Data and Metadata. 2022; 1:43
doi: 10.56294/dm202282

ORIGINAL

Introducing ASEAN Journal of Science and Engineering Education: A Bibliometric Analysis Study for Understanding Internationalization

Presentación de ASEAN Journal of Science and Engineering Education: Un estudio de análisis bibliométrico para comprender la internacionalización

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Cite as: Al Husaeni DN, Al Husaeni DF, Nandiyanto ABD, Mahdi Al-Obaidi AS. Introducing ASEAN Journal of Science and Engineering Education: A Bibliometric Analysis Study for Understanding Internationalization. Data and Metadata. 2022;1:43. https://doi.org/10.56294/dm202282

Submitted: 24-07-2022 **Revised:** 08-10-2022 **Accepted:** 30-11-2022 **Published:** 01-12-2022

Editor: Prof. Dr. Javier González Argote

ABSTRACT

The research objective is to analyze the internationalization and social impacts of publications in the ASEAN Journal of Science and Engineering Education (AJSEE) using bibliographic data from 2021 to 2022 using Publish or Perish, VOSviewer, and R Studio based on the Google Scholar database. This study shows the success rate of the AJSEE for internationalization. AJSEE has a homogeneous scope in the field of science and technology education only. AJSEE could become a medium for cooperation among international countries, which is not only limited to Asian countries. This research is expected to be a reference for researchers who will publish their articles in the science and technology education area. In addition, this research is expected to provide motivation and increase the enthusiasm of local researchers in ASEAN to conduct research, especially in the field of science and engineering education.

Keywords: AJSEE; Bibliometric Analysis; Education; Engineering Education; Journal; Science.

RESUMEN

El objetivo de la investigación es analizar la internacionalización y los impactos sociales de las publicaciones en el ASEAN Journal of Science and Engineering Education (AJSEE) a partir de datos bibliográficos de 2021 a 2022 utilizando Publish or Perish, VOSviewer y R Studio a partir de la base de datos Google Scholar. Este estudio muestra la tasa de éxito de la AJSEE para la internacionalización. AJSEE tiene un alcance homogéneo en el campo de la educación científica y tecnológica solamente. AJSEE podría convertirse en un medio para la cooperación entre los países internacionales, que no sólo se limita a los países asiáticos. Se espera que esta investigación sea una referencia para los investigadores que publiquen sus artículos en el área de la educación científica y tecnológica. Además, se espera que esta investigación sirva de motivación y aumente el entusiasmo de los investigadores locales de la ASEAN para llevar a cabo investigaciones, especialmente en el campo de la enseñanza de la ciencia y la ingeniería.

Palabras clave: AJSEE; Análisis bibliométrico; Educación; Enseñanza de la ingeniería; Revista; Ciencia.

INTRODUCTION

Publishing research in scholarly journals has been a common practice for decades. As a crucial tool in the

advancement of research and technology, scientific journals are used to foster communication across scientific groups. Scientific journals are a tool for researchers to publish the findings of their research in addition to being a source of knowledge. Therefore, the public can access and utilize the study findings of scientists through scholarly periodicals.[1,2]

Currently, nations across all continents, including Indonesia, have to launch their academic publications. Even scientific periodicals with a history spanning more than ten years can be found in Indonesia, it must be spread more to increase science and technology information. To spread out the resulting output, scientific journals are one of the choices for researchers. However, to legalize their writing works as copyright, the research output must be published in accredited scientific journals. One of the examples of accreditation in Indonesia is the Indonesian Science and Technology Index (SINTA), run by the Ministry of Education, Culture, and Research and Technology of Indonesia. SINTA periodically recognized national journals. 8,881 journals and 1,395 publishers are detected in SINTA.

Here, the purpose of this study was to analyze one of the best journals in education in Indonesia, namely the ASEAN Journal of Science and Engineering Education (AJSEE). AJSEE is a journal published by Universitas Pendidikan Indonesia (UPI) (*https://ejournal.upi.edu/index.php/AJSEE*). UPI is the best university in the field of education in Indonesia. AJSEE is a nationally accredited journal (SINTA 4). AJSEE is an open-access and peer-reviewed journal that serves as a medium for disseminating research results by scientists, engineers, and educators in science and engineering education subject. AJSEE is a three times issued journal, published in March, September, and December every year. Each issue consists of 5-10 articles/reviews. AJSEE has involved authors from several countries and institutions in more than 20 countries in the world, including Indonesia, Malaysia, Philippines, Algeria, Thailand, Japan, Pakistan, Nigeria, India, Iraq, Sweden, United States, Uzbekistan, Germany, Australia, Zimbabwe, Qatar, Cambodia, Russian Federation, and Brunei Darussalam. One of the best articles published in 2021 on AJSEE has been cited more than 50 times, and categorized as very good in its field. The top 25 best papers are listed in Table 1.

Table 1. Top cited articles in AJSEE

Document title	Authors	Year	Ref
Bibliometric and visualized analysis of scientific publications on geotechnics fields	Mulyawati and Ramadhan	2021	(3)
Vocational education curriculum: Between vocational education and industrial needs	Rosina *et al*.	2021	(4)
The use of learning videos in order to increase student motivation and learning outcomes during the COVID-19 pandemic	Hernawati & Nandiyanto	2021	(5)
E-learning amidst the pandemic: Teachers' perspective in the Philippines	Estrellan *et al*.	2021	(6)
How to read and calculate diameter size from electron microscopy images	Yolanda and Nandiyanto	2022	(7)
Causes of students' reluctance to participate in classroom discussions	Ahmad	2021	(8)
Efforts to increasing numeracy literacy of elementary school students through quiziz learning media	Saefurohman et al.	2021	(9)
Education for sustainable development in science national exam questions of elementary school	Suryani and Hamdu	2021	(10)
Designing an educational website regarding recycling of plastic waste into roads	Soegoto et al.	2021	(11)
Improving students' learning outcomes using 5e learning cycle model	Rahmawati et al.	2021	(12)
Design-construction of a solar cell energy water pump as a clean water source for people in Sirnajaya village, Gununghalu district	Irawan et al.	2021	(13)
Construction process of robotic devices to teach aspect of auto mechanic in Nigeria Basic Schools	Babalola and Omolafe	2022	(14)
Detail experimental procedure for the construction process of robotic devices to teach aspect of auto mechanic	Babalola and Omolafe	2022	(15)
The effects of problem-based learning in students reading comprehension for mastering the content and vocabulary acquisition	Sidik and Masek	2021	(16)
Portfolio workbook as an effective method for student-centered learning of chemical engineering principles	Bilad and Prayogi	2021	(17)
How difficult is 1+ 1? A phenomenological study of high school students struggling in mathematics	Camenda et al.	2021	(18)

