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A Bibliometric Analysis of the International Journal of Energy Economics and Policy: 2013-2022

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ABSTRACT

This paper performs a bibliometric analysis of the *International Journal of Energy Economics and Policy (IJEEP)* for 2013-2022. Bibliometrix R package (R studio) and Scopus database were used for the study and examined 2194 documents published in the journal between 2013 and 2022. The results showed an upward trend in publications with a yearly growth rate of 21.92%. Mahmood is the most relevant author by the number of papers published with the highest h-index, while the most-cited author is Mikhaylov. This research revealed that Indonesia is the most productive country in terms of publications, while Malaysia is the most-cited nation. Covenant University is the most productive university in terms of overall publications. The results show that there are 4782 authors' keywords in total. Of these keywords, "economic growth" is the top keyword, with more than 293 occurrences. Intellectual and social structures highlighted collaborations amongst authors, institutes and countries.

Keywords: Journal Analysis, Scopus, R-package, Citation Analysis, Co-citation Analysis, Co-occurrence, Economic Growth JEL Classifications: C88, M20, Q40, Q43, Q48

1. INTRODUCTION

In recent years, bibliometric analysis has gained immense popularity (Donthu et al., 2021) as it is a set of techniques for analyzing words and data, especially in enormous datasets (Cobo et al., 2011) and is a powerful tool for evaluating scientific outputs of journals, authors, institutes, and countries (Liao et al., 2019). The bibliometric analysis aids in the identification of current research trends as well as future research directions (Kent Baker et al., 2020). The bibliometric research technique is proliferating and is widely used in a range of disciplines (Chen et al., 2016; Merigó and Yang, 2017; Rialti et al., 2019; Swain et al., 2013; Zupic and Čater, 2015) such as Finance (Abad-Segura and González-Zamar, 2019; Akter et al., 2021; Goyal and Kumar, 2021; Ingale and Paluri, 2022; Pattnaik et al., 2020), Tourism (Atsız et al., 2022; Kim and So, 2022; León-Gómez et al., 2021), education (Budd, 1988), Economics (Castillo-Vergara et al., 2018), Human Resources (Danvila-del-Valle et al., 2019), Supply Chain Management (Fahimnia et al., 2015; Han et al., 2020; Ma et al., 2020), Knowledge Management (Agostini et al., 2020; Agrifoglio et al., 2021; Farooq, 2022; Sanguankaew and Vathanophas Ractham, 2019).

Similarly, the Bibliometric study of a particular journal helps to understand the journal's quality, maturity, and productivity in any field, country, or region (Wan Utap Anyi Kevin et al., 2009). Numerous authors also perform bibliometric analysis related to a specific journal. Journal of Knowledge Management (Alajmi and Alhaji, 2018; Farooq, 2021), Journal of Information and Knowledge Management (Islam and Widen, 2021), Applied Artificial Intelligence (A.A.I.), Journal of Documentation (Tsay and Shu, 2011), Malaysian Journal of Computer Science (Zainab

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et al., 2013), Journal of the American Society for Information Science and Technology (JASIST), Information Processing and Management and Journal of Documentation (Tsay, 2011) etc., highlight journal specific study.

In order to gain insightful understanding of the literature published in the International Journal of Energy Economics and Policy (IJEEP), this study employs bibliometric analysis. A well-known academic journal devoted to researching energy economics and policy is the International Journal of Energy Economics and Policy (IJEEP). It serves as a platform for researchers, scholars, policymakers, and industry professionals to share their knowledge, insights, and research findings related to various energy economics and policy aspects. IJEEP publishes high-quality, peer-reviewed articles that cover a wide range of topics, including energy markets, energy pricing, energy efficiency, renewable energy, energy security, energy policy analysis, and sustainable energy development. The journal aims to foster a better understanding of the economic, environmental, and social implications of energy production, consumption, and policy interventions. With its rigorous review process and commitment to excellence, IJEEP ensures that the published articles contribute significantly to the existing body of knowledge in the field of energy economics and policy. By promoting scholarly discussions and disseminating cutting-edge research, the journal plays a crucial role in shaping the energy landscape and informing policy decisions at both national and international levels. Researchers and practitioners in the energy sector rely on IJEEP to stay abreast of the latest developments and to gain valuable insights into the complex dynamics of energy economics and policy.

The following is the paper's structure, Section one introduces the study and its significance; The methodology adopted in this study is comprehensively discussed in the Second section, while Section third discusses the analysis and the study's findings. Concluding remark is presented in Section four.

