growth rates of OAJ publication, registration, and the type of CC licenses in DOAJ. Of the last set of data, eight bibliometric indicators of CiteScore were used to capture the journal quality. The indicators were Citescore, Percentile, Citation Count, Scholarly Output, % Cited, SNIP, SCImago Journal Rank (SJR), and Quartile. Through the three sets of data, this study could take a better full-length portrait of OAJ in the region including some relevant information.

## Results

In each journal index, to better portray the OAJ in ASEAN countries, the portrait was taken from broader to narrower angles. The presentation is given mostly by following Ghane and Niazmand (2016).

### ASEAN Citation Index

The figure 1 proves that Indonesia topped the ACI list with over one-third of the 587 science journals,  $M = 58.7$ ,  $SD = 82.57$ . Between Indonesia and Thailand, the second most productive publishing member state, there was a difference of 16 journals only. The number of journals published in the top two countries constituted nearly 70% of the total journals in ACI. Besides, Malaysia is one of the top three member states whose number of journals reached over 100 journals. Therefore, the top 3 publishing countries in ASEAN published nearly 90% of the scientific journals in the regional index. Note that Lao People's Democratic Republic did not register a single journal and neither did the index provide information on the Open Access status for the indexed journals.

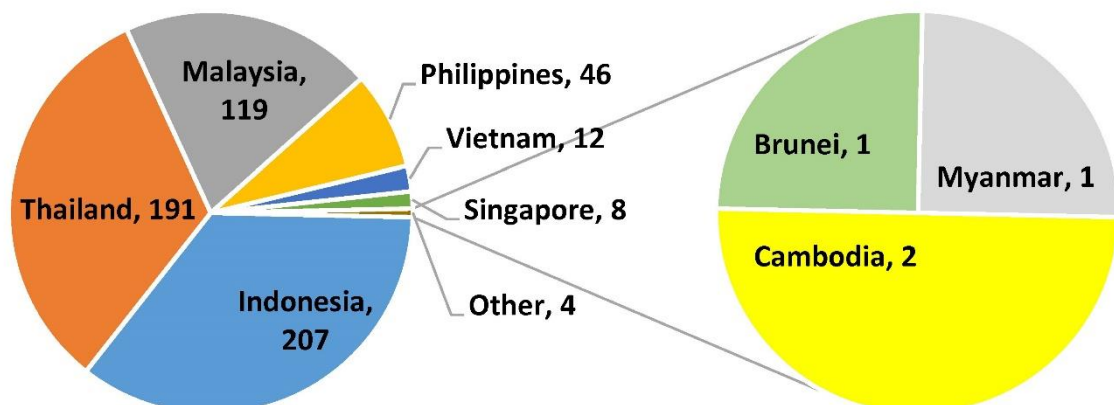


Figure 1. The share of the ASEAN member states in ACI

### Directory of Open Access Journals

Since 2002 a total of 13,406 journals by 124 countries,  $M = 108.11$ ,  $SD = 255.4$ , has been added in DOAJ. With over 1,500 journals, United Kingdom topped the list of publishing

countries. Interestingly, Indonesia ranked second with a difference of just around 50 titles, ahead of Brazil with less than 1,400 ones. When the journals from the top three were taken together, they totaled about one-third of those indexed in DOAJ. No more countries registered over one thousand journals.

As shown in Figure 2, 1,623 journals published by the six member states,  $M = 270.5$ ,  $SD = 602.3$ , constituted over 12% of the journals in DOAJ. As one of the biggest OAJ publishing countries, Indonesia certainly appears in the top quartile. Whereas the second quartile includes Malaysia and Thailand, the third one does Singapore and the Philippines. With only one journal, Viet Nam is within the last quartile. The domination of Indonesia is thus undisputed since the total number of Indonesian science journals in DOAJ was over eightfold higher than the overall OAJs by the rest of member states. Figure 2 also indicates that no journals were registered from Brunei, Cambodia, Lao People's Democratic Republic, and Myanmar.

Before DOAJ was established in 2003, between 1874 and 1999 there had been 1,141 OAJs published in 74 countries,  $M = 16.11$ ,  $SD = 29.80$ , constituting nearly 9% of today's DOAJ indexed journals. A science journal published by Hindawi Ltd. (United Kingdom), *Psyche: A Journal of Entomology*, has provided free-to-read articles since 1874. As pinpointed in Figure 3, since 2000 the journals giving free-to-read articles have increased from around one thousand to 13 thousand titles, with an average or a compound annual growth rate of 13%.