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Primary educators experts' validation of the developed mathematics mobile application to enhance the teaching of mathematics in Nigeria primary schools	Omolafe	2021	[19]
The integration of the engineering design process in biology-related STEM activity: A review of Thai secondary education	Tipmontiane and Williams	2022	[20]
The effectiveness of using a virtual laboratory in distance learning on the measurement materials of the natural sciences of physics for junior high school students	Azizah et al.	2021	[21]
Integrated project as innovative assessment to enhance learning experience in thermodynamics class	Sambudi and Ramli	2021	[22]

To address the research aims, bibliometric analysis is used in this study. As demonstrated in Tables 2 and 3, various prior scholars have conducted research employing bibliographic analysis. Table 2 compares our research to a prior study on bibliometric analysis. It is quite efficient to utilize bibliometric analysis to browse and visualize the most recent publications. Furthermore, the decision to continue or stop future studies is made using bibliometric analysis. However, there has not been much discussion regarding the influence of journals employing bibliographical analysis. Based on the findings of this analysis, we examined bibliographic data from AJSEE publications between 2021 and 2022 to see whether this journal has successfully expanded internationally and what effect can be gained.

Table 2. Previous studies of bibliometric analysis

Title	Topic Discussion	Ref
Progress on Pharmaceutical Sciences/Pharmacy Postgraduate Education: a Bibliometric Perspective	The study quantitatively investigated the related research progress in pharmaceutical sciences/pharmacy education from a bibliometric angle and provided feasible suggestions to facilitate the development of pharmaceutical sciences/ pharmacy postgraduate education.	[23]
Mapping research on biochemistry education: A bibliometric analysis	The main contribution is offering insights into the evolution of the field. Also, the use of a quantitative methodological design, which covers a large volume of publications, and could identify possible gaps in the area.	[24]
Virtual and remote labs in education: A bibliometric analysis	This paper analyzes the literature on virtual and remote labs from its beginnings to 2015, identifying the most influential publications, the most researched topics, and how the interest in those topics has evolved along the way.	[25]
The use of simple spectrophotometer in STEM education: A bibliometric analysis	The development of other types of spectrophotometers that involve students in building them can be a potential research alternative in Chemistry and other STEM areas.	[26]
Academia's responses to crisis: A bibliometric analysis of literature on online learning in higher education during COVID-19	The paper provide a holistic view of research that investigated online learning in higher education around the globe during COVID-19 utilizing a bibliometric analysis	[27]
A bibliometric analysis of covid-19 research using VOSviewer.	Using bibliometric methodology, this study examines the evolution of research throughout the Covid-19 era.	[28]
The concise latest report on the advantages and disadvantages of pure biodiesel (B100) on engine performance: Literature review and bibliometric analysis	The pros and cons of using pure biodiesel on engine performance are discussed in this study's literature review.	[29]
A bibliometric analysis of management bioenergy research using vosviewer application	The trends and advancements in bioenergy management research are discussed in this paper.	[30]
Oil palm empty fruit bunch waste pretreatment with benzotriazolium-based ionic liquids for cellulose conversion to glucose: Experiments with computational bibliometric analysis	This study used bibliometric analysis and VOSviewer to examine how benzotriazole ionic salt liquid was used to dissolve empty palm oil fruit bunches.	[31]
Management information systems: bibliometric analysis and its effect on decision making.	In this study, information about decision-making is discussed.	[32]
Correlation between process engineering and special needs from bibliometric analysis perspectives.	The integration of mapping analysis utilizing the VOSviewer program is covered in this study.	[33]

Bibliometric analysis for understanding the correlation between chemistry and special needs education using VOSviewer indexed by Google.	The use of VOSviewer in conjunction with mapping analysis is discussed in this paper.	(34)
Implementation of Biotechnology in Education towards Green Chemistry Teaching: A Bibliometrics Study and Research Trends	The use bibliometric analysis to assess the trend bodies of research on biotechnology in education towards green chemistry during the last decade (2012-2022)	(35)
A bibliometric analysis of computational mapping on publishing teaching science engineering using VOSviewer application and correlation.	In this study, new breakthroughs in scientific education and engineering research is described.	(36)
What is the correlation between chemical engineering and special needs education from the perspective of bibliometric analysis using VOSviewer indexed by google scholar?	By integrating mapping analysis and the VOSviewer program, this study examines the "Special Needs of Chemical Engineering".	(37)
Scientific production on patient safety in the field of nursing in Latin America	Characterizing the scientific production on patient safety in the area of Nursing in Latin America	(38)
Productivity and impact of Cuban hospitals in Scopus between 1996 and 2016	This study characterizes communication patterns and the impact of scientific production in Cuban hospitals.	(39)
History and Philosophy of Science in Latin America	A bibliometric study was conducted of documents in the "History and Philosophy of Science" category from the period between 1996 and 2016 using the Scival and Scimago Country tools and the journal Rank.	(40)
Characterization of the scientific output on lithium batteries through SciVal topic analysis	Bibliometric study characterizing scientific output on lithium-ion batteries by analyzing SciVal's 2017 and 2021 topics.	(41)