2. METHODOLOGY

2.1. Bibliometric Analysis and Database

The bibliometric method is a recognized research technique for the statistical and numerical assessment of scientific literature. It was first introduced by (Pritchard, 1969) as "the mathematical and statistical analysis of bibliographic records." The quantitative analysis of bibliographic content is called bibliometric analysis (Donthu et al., 2021; Kumar et al., 2022; Merigó and Yang, 2017; Mukherjee et al., 2021; Zupic and Čater, 2015) and Bibliometix is a package written in R for bibliometric analysis (Derviş, 2020). Bibliometric research focuses on networks that involve authors, keywords, or documents (Sharma et al., 2021), creating conceptual connections between various analytical units (Agostini et al., 2020). The two main uses of bibliometric techniques are performance analysis and science mapping. We can identify new patterns and possible study directions by utilizing such methods. Bibliometricians use various software tools to analyze and interpret data, including Bibexcel, SciMAT, VOSviewer, CitNetExplorer, and CiteSpace (Farooq, 2022). In this study, we used the open-source statistics application called Bibliometrix R package (R studio) which is the most popular amongst the research scholars (Linnenluecke et al., 2020) a tool developed in the R language by (Aria and Cuccurullo, 2017). R is considered to be superior to other tools due to its advanced integrated data visualization capabilities (Singh & Dhir, 2019). The bibliometric method is used in this study to answer the following research questions:

- 1. What is the current trend of publications and citations?
- 2. Who are the most productive, cited, and impactful authors and documents?
- 3. Which countries and institutions contribute most?
- 4. Which are the frequently used keywords, trending topics, co-occurring keywords and emerging themes?
- 5. What is the current state of collaboration among authors, institutions, and countries?

We used descriptive, conceptual, intellectual, and social structures to answer the above questions.

This study uses the Scopus database since it contains more journals than other scientific databases like WoS (Abad-Segura and González-Zamar, 2019; Akter et al., 2021; Falagas et al., 2008; Farooq, 2022). To obtain the data of the study, a search was carried out on the Scopus database on 27.05.2023. Scopus indexed 2356 documents published by the *International Journal* of Energy Economics and Policy (IJEEP) as of 29-05-2023. This study covers 2194 documents published between 2013 and 2022.

3. DATA ANALYSIS AND FINDINGS

3.1. Descriptive Structure

Descriptive analysis investigates data in terms of the fundamental properties of the collected data, such as (1) authors, (2) documents, (3) sources/journals, (4) organizations, (5) countries, and (6) analysis of authors' keywords. Accordingly, bibliometric indicators such as publication and citation structure, most productive authors, documents, organization, countries, and author's keywords are used for descriptive analysis.

Table 1: Summary of data from 2013 to 2022

Description	Desults
Description	Results
Documents	2194
Average years from publication	3.96
Average citations per document	7.15
Average citations per year per doc	1.31
Document types	
Article	2181
Review	13
Author's Keywords (DE)	4782
Authors	4801
Authors of single-authored documents	301
Authors of multi-authored documents	4500
Authors collaboration	
Single-authored documents	388
Documents per author	0.46
Authors per document	2.19
Co-authors per documents	3.05
Collaboration index	2.49

3.1.1. Data set

Table 1 provides an overview of the 2194 publications' bibliometric data. These articles were published in the journal from 2013 to 2022, with an average of 3.96 years since publication. Each document received an average of 7.15 citations, with an annual average of 1.31 citations per document. There were 2181 articles and 13 review papers in this list. The output shows 4801 authors with 4782 authors' keywords, including 388 single-authored documents and 4500 multiple-authored documents. The outcome of the collaboration index, which assesses the extent to which authors collaborate, was 2.49, indicating extensive collaboration among researchers.

3.1.2. Scientific production and citation analysis (2013-2022)

Table 2 highlights an upward trend in an annual publication from 2013 to 2022, with a yearly growth rate of 21.92%. Sixty articles were published in 2013, with 12.60 citations per article, and the average annual citation count was 1.26. Journal citation analysis is used to monitor the relevance of publication outlets (Kraus et al., 2020). Regarding the number of published research articles, 2013, 2014, and 2016 were the least prolific years, with 60, 74 and 94 publications. Conversely, 2020, 2022, and 2021 were the most productive years, with 432, 357, and 337 articles published, respectively. The highest average total citations per article was 18.58 reported in 2014, and the annual average number of citations was 2.06.