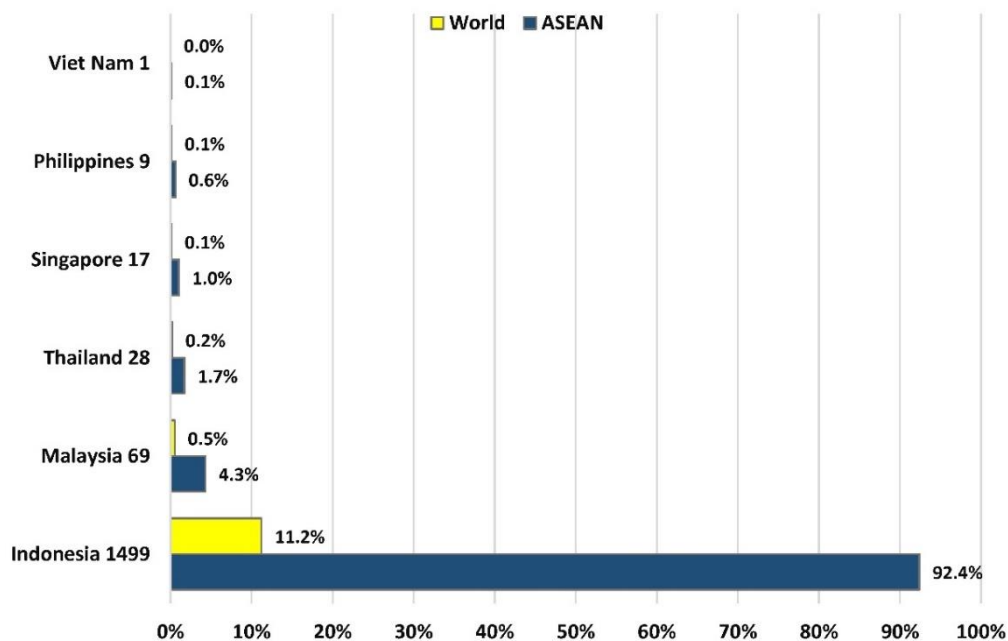


Figure 2. The global and regional share of OAJs in ASEAN

In Southeast Asia, the *Journal of Associated Medical Sciences* by Chiang Mai University (Thailand) has provided open access contents since 1968. Between 1968 and 1999, about 49 titles were published in Southeast Asia,  $M = 2.4$ ,  $SD = 2.50$ . An over 3200% growth in making their articles free to read and download has been demonstrated by ASEAN countries, i.e., from about 50 in 1999 to over 1,600 journals in 2019. Such an impressive increase, over tripled than that of the world, could be explained by the average annual and compound annual growth rates of approximately 20% and 30%, respectively. As can be seen in Figure 3, the OAJs publication

reached a peak globally in 2013 with over 1,100 journals and regionally in 2016 with around 240 journals.

From Figure 3, it is also apparent that between 2002 and 2017 the DOAJ registration grew more slowly than the OAJ's publication did in the world and Southeast Asia. That many OAJ's failed to reach the standards set by DOAJ could well be responsible for the gap at the period. Such a gap could also be explained in part by some researchers and journal editors' higher familiarity with Toll Access journals (Ghane & Niazmand, 2016) and the relatively limited acceptance of DOAJ as reputable indexing service. In contrast, the DOAJ registration peaked globally and regionally in 2017. Since then the DOAJ registration has been higher than the OAJ's publication. The world and ASEAN's half of the total DOAJ registrations begun in 2016 and 2017, respectively.