Table 3. Our works in bibliometric analysis

Title	Topic Discussion	Ref
A bibliometric analysis of materials research in Indonesian journal using VOSviewer	This paper discusses the current directions in materials research.	(42)
Sustainable development goals (SDGs) in science education: Definition, literature review, and bibliometric analysis.	This investigation looks at the reasons for and trends in the growth of research on SDGs.	(43)
A bibliometric analysis of chemical engineering research using VOSviewer and its correlation with covid-19 pandemic condition.	This research examines chemical engineering research.	(44)
Computational bibliometric analysis of research on science and islam with VOSviewer: Scopus database in 2012 to 2022.	This study explores the development of research with bibliometric analysis in the fields of science and Islam using information from Scopus-indexed article data.	(45)
Resin matrix composition on the performance of brake pads made from durian seeds: From computational bibliometric literature analysis to experiment.	To discuss the effect of resin matrix composition on brake pad performance, bibliometric analysis is used in this work.	(46)
Bibliometric Analysis of Briquette Research Trends During the Covid-19 Pandemic.	The trends in briquette research during the COVID-19 pandemic are examined in this work.	(47)
Computational Bibliometric Analysis on Publication of Techno-Economic Education.	In this study, the evolution of publications in techno-economic education is discussed using bibliometric analysis.	(48)
How bibliographic dataset portrays decreasing number of scientific publications from Indonesia	This study looks into using bibliographic datasets to describe the drop in scientific publications in Indonesia.	(49)
How to calculate bibliometric using VOSviewer with Publish or Perish (using Scopus data): Science education keywords	In this study, the Publish or Perish application is used to assess bibliometrics using VOSviewer.	(50)
Bibliometric analysis of engineering research using Vosviewer indexed by Google Scholar	Using data from articles that were indexed by Google Scholar, this study uses VOSviewer to look at how technical research has evolved.	(51)
Bibliometric computational mapping analysis of publications on mechanical engineering education using VOSviewer	This study looks at how research in the area of engineering education has evolved.	(52)

METHODS

In this study, we retrieved all bibliographic data from articles published in the AJSEE from 2021 to 2022 using the Publish or Perish application. Publish or Perish result data will then be saved in two formats, namely *.ris (for data mapping using the VOSviewer application) and *.csv (for data processing in Ms.Excel). The data taken

is data from articles that have been published starting from the year of publication, author's name, author's country, and keywords. Once the data is captured, we use the VOSviewer application as a data visualization tool which generates a network from the pre-processed data set, to build a scientometric network that outlines productivity. The term ASEAN Journal of Science and Engineering Education is used as a search keyword (publication name) in the Publish or Perish application. The bibliometric analysis in this study was divided into 4 stages, along with a further explanation of the stages of the bibliometric analysis.

Harvesting Data

At this stage, we collect data for trend analysis and identify the impact of the AJSEE journal on research publications. At this stage, published research documents (articles) related to science, engineering, and education topics are collected using the Publish or Perish application. Research documents were collected using the publication name ASEAN Journal of Science and Engineering Education. The article data taken is article data published from 2021 to 2022.

Screening Data

Research documents collected with the help of the Publish or Perish application cannot be analyzed directly. As a result, data filtering is required. At this stage, data screening is carried out by paying attention to the publisher. Articles that are not published by the publisher ejournal.upi.edu are eliminated. The elimination process is carried out in the Publish or Perish application and Microsoft Excel. After screening the data, 58 relevant articles were obtained.

Visualization Data

The data that has been saved in the format (*.ris) is then uploaded to the VOSviewer application to get the data mapping results. The terms in the VOSviewer network mapping visualization are filtered at this stage. The source database is used to map the article data.

Analysis Data

At this stage the data that has been visualized and processed using Ms. Excel is analyzed in such a way as to obtain the results of research developments per year, the authors with the most research, the country, and the relationship between the authors and other authors and countries with other countries. In addition, the clusters obtained from the visualization results are also analyzed at this stage.

RESULTS AND DISCUSSION

The results of the analysis of article data obtained through Publish or Perish, VOSviewer, and Microsoft Excel show that the AJSEE has succeeded in gaining recognition from the writing community. The types of articles published by AJSEE are journal articles. The distribution of publications shown in Figure 1 proves that AJSEE has published about 60 articles in a period of 2 years, namely from 2021-2022. In 2021 the number of articles published on AJSEE will be 30 articles, while in 2022 there will be 28 articles. Judging from the numbers and data shown in Figure 1, the number of publications on AJSEE from 2021-2022 has decreased by 2 articles.

Based on Table 4, the author with the highest number of articles published in AJSEE is Omolafe with 5 articles. Then there are Maryanti, Babalola, and Nandiyanto with 4 articles each. Then. Muktiarni and Mupita have 3 articles each. Also, Ahsan, Ochayi, Olabo, and Wulandary have 3 articles each. From the data of several authors who published their articles on AJSEE, AJSEE is widely used by local researchers in ASEAN. Even so, the number of outside (international) researchers is not small, this is evidenced by the inclusion of 4 outside authors into the 10 most productive writers at AJSEE for 2 years. In addition, from the 10 authors shown in Table 4, it was identified as the 10 most productive authors with a total of 4 articles in 2021-2022. With the high reputation of AJSEE, it can help attract local and regional researchers to publish their articles in AJSEE. This confirms that some journals publish articles that are of high quality only if the management of the journal is homogeneous and includes many respected editors.[53,54]

When assessing the author collaboration network in the AJSEE journal (see Figure 2), there were cluster groups that were not bound between one author and another. Of the 48 cluster groups, there is one cluster group shown in Figure 3 which dominates the number of publications in AJSEE. The dominating group is cluster 1 which is connected to clusters 2 and 3 which are marked in green and blue respectively. The number of writers in Cluster 1 has 4 writers, Cluster 2 has 2 writers, and Cluster 3 has 2 writers. Several writers who are in cluster 1 such as Maryanti and Wulandary are included in the 10 most productive writers as shown in Table 4.