3.1.3. Analysis of authors (Top 20)

The number of publications each author contributed, the total number of citations, and the h-index are all shown in Table 3. 4801 authors published research papers during 2013 to 2022. Of these

Table 2: Annual publication and citations (2013-2022)

Year	n	Mean TCperArt	Mean TC/year	Citable years
2013	60	12.60	1.26	10
2014	74	18.58	2.06	9
2015	105	12.83	1.60	8
2016	94	10.43	1.49	7
2017	211	10.77	1.79	6
2018	228	9.80	1.96	5
2019	296	11.25	2.81	4
2020	432	4.76	1.59	3
2021	337	2.68	1.34	2
2022	357	1.22	1.22	1

N: Number of publications, MeanTCperArt: Average total citations per article, Mean TC/year: Average total citations per year

Table 3: Analysis of authors (Top 20)

Authors	NA	h_	T.C.	Authors	NA	h_	ТС
		index				index	
Mahmood	20	10	259	Osabohien	9	7	186
Alkhateeb	13	9	209	Adam	13	6	109
Alekseev	11	8	115	Bass	7	6	48
Bogoviz	11	8	115	Ogundipe	9	6	95
Kapitonov	8	8	148	Ozturk	6	6	276
Lobova	11	8	146	Ragulina	9	6	93
Bekhet	11	7	99	Sultan	8	6	103
Dudin	9	7	81	Alege	7	5	85
Khobai	14	7	165	Emodi	5	5	86
Mikhaylov	7	7	429	Jermsittiparsert	5	5	222

N: Number of publications, TC: Total citations

4801 authors, Mahmood published the highest number of papers (twenty papers), followed by Khobai (fourteen articles), Alkhateeb (thirteen articles), etc., as given in Table 3. Table 3 also presents the total citation analysis and h_index of the top 20 authors. It is important to note that Mahmood is the most significant author by the number of research papers published and h-index (10), but he is not the author with the most citations. Instead, the most-cited author is Mikhaylov, with 429 citations, followed by Ozturk (276 citations), Mahmood (259 citations), as shown in Table 3. The reception of citations over a period of time for a given paper exhibits a characteristic birth-death phenomenon (Mingers & Leydesdorff, 2015).

3.1.4. Corresponding author's country (Top 20)

Figure 1 shows the author's correspondence with various countries for each publication and the author's collaboration. It includes single-country publications (S.C.P.; one-country collaboration) and multiple-country publications (M.C.P.; collaboration between countries). Indonesia leads with 291 publications, 270 one-country publications, and 21 multiple-country publications. Malaysia came second with 118 publications, including 65 single-country and 53 multi-country publications. Nigeria is third with 102 single-country publications and 08 multiple-country publications.

3.1.5. Country-specific publication (Top 20)

Figure 2 lists the top 20 contributing nations in terms of publications. With 1158 papers, Indonesia is the most productive country, followed by Nigeria with 602 publications, Malaysia with 466 publications, etc., as shown in Figure 2.

3.1.6. Country-specific citation (Top 20)

Figure 3 lists the top 20 contributing nations regarding the total citations. A total of 97 countries have published papers. The lowest citation score was zero, while the highest citation score exceeded 1,000 for some countries. The data shows Malaysia received 1,153 citations, making it the most-cited nation. With more than 1,000 citations, Indonesia remained the second-most-cited nation, followed by Turkey, Nigeria, etc., as shown in Figure 3.

3.1.7. Institutions with the largest contributions (Top 20)

In this study, 1419 organizations contributed articles to the *International Journal of Energy Economics and Policy (IJEEP)*. Of these 1419 organizations, the top 20 most productive institutions are presented in Figure 4. These organizations each contributed from one to one hundred and ninety-three articles. With 119 papers, Covenant University was the most productive university in terms of overall publications, followed by Financial University under the Government of the Russian Federation with 143 papers, and Lampung University with 80 publications, etc., as shown in Figure 4.