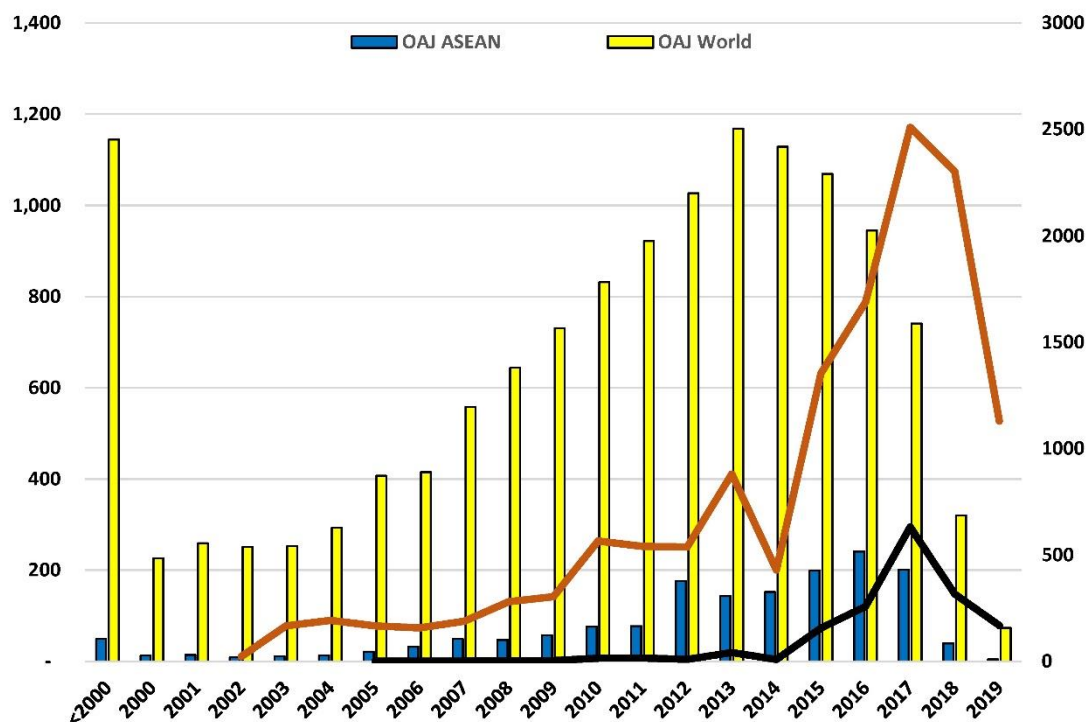


Figure 3. The global and regional share of OAJ's in ASEAN

The BMC Ecology by BMC (United Kingdom) have provided open access contents since 2001. In DOAJ, the journal was the first to register in 2002. In Southeast Asia, a Thai journal, the Songklanakarin Journal of Science and Technology by Prince of Songkla University making its articles open access in 2003, was the first journal included in 2005. Since 2002 the journals added in DOAJ have increased from about 20 to over 13 thousand titles, an increase of over 18 thousand percent with a 75% average annual growth rate or a 45% compound annual growth rate. Interestingly, the growth rate of DOAJ registration followed a similar pattern of that of open access publication. ASEAN based OAJ's registrations in DOAJ also have grown more rapidly than the world's OAJ's, i.e., from one in 2005 to more than 1,600 titles in 2019 with both average and compound annual growth rates of over 70%.

As mentioned previously, a Thai journal has begun the open-access publication in the region since 1968. Curiously, it took around five decades for the journal to get registered in

DOAJ in 2019. Table 1 lists the year of Open Access publication and DOAJ registration in the ASEAN member states. In Thailand both of them began in 1968 and 2005, respectively. Intriguingly, although Indonesian journals' DOAJ registration was some years late compared to Thai, Malaysian, and Philippine journals, Indonesian ones could surpass other member states' journals in just three years.

Table 1

*Years of OAJs publication and DOAJ registration by the ASEAN member states*

Year	Indonesia		Malaysia		Thailand		Singapore		Philippines		Viet Nam	
	OAJs	DOAJ	OAJs	DOAJ	OAJs	DOAJ	OAJs	DOAJ	OAJs	DOAJ	OAJs	DOAJ
<2000	41	-	4	-	2	-	1	-	1	-	-	-
2000	9	-	2	-	-	-	-	-	2	-	-	-
2001	12	-	2	-	-	-	-	-	-	-	-	-
2002	9	-	-	-	-	-	-	-	-	-	-	-
2003	8	-	1	-	2	-	-	-	-	-	-	-
2004	11	-	-	-	1	-	1	-	-	-	-	-
2005	16	-	3	-	1	1	-	-	1	-	-	-
2006	27	-	5	-	-	-	-	-	-	-	-	-
2007	44	-	1	-	4	-	-	-	-	-	-	-
2008	43	-	2	-	1	1	-	-	1	1	-	-
2009	52	2	4	-	-	1	-	-	1	-	-	-
2010	73	6	2	7	1	-	-	1	-	-	-	-
2011	70	8	3	3	1	-	1	-	2	4	-	-
2012	165	5	8	3	3	1	-	-	-	-	-	-
2013	135	33	3	4	2	2	2	1	1	1	-	-
2014	141	8	4	-	5	-	2	-	-	-	-	-
2015	193	148	1	4	3	2	2	1	-	1	-	-
2016	234	241	3	9	1	4	2	3	-	-	1	-
2017	178	613	20	7	1	6	2	4	-	1	-	-
2018	34	278	1	24	-	7	4	5	-	1	-	1
2019	4	157	-	6	-	3	-	2	-	-	-	-