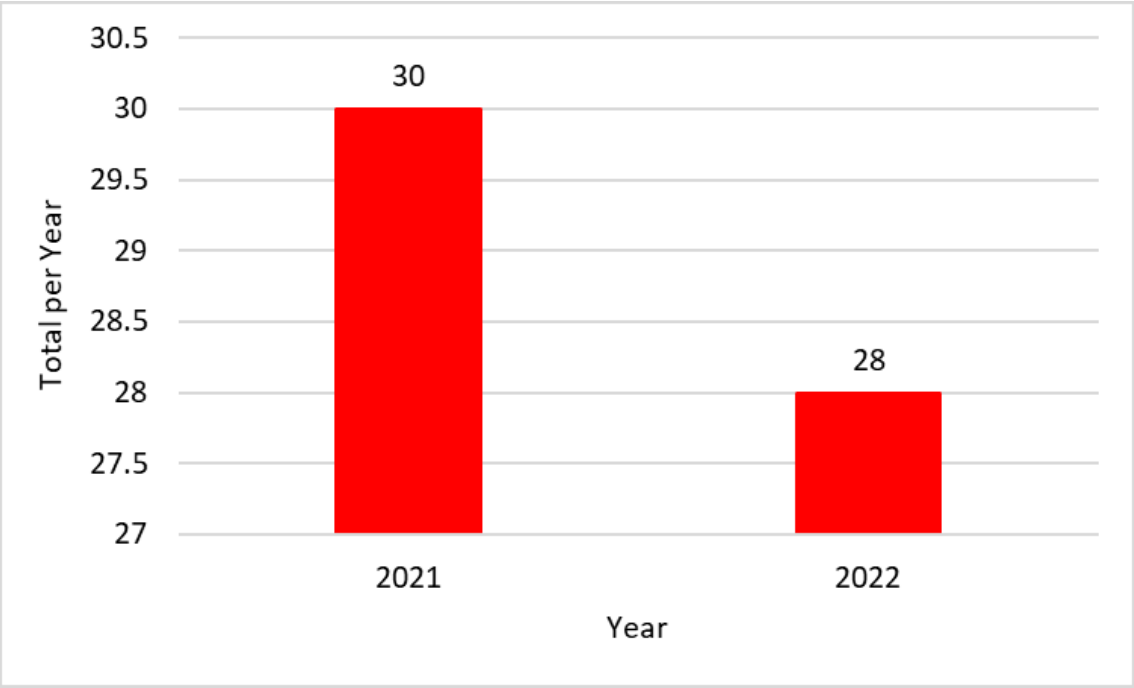

Figure 1. Distribution of research papers from AJSEE per year of publication.

Figure 2. Author collaboration network in AJSEE.

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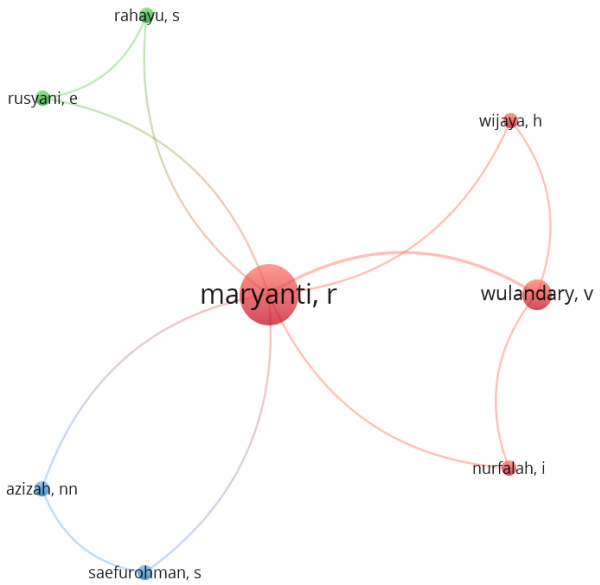

Figure 3. Author collaboration network in AJSEE with the most publications.

Table 4. The ten most productive AJSEE researchers from 2021-2022

Researcher	Number of Documents	Total link strength
Omolafe	5	5
Maryanti	4	8
Babalola	4	5
Nandiyanto	4	5
Muktiarni	3	6
Mupita	3	6
Ahsan	2	5
Ochayi	2	4
Olabo	2	4
Wulandary	2	4

When analyzing which countries have actively contributed to publishing their articles on AJSEE, Indonesia, Malaysia, and the Philippines are the countries that have most actively contributed to publishing their articles on AJSEE (see Figure 4). Although 41,85 % of the articles published in AJSEE are articles originating from researchers from Indonesia, Malaysia, and the Philippines, the other 58,15 % are not from local researchers (Indonesia). This is in line with the name of the journal that includes the name of ASEAN as the main regional authors. The countries included in the 58,15 % mentioned earlier are Thailand, Nigeria, Japan, Pakistan, Zimbabwe, Australia, India, Sweden, the United States, Brunei Darussalam, Qatar, Algeria, and Tunisia (see Figure 5 and Table 5). These results prove that AJSEE is not limited to the local community and is open to researchers around the world, proving the internationalization of AJSEE. In Figure 5, countries have contributed to the AJSEE journal, including Zimbabwe, Australia, India, Sweden, the United States, Brunei Darussalam, and Qatar.

In Table 5, the number of articles owned by the countries of Indonesia, Malaysia, and the Philippines that were successfully published in AJSEE for a period of 2 years, namely 2021 – 2022, has a consistent number of 3 articles each year. Thus, the total articles for 2 years are 6 articles each. Based on the results of an analysis of countries that actively published research in AJSEE, most countries that contributed were from Asia. These Asian countries have surprisingly become the main collaborators of AJSEE for the last 2 years (in 2021 and 2022), and of the several Asian countries that have contributed, some countries are included in the 10 most productive countries (as shown in Table 5). Apart from Asian countries, countries on the African continent are included in the 10 most productive countries. The country in question is Nigeria with a total of 4 articles published. The inclusion of articles originating from Africa and America confirms that AJSEE can serve as an incubator for building international collaborations beyond Asian countries.