In terms of the legal aspect, one of the sections in the DOAJ application form is related to the article's license. One of six CC licenses or another license type must be chosen or typed by a journal representative. The license types granted by the journals are presented in Figure 4. As predicted, CC BY was globally and regionally chosen by around 40% of the journals whereas CC BY-NC-ND sat in second place globally, i.e., over 20%. On the other hand, CC BY-SA, another version of CC BY with an emphasis on the original license, did regionally, i.e., over 30%. Also, the publisher's license was chosen over 3% globally but less than 1% regionally. Only one journal used the public domain license allowing anyone to use anything as freely as possible under copyright law. Of interest, although the option of publication licenses in the DOAJ registration form was required, some journals could provide no chosen license type but still be registered.



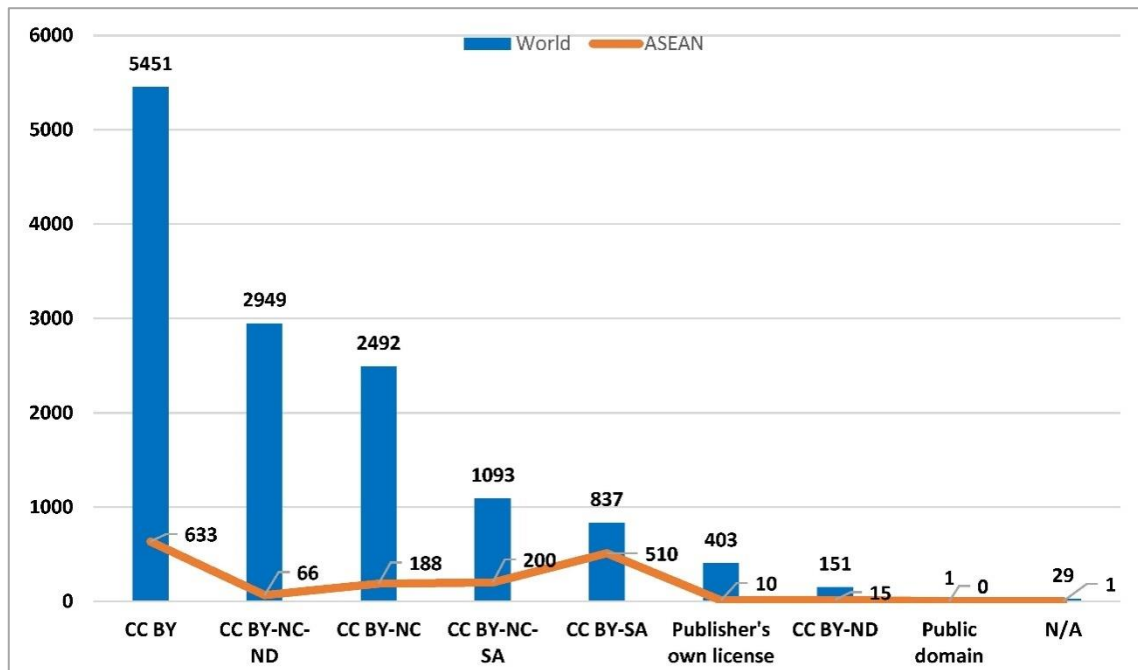


Figure 4. CC licenses adopted by the world and ASEAN

Table 2 shows the adoption of the CC license types in each member states. Over 50% of Malaysian and Singaporean, over 30% of the Philippine and Indonesian, and about 18% of Thai journals granted CC BY. Over 30% of Indonesian journals used CC BY-SA, making it the second most frequently used type. CC BY-NC-SA, which emphasizes noncommercial use and original license, and CC BY-NC, which underlines noncommercial use only, were each used by about 12% of Indonesian journals. Furthermore, less than 5% of the journals chose CC BY-NC-ND. A maximum of 1% of the journals, however, used CC BY-ND and Publisher’s license. An Indonesian journal providing no license type could surprisingly be listed in DOAJ.

Table 2  
CC license types adopted by OAJsin ASEAN

License	Indonesia	Malaysia	Philippines	Singapore	Thailand	Viet Nam
CC BY	575	41	3	9	5	N/A
CC BY-SA	508	N/A	N/A	1	1	N/A
CC BY-NC-SA	193	4	1	N/A	2	N/A
CC BY-NC	168	11	1	4	4	N/A
CC BY-NC-ND	41	7	N/A	3	14	1
CC BY-ND	12	1	1	N/A	1	N/A
Publisher’s license	1	5	3	N/A	1	N/A
N/A	1	N/A	N/A	N/A	N/A	N/A

N/A: Not Applicable

**Scopus**

In April 2019 Scopus indexed 23,452 active journals published by 109 countries,  $M = 213.24$ ,  $SD = 793.88$ . The United States and the United Kingdom published over 5 thousand journal search constituting half of them. After Netherlands with over 2 thousand journals and Germany with about 1,500 ones, no more countries published more than one thousand journals

indexed in Scopus.

On the other hand, the six countries could list 332 journals,  $M = 47.43$ ,  $SD = 47.01$ , constituting less than 7% of the Scopus indexed journals. As detailed in Table 3, Indonesia, ranked first among the ASEAN member states in the previous indexes, fell behind Singapore and Malaysia, but ahead of Thailand and the Philippines. Brunei Darussalam and Viet Nam each registered only one journal but Cambodia, Myanmar, and Lao did not at all.

Table 3

*ASEAN based journals in Scopus and OAJ metrics*

Country	OAJs		Cite-Score	Per-centile	Citation Count	Scholarly Output	% Cited	SNIP	SJR
	No	Yes							
The world	18,447	5,005	1.47	46.24	632.72	251.19	45.64	0.76	0.58
Brunei	0	1	0.02	6.00	3.00	158.00	1.00	0.01	0.10
Indonesia	15	32	0.69	40.90	176.38	193.46	37.91	0.80	0.20
Malaysia	60	36	0.64	40.08	85.07	159.46	32.48	0.55	0.21
Philippines	34	8	0.29	40.17	28.33	67.83	14.83	0.06	0.21
Singapore	17	4	1.37	53.46	169.27	131.57	50.92	0.64	0.41
Thailand	107	17	0.75	31.08	1373.69	989.46	37.08	0.40	0.29
Viet Nam	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A: Not Applicable									

Importantly, Scopus has paid considerable attention to OAJs by providing clear information whether a certain journal belongs to OAJs, i.e., indexed in DOAJ or Directory of Open Access Scholarly Resources. Table 3 highlights the active OAJs indexed in Scopus per March 2009 was only about one-fifth of the total journals in Scopus. In the database, the United Kingdom, with almost 13% of the total OAJs, ranked first, followed by the United States with less than 10%. Also, Brazilian and Spanish journals each constituted over 6% of the OAJs, followed by Germany with nearly 5%.

Similarly, only 98 journals by the six ASEAN countries belonged to OAJs,  $M = 57.40$ ,  $SD = 102.39$ . Their share was then approximately 2%. Table 3 shows the largest discrepancy could be found in Singapore having one of the least ratios between its OAJs and total journals, i.e., 17:124. The only Vietnamese journal did not belong to OAJs. Furthermore, Thai and Philippine had the same ratio, i.e., 4:21. Surprisingly, the only Bruneian journal not indexed in DOAJ registered in the Directory of Open Access Scholarly Resources. The directory provided by ISSN International Center indexes not only OAJs but also monographic series, conference proceedings and academic repositories (ISSN, 2019).

Table 3 is also revealing in several ways. Firstly, out of seven journal indicators, OAJs published in the six ASEAN member states had a higher average score in Scholarly Output only than the world's OAJs did. It indicates that between 2015 and 2017, OAJs by ASEAN member states were more productive in publishing articles than the world. Publishing about 890 documents, the 17 Thai OAJs were much more productive than the average Scopus-indexed OAJs were regionally and globally. The mean of contents published in OAJs by each country was below the regional average Scholarly Output. Although the Philippines registered 8 OAJs in Scopus, as compared in Table 3, they published fewer documents than the only Bruneian and 4 Singaporean OAJs. Such a pattern could also be seen between Indonesian and Malaysian OAJs.

Secondly, among the ASEAN countries the 4 Singaporean OAJs averaged the highest in four indicators, i.e., CiteScore, Percentile, % Cited, and SJR. Besides, their mean Percentile and % Cited were higher than those gained by OAJs in the world. Not only regionally but also globally they stood relatively better in their subject fields and had a better proportion of the articles in their OAJs between 2015 and 2017 with a minimum of one citation in 2018.