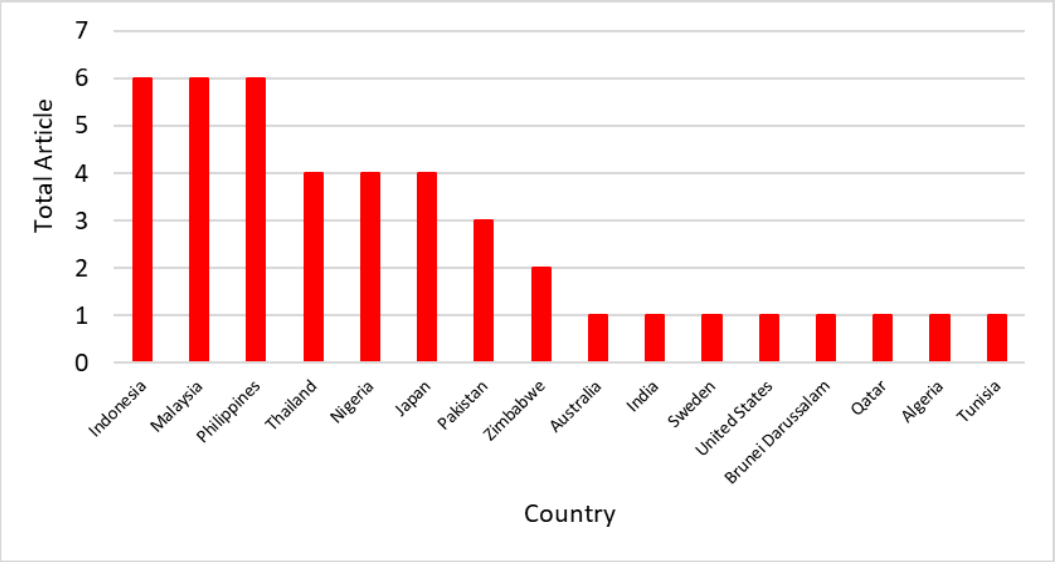

Figure 4. Countries contributing to AJSEE

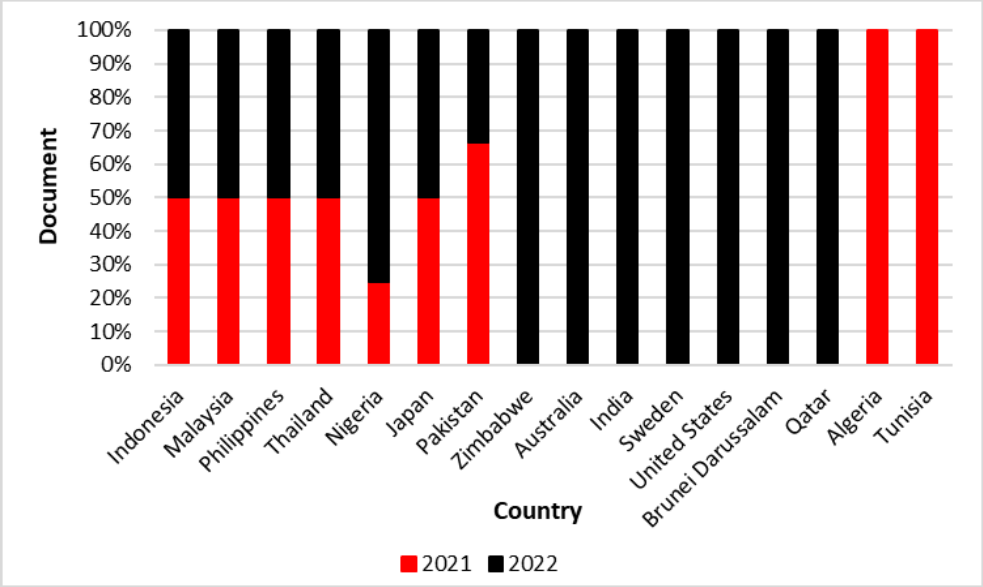

Figure 5. Annual distribution of scientific contributions from countries most published in AJSEE.

Table 5. The ten most productive countries publish their articles in AJSEE in 2021-2022

Country	2021	2022	Total Article	Percentage (%)
Indonesia	3	3	6	13,95
Malaysia	3	3	6	13,95
Philippines	3	3	6	13,95
Thailand	2	2	4	9,30
Nigeria	1	3	4	9,30
Japan	2	2	4	9,30
Pakistan	2	1	3	6,98
Zimbabwe	0	2	2	4,65
Australia	0	1	1	2,33
India	0	1	1	2,33

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Based on the mapping results shown in figure 6, most of the terms published in AJSEE are related to science and engineering education. In addition, from the mapping results, we get 5 cluster groups, namely cluster 1 (effect, elementary school student, Ilorin, Nigeria, perception, science, study, undergraduate, and use), cluster 2 (child, development, junior high school student, learning, mathematics, research, teaching, and time), cluster 3 (country, education, man, person, society, and student), cluster 4 (aspect, course, experience, undergraduate stunt, and university), and cluster 5 (covid, implementation, pandemic, and school). Each item is obtained from the results of selecting occurrences, namely at least 3. In addition, the clusters that have been mentioned are differentiated by color. Cluster 1 is red, Cluster 2 is green, Cluster 3 is blue, Cluster 4 is yellow, and Cluster 5 is purple.