As with Citation Count and Scholarly Output, the 17 Thai OAJs achieved better than the regional and global OAJs. The citations received in 2018 for the articles published between 2015 and 2017 in the Thai OAJs were greater than those in the average OAJs. In the second indicator, the 17 Thai OAJs published about 990 documents at the same time, higher than the average number of documents in the regional and global OAJs.

Regarding the average citation impact of the OAJs publications, with less OAJs than Malaysia, lower average CiteScore, Percentile, % Cited, and SJR than Singapore, along with less mean Citation Count and Scholarly Output than Thailand, Indonesia had the highest average SNIP in ASEAN and a better one than the world. As the most productive publishing country of Scopus indexed OAJs in ASEAN, Malaysia also achieved better average SNIP than the world. The Singaporean OAJs could draw level the world in terms of the number of citations to their journals' articles between 2015 and 2017 divided by the total number of its articles at the same time (Moed, 2017). The mean SNIP by the other three member countries ranged from 0.01 to 0.4.

In this study, SJR calculated the citations gained in 2018 by the articles published three years before and the prestige or standing of the citing journals whose prestige was based on the citations received by the journals (SCImago, n.d.). Table 3 shows the 4 Singaporean OAJs had the highest average SJR in the region. The rest of state members but Brunei Darussalam averaged between 0.20 and 0.29.

Concerning the last bibliometric indicator in CiteScore, nearly 30% of the active OAJs indexed in Scopus positioned in Quartile 3, i.e., in the 49th – 25th CiteScore Percentile. Over 26% and around 25% of them were seated in Quartile 2 and Quartile 1, respectively. Only about 19% of them belonged to the last quartile. From this perspective, these data may mean that in general the OAJs have gained a good position in one of the major abstract and citation databases, Scopus.

On the other hand, over 40% of OAJs published by the six ASEAN countries were in Quartile 2. Nearly 33% and 14% of them sat in Quartile 3 and 4. Around 12% of them joined the 99th – 75th CiteScore Percentile, the first quartile. As illustrated in Figure 5, one Malaysian and one Philippine OAJs could not qualify for any quartile since they have just started their coverage since 2018. The figure also indicates the quartile which OAJs published in each member states joined. Seen in this way, the OAJs published in the ASEAN member states had relative standing similar to the world's OAJs did in Scopus.

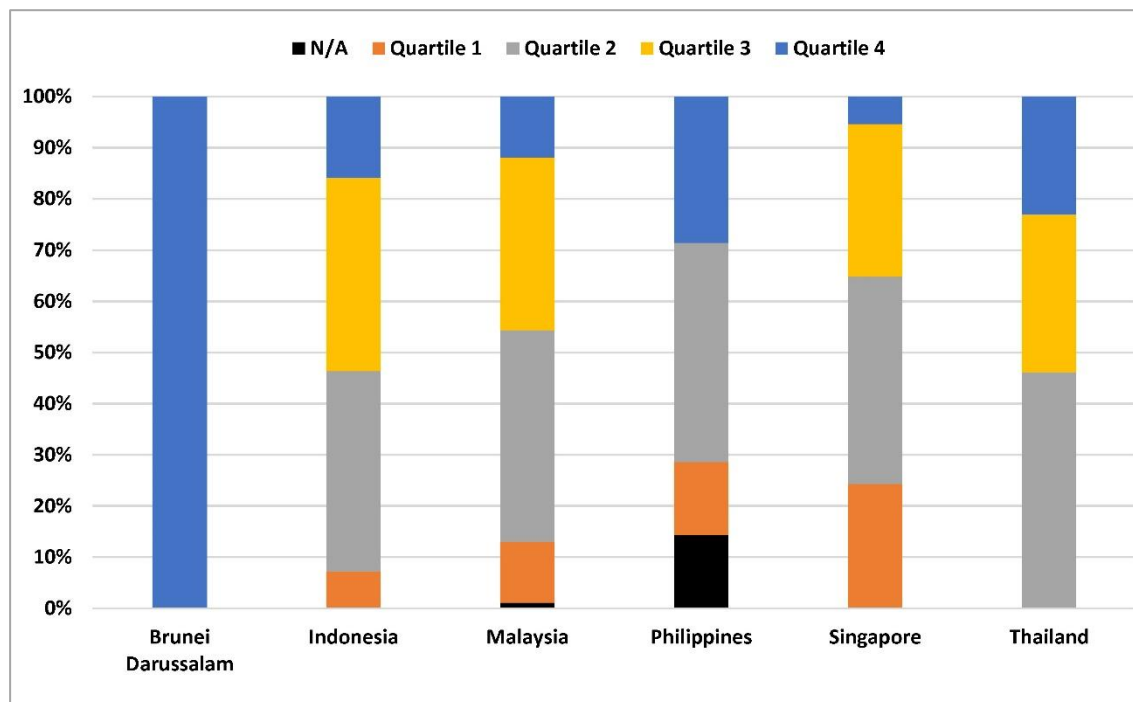


Figure 5. Quartiles of OAJs by the ASEAN member states

### Discussion

This study could paint better a portrait of OAJs published in the ASEAN member states by looking through the three viewfinders. The ACI is the official indexing service for ASEAN-based journals whereas the DOAJ indexes and provides access to quality peer-reviewed OAJs. The third index is Scopus, one of the globally acknowledged abstract and citation databases, Scopus. Its journal indicators are useful for examining the impacts of OAJs in the ASEAN member states. Of the three journal indexes, a noticeable disagreement is evident in terms of the quantity.

In the regional citation index, whether a journal provides open access or not does not matter as far as it is published in one of the ten member states. A bit of information about a journal's open access status could hardly be found in ACI, either. Moreover, neither Indonesian nor Malaysian journals could apply for the index inclusion by themselves. They must register through their respective state-managed citation centers (Thai-Journal Citation Index Centre, 2018). To some extent, this might explain the discrepancy between the journals in ACI and those in DOAJ.

Following Bruns, Lenke, Schmidt, & Taubert (2019), a comparison of the International Standard Serial Number in ACI and DOAJ indicated that only about 160 online and 200 print journals in ACI listed in DOAJ. Over half of the ACI indexed journals possibly neither belong to OAJs nor submitted to DOAJ. A closer look at the ACI criteria revealed an emphasis on the use of English for abstracts, article title, and keywords as stated in the Journal Selection Criteria (Thai-Journal Citation Index Centre, 2018). Moreover, it might be possible that they could not qualify for both the ACI and DOAJ submission indicated in the Journal Application Form (DOAJ, 2019).

The facts could reasonably cause such a limited number of OAJs in Scopus. OAJs, especially those in the ASEAN member states, are still in their early years along with that Scopus evaluated and selected the journals more rigorously, especially by focusing on the

sustainability of journal quality (Elsevier, 2019). Nevertheless, the findings that the ASEAN member states registered 1,623 OAJs constituting over 12% in DOAJ but only 98 OAJs doing approximately two percent in Scopus could better be explained not by the quality of a certain indexing system, but by varying acceptance criteria in each indexing service such as listed by Astaneh & Masoumi (2017).

As new emerging forces in the arena of OAJs, ASEAN countries demonstrated much higher annual and compound annual growth rates of OAJs publication and DOAJ registrations than the world did. Their contribution to DOAJ, however, was nearly half the size of G7 countries' contribution, i.e., 12% vs. 25%. With over 60% of the world's wealth, almost 50% of the global GDP, and a very high human development index (Kamble et al., 2018), the G7 countries as established forces in the scientific publication enterprise could serve as a model of promoting OAJs for ASEAN countries. In the next few years, based on how well the ASEAN member states have constantly strived for improved research productivity, they are likely to become a dominant player in OAJs publication and DOAJ registration.

In terms of the CC licenses, the granted type did not differ between OAJs in the world and ASEAN countries, i.e., CC BY, the least restrictive one. Interestingly, they differed in the next most used types of CC licenses. OAJs in ASEAN countries granted less restrictive types of CC licenses than OAJs in the world did. For editors of newly published OAJs in the region with limited scientific journal editorial and managerial skills (Tecson-Mendoza, 2015; Wiryawan, 2014), choosing a certain type of CC licenses could be confusing. The choice was probably based on less restriction, cultural and scientific considerations, or without paying more attention to specific detailed permission to use, reuse, and remix the published articles. These findings suggest some opportunities for future studies.