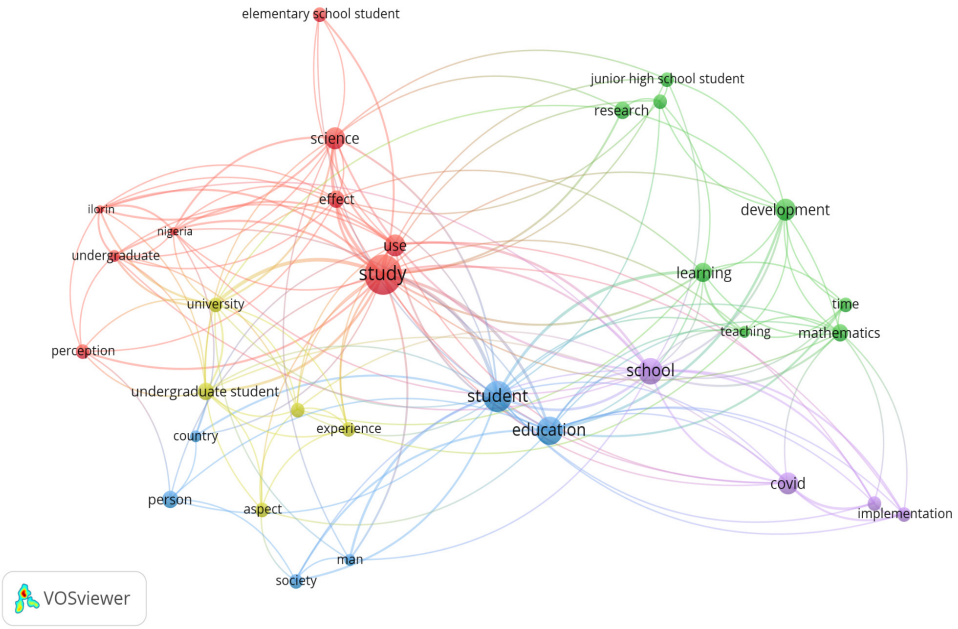

Figure 6. Co-occurrence network of the keywords from research papers published in AJSEE from 2021 to 2022.

Finally, detailed AJSEE publication data is presented in Figure 7. These results indicate that the longer age of the journal correlates to the more contributions from authors as well as the diverser involvement of affiliations. It should be noted that AJSEE is ready for internationalization since this journal is involved by authors from many countries and affiliations.

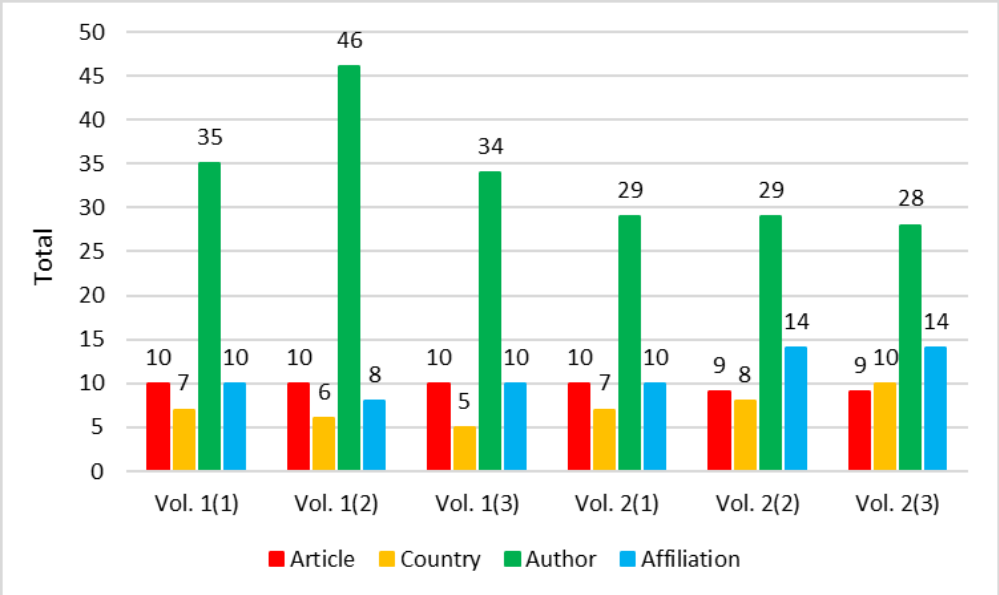

Figure 7. Publication data in AJSEE.

CONCLUSION

This research paper analyzes the output of the AJSEE from 2021 to 2022 by assessing bibliographic data. We analyzed the impact of AJSEE's development and internationalization on the local research community. AJSEE has grown rapidly due to its open-source access research policy. On the other hand, the journal succeeded in raising various topics, especially those related to science and engineering education. On the other hand, AJSEE encourages local and international research networks by making the journal as a forum for discussion and improvement of initial research initiatives in the fields of science and engineering education. This achieved contributions from 16 countries in 5 continents (i.e. Asia, Africa, America, Australia, and Europe). In addition, this journal is very useful for launching new research collaborations among authors from other countries, both Asian countries (Indonesia, Malaysia, Philippines, Thailand, Japan, Pakistan, India, Brunei Darussalam, Qatar) and non-Asian countries such as Nigeria, Zimbabwe, Australia, Sweden, United States, Algeria, and Tunisia. The internationalization carried out at AJSEE encouraged the development of international collaboration networks, leading to an increase in the scope of topics and the diversity of research results. Collaboration between local, regional, and international researchers guarantees greater visibility and impact for researchers. In addition, we identified that journals can be used as media and models for developing research collaborations.

REFERENCES

1. Solomon D.J, Björk B.C. A study of open access journals using article processing charges. Journal of the American Society for Information Science and Technology. 2012;63(8):1485-1495.

2. Yuen J, Muquit S, Whitfield P.C. Correlation between cost of publication and journal impact, Comprehensive cross-sectional study of exclusively open-access surgical journals. Journal of Surgical Education. 2019:76(1):107-119.

3. Mulyawati I.B, and Ramadhan D.F. Bibliometric and visualized analysis of scientific publications on geotechnics fields. ASEAN Journal of Science and Engineering Education. 2021;1(1):37-46.