Our findings would seem to show the Scopus-indexed OAJs in the region averaged below the global averages of all bibliometric indicators but Scholarly Output. Despite this, three countries were above the global average in eight bibliometric indicators. Over 40% of the 98 OAJs indexed in Scopus positioned in Quartile 2. As in DOAJ, the relative standing in such a short time suggests that ASEAN member countries could show greater scientific impacts and higher visibility in Scopus and other indexing systems such as Web of Science (WoS).

Results so far have been auspicious. Nevertheless, the promising ones were on the ASEAN level only. In the three indexing services, OAJs in ASEAN countries were not well equitably distributed. Such diversity of OAJs publication and bibliometric indicators suggests the lack of inter-governmental cooperation on maximizing scientific productivity in the Open Access venue. Despite the huge growth of OAJs and the establishment of ACI, few studies on the development of OAJs in the ASEAN member states (Tecson-Mendoza, 2015; Wiryawan, 2014) might reflect how researchers and OAJs in each member countries were much helped by their governments, not by the regional cooperation. The lack of effective cooperation reflects the tension is higher than the integration at ASEAN level. The level of tension was also criticized by Degelsegger-Márquez & Remøe (2019) after finding a gap between regional and inter-governmental development of science, technology, and innovation. Improving integration from policy to ground levels will benefit the quantity and quality of OAJs.

As described in the Methodology, three web-based sources framed the status of OAJs in the ASEAN member states. It is worthwhile noting that the data were time-bound. Despite the ever-increasing quantity and quality of OAJs nationally, regionally, and globally, the strengths and weaknesses of OAJs in the region as shared in this work would benefit several stakeholders

such as the research funding agencies, Higher Education Institutions, research centers, along with scholarly readers, authors, and publishers as well as the interested public.

With regards to journal indicators, this study used the journal metrics from Scopus only because of being freely available on the internet. Besides, previous studies have shown that some bibliometric indicators in CiteScore by Scopus had moderate to high positive correlations with those in Journal Citation Reports (Ahmad, Sohail & Abdel-Magid 2017; García-Pachón & Arencibia-Jorge, 2014; Ghane & Niazmand, 2016; Yuen, 2018). Both of the major journal metrics developed on a similar citation basis but a different period for the impact calculation (Fernandez-Llimos, 2018; Kim & Chung, 2018). Using one of them thus seems to be acceptable. The portrait could then relatively be a very true likeness of OAJs published in the ASEAN member states.

This work has gone some way towards enhancing the understanding of OAJs published in the ASEAN member states. Further studies, which take the editors of OAJs into account, will need to be performed. The editors are absolutely the key players in the improvement of OAJs both globally and regionally.

### Conclusions

This work investigates the current status of OAJs in the ASEAN member states concerning quantity and quality by incorporating three indexing systems. OAJs is believed to be able to increase the visibility of scientific work and to bridge the gap between the development of science and technology in the developed countries and that in the developing ones, including the ASEAN member states. To give the ASEAN scientific productivity higher visibility, the member states established ACI in 2013. However, the ASEAN owned journal index has not paid closer attention to OAJs yet.

The findings reveal that ASEAN could be one of the powerhouses in the OAJs publication as they, especially Indonesia, published around 12% of the 13,406 OAJs in the world that could meet the quality standards set by DOAJ. As with the global OAJs, most of OAJs published by the six ASEAN member states tried their best to disseminate the contents of their OAJs by granting CC BY, the least restrictive license. They also demonstrated faster growths of OAJs publication and DOAJ registration than the world did.

The marked contrast between the numbers of ASEAN based OAJs indexed in the DOAJ and Scopus is, however, causing some concern. Only 32 of 1,623 ASEAN based OAJs in DOAJ could be indexed in one of the largest abstract and citation databases, constituting only two percent of over five thousand OAJs indexed in Scopus. Despite this, ASEAN countries could achieve a higher Scholarly Output average than the world did. Even three member countries averaged better than the world did, i.e., Singapore for CiteScore, Percentile, Percent Cited, and SJR, Thailand for Citation Count and Scholarly Output, along with Indonesia for SNIP. As for the last bibliometric indicator, over 40% of OAJs published in the ASEAN member states had a relative good standing, i.e., in Quartile 2 (74th – 50th CiteScore Percentile).

Taken together these results suggest that ASEAN has excellent potential to be one of the OAJs publishing empires in the world. The OAJs are in blossom in the region but not in all member states. That is why the ASEAN member countries should endeavor to improve the quality of OAJs by strengthening intra- and inter-ASEAN scientific collaborations. One of them is by making ACI the home of OAJs in ASEAN.

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