4. Rosina H, Virgantina V, Ayyash Y, Dwiyanti V, Boonsong S. Vocational education curriculum: Between vocational education and industrial needs. ASEAN Journal of Science and Engineering Education. 2021;1(2):105-110.

5. Hernawati D, Nandiyanto A.B.D, Muhammad N. The use of learning videos in order to increase student motivation and learning outcomes during the COVID-19 pandemic. ASEAN Journal of Science and Engineering Education. 2021;1(2): 77-80.

6. Estrellan A, Ferrariz K.J, Lazona P.A, Madres V.E, Estrellan J.C. E-learning amidst the pandemic: Teachers' perspective in the Philippines. ASEAN Journal of Science and Engineering Education. 2021;1(2):93-96.

7. Yolanda Y.D, Nandiyanto A.B.D. How to read and calculate diameter size from electron microscopy images. ASEAN Journal of Science and Engineering Education. 2022;2(1):11-36.

8. Ahmad C.V. Causes of students' reluctance to participate in classroom discussions. ASEAN Journal of Science and Engineering Education. 2021;1(1): 47-62,

9. Saefurohman S, Maryanti R, Azizah N.N, Al Husaeni D.F, Wulandary V, Irawan A.R. Efforts to increasing numeracy literacy of elementary school students through quiziz learning media. ASEAN Journal of Science and Engineering Education, 2021;3(1):11-18.

10. Suryani L, Hamdu G. Education for sustainable development in science national exam questions of elementary school. ASEAN Journal of Science and Engineering Education, 2021;1(1):1-6.

11. Soegoto E.S, Ramana J.M, Rafif L.S. Designing an educational website regarding recycling of plastic waste into roads. ASEAN Journal of Science and Engineering Education, 2021;1(3):135-140.

12. Rahmawati F, Achdiani Y, Maharani S. Improving students' learning outcomes using 5e learning cycle model. ASEAN Journal of Science and Engineering Education, 2021;1(2):97-100.

13. Irawan A.K, Rusdiana D, Setiawan W, Purnama W, Fauzi R.M, Fauzi S.A, Arfiyogo M.R. Design-construction of a solar cell energy water pump as a clean water source for people in Sirnajaya village Gununghalu district.

ASEAN Journal of Science and Engineering Education. 2021;1(1):15-20.

14. Babalola E.O, Omolafe E.V. Construction process of robotic devices to teach aspect of auto mechanic in Nigeria Basic Schools. ASEAN Journal of Science and Engineering Education. 2022;2(1):123-128.

15. Babalola E.O, Omolafe E.V. Detail experimental procedure for the construction process of robotic devices to teach aspect of auto mechanic. ASEAN Journal of Science and Engineering Education. 2022;2(2):169-176.

16. Sidik H, Masek A. The effects of problem-based learning in students reading comprehension for mastering the content and vocabulary acquisition. ASEAN Journal of Science and Engineering Education. 2021;1(2):87-92.

17. Bilad M.R, Prayogi S. Portfolio workbook as an effective method for student-centered learning of chemical engineering principles. ASEAN Journal of Science and Engineering Education. 2021;1(1):31-36.

18. Camenda D.Y, Gaba C.A, Lacord N, Natango D, Pabl A, Abusam H. How difficult is 1+ 1? A phenomenological study of high school students struggling in mathematics. ASEAN Journal of Science and Engineering Education. 2021;1(2):111-116.

19. Omolafe E.V. Primary educators' experts' validation of the developed mathematics mobile application to enhance the teaching of mathematics in Nigeria primary schools. ASEAN Journal of Science and Engineering Education. 2021;1(3):157-166.

20. Tipmontiane K, Williams P.J. The integration of the engineering design process in biology-related STEM activity: A review of Thai secondary education. ASEAN Journal of Science and Engineering Education. 2021;2(1):1-10.

21. Azizah E.V, Nandiyanto A.B.D, Kurniawan T, Bilad M.R. The effectiveness of using a virtual laboratory in distance learning on the measurement materials of the natural sciences of physics for junior high school students. ASEAN Journal of Science and Engineering Education. 2021;2(3):207-214.

22. Sambudi N.S, Ramli R.M. Integrated project as innovative assessment to enhance learning experience in thermodynamics class. ASEAN Journal of Science and Engineering Education. 2021;1(3):167-176.

23. Huang Z, Zhang X, Wu L, Hu P, Huang Y, Pan X, et al. Progress on Pharmaceutical Sciences/Pharmacy Postgraduate Education: a Bibliometric Perspective. J Pharm Innov 2022;17:1360–72. https://doi.org/10.1007/s12247-021-09611-z

24. Barbosa ML de O, Galembeck E. Mapping research on biochemistry education: A bibliometric analysis. Biochemistry and Molecular Biology Education 2022; 50:201–15. https://doi.org/10.1002/bmb.21607.

25. Heradio R, de la Torre L, Galan D, Cabrerizo FJ, Herrera-Viedma E, Dormido S. Virtual and remote labs in education: A bibliometric analysis. Computers & Education 2016; 98:14–38. https://doi.org/10.1016/j.compedu.2016.03.010

26. Shidiq AS, Permanasari A, Hernani, Hendayana S. The use of simple spectrophotometer in STEM education: A bibliometric analysis. Moroccan Journal of Chemistry 2021;9:9–300. https://doi.org/10.48317/IMIST.PRSM/morjchem-v9i2.27581.

27. Zhang L, Carter Jr. RA, Qian X, Yang S, Rujimora J, Wen S. Academia's responses to crisis: A bibliometric analysis of literature on online learning in higher education during COVID-19. British Journal of Educational Technology 2022;53:620–46. https://doi.org/10.1111/bjet.13191.

28. Hamidah I, Sriyono S, Hudha M.N. A Bibliometric analysis of Covid-19 research using VOSviewer. Indonesian Journal of Science and Technology. 2020;5(2):34-41.

29. Setiyo M, Yuvenda D, Samuel O.D. The Concise latest report on the advantages and disadvantages of pure biodiesel (B100) on engine performance: Literature review and bibliometric analysis. Indonesian Journal of Science and Technology. 2021;6(3):469-490.

30. Soegoto H, Soeryanto Soegoto E, Luckyardi S, Abhi Rafdhi A. A bibliometric analysis of management bioenergy research using vosviewer application. Indonesian Journal of Science and Technology. 2022;7(1):89-104.

31. Mudzakir A, Rizky K.M, Munawaroh H.S.H, Puspitasari D. Oil palm empty fruit bunch waste pretreatment with benzotriazolium-based ionic liquids for cellulose conversion to glucose: Experiments with computational bibliometric analysis. Indonesian Journal of Science and Technology. 2022;7(2):291-310.

32. Santoso B, Hikmawan T, Imaniyati N. Management information systems: bibliometric analysis and its effect on decision making. Indonesian Journal of Science and Technology. 2022;7(3);583-602.

33. Nordin N.A.H.M. Correlation between process engineering and special needs from bibliometric analysis perspectives. ASEAN Journal of Community and Special Needs Education. 2022;1(1):9-16.

34. Bilad M.R. Bibliometric analysis for understanding the correlation between chemistry and special needs education using vosviewer indexed by google. ASEAN Journal of Community and Special Needs Education. 2022;1(2):61-68.

35. Riandi R, Permanasari A, Novia N. Implementation of Biotechnology in Education towards Green Chemistry Teaching: A Bibliometrics Study and Research Trends. Moroccan Journal of Chemistry 2022;10:10–427. https://doi.org/10.48317/IMIST.PRSM/morjchem-v10i3.33060.

36. Nordin N.A.H.M. A bibliometric analysis of computational mapping on publishing teaching science engineering using VOSviewer application and correlation. Indonesian Journal of Teaching in Science. 2022;2(2):127-138.

37. Wirzal M.D.H, Putra Z.A. What is the correlation between chemical engineering and special needs education from the perspective of bibliometric analysis using vosviewer indexed by google scholar?. Indonesian Journal of Community and Special Needs Education, 2022;2(2):103-110.

38. Aguirre M.H. Producción científica sobre seguridad del paciente en el área de Enfermería en Latinoamérica. Salud Ciencia y Tecnología. 2021;1:17-17.

39. Hernandez-Negrin H, Vitón-Castillo A.A. Productivity and impact of Cuban hospitals in Scopus between 1996 and 2016. Salud Ciencia y Tecnología. 2022:1(1):1-24.

40. Alonso F.G, Gonzalez-Argote J. History and Philosophy of Science in Latin America. Salud Ciencia y Tecnología. 2022;1(1):1-9.

41. Delgado M.C.F, Mendoza J.A.R, Piñero A.L.C. Caracterización de la producción científica sobre baterías de litio mediante análisis de tópicos de SciVal. Data and Metadata, 2022;1:5-5.

42. Nandiyanto A.B.D, Al Husaeni D.F, A bibliometric analysis of materials research in Indonesian journal using VOSviewer. Journal of Engineering Research. 2021;9:1-16.

43. Maryanti R.I.N.A, Rahayu N.I, Muktiarni M, Al Husaeni D.F, Hufad A.C.H.M.A.D, Sunardi S, Nandiyanto A.B.D. Sustainable development goals (SDGs) in science education: Definition literature review and bibliometric analysis. Journal of Engineering Science and Technology. 2022; 17:161-181.

44. Nandiyanto A.B.D, Al Husaeni D.N, Al Husaeni D.F. A bibliometric analysis of chemical engineering research using vosviewer and its correlation with covid-19 pandemic condition. Journal of Engineering Science and Technology. 2021; 16(6):4414-4422.

45. Al Husaeni D.F. Al Husaeni D.N. Computational bibliometric analysis of research on science and Islam with VOSviewer: Scopus database in 2012 to 2022. ASEAN Journal of Religion Education and Society. 2022; 1(1):39-48.

46. Nandiyanto A.B.D, Al Husaeni D.N, Ragadhita R, Fiandini M, Al Husaeni D.F, Aziz M. Resin matrix composition on the performance of brake pads made from durian seeds: From computational bibliometric

literature analysis to experiment. Automotive Experiences. 2022; 5(3):328-342.

47. Al Husaeni D.N. Bibliometric Analysis of Briquette Research Trends During the Covid-19 Pandemic. ASEAN Journal for Science and Engineering in Materials. 2022;1(2):99-106.

48. Ragadhita R, Nandiyanto A.B.D. Computational bibliometric analysis on publication of techno-economic education. Indonesian Journal of Multidiciplinary Research. 2022;2(1):213-222.

49. Nandiyanto A.B.D, Biddinika M.K, Triawan F. How bibliographic dataset portrays decreasing number of scientific publication from Indonesia. Indonesian Journal of Science and Technology. 2020;5(1):154-175.

50. Al Husaeni D.N, Al Husaeni D.F. How to calculate bibliometric using VOSviewer with Publish or Perish (using scopus data): Science education keywords. Indonesian Journal of Educational Research and Technology. 2022;2(3):247-274.

51. Nandiyanto A.B.D, Al Husaeni D.F. Bibliometric analysis of engineering research using vosviewer indexed by google scholar. Journal of Engineering Science and Technology. 2022;17(2):883-894.

52. Al Husaeni D.F, Nandiyanto A.B.D. Bibliometric computational mapping analysis of publications on mechanical engineering education using vosviewer. Journal of Engineering Science and Technology. 2022;17(2):1135-1149.

53. Besancenot D, Huynh K.V, Faria J.R. Search and research: The influence of editorial boards on journals' quality. Theory and Decision. 2012;73:687-702.

FINANCING

No financing.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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