3.1.8. Documents with the most global citations (Top 20)

The quantity of citations received without screening is called global citations (Kumar et al., 2021). The top 20 internationally cited articles during the study period (2013-2022) are displayed

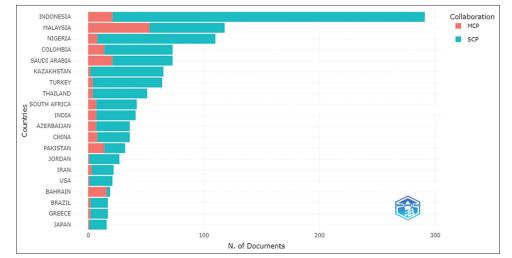
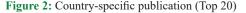


Figure 1: Corresponding author's country. SCP: Single-country publications, MCP: Multiple-country publications



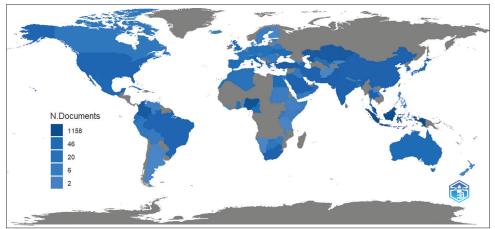
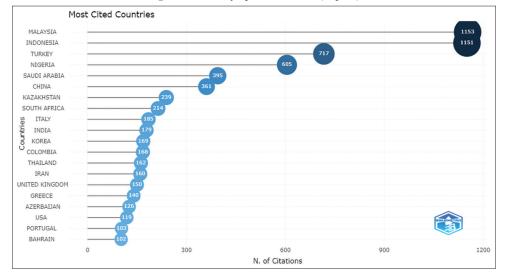


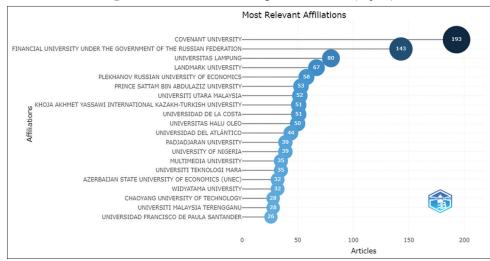
Figure 3: Country-specific citation (Top 20)

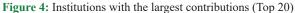


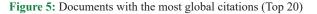
in Figure 5. Some articles are cited 0 times, while others are cited more than 300 times. The most cited paper was written by Haseeb (2019), who received 302 citations, followed by N. Apergis (2014), who received 135 citations. Other authors' citation details are given in Figure 5.

3.1.9. Analysis of keywords

Figure 6 depicts the authors' keyword analysis. Statistical analysis of the author's keywords, keywords plus, and title words helps determine study directions (Akter et al., 2021). The results show that there were 4782 authors' keywords in total. Out of these







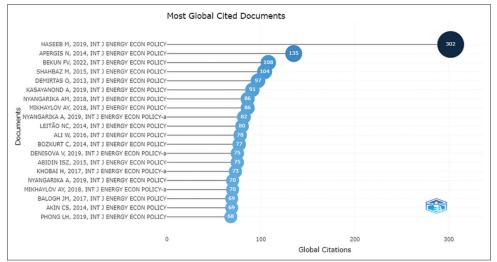
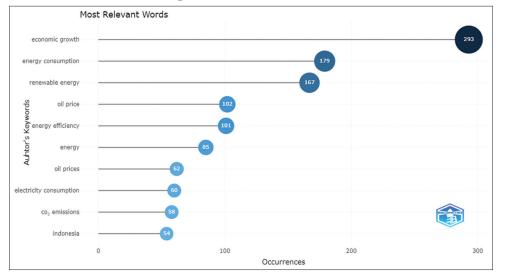


Figure 6: The most relevant words



4782 words, occurrences of each word ranged from one to 293 occurrences. The top 10 keywords are shown in the output. "economic growth" is the top keyword, with 293 occurrences.

The keyword "energy consumption" is in second place, with 179 occurrences, followed by "renewable energy," "oil price," "energy efficiency", etc., as shown in Figure 6. The Word TreeMap shows frequently appearing words in boxes that resemble map regions; the more significant the square space, the more words are displayed. According to TreeMap's findings, economic growth appeared in 12% of all keywords, followed by energy consumption (8%), renewable energy (7%), oil price (4%). This analysis shows that the cumulative word growth of "economic growth" is the highest, as shown in Figure 7.

3.2. Conceptual Structure

We performed conceptual structure analysis to discover several essential concepts and themes investigated. A co-word analysis based on the author's keywords and the thematic map was carried out for that reason.

3.2.1. Co-occurrence of keywords

Co-word analysis was proposed by (Callon et al., 1983). Network or co-word analysis co-occurrence can illustrate the relationship between themes, topics, and trends (Ingale and Paluri, 2022). When two keywords come together in a sentence, it indicates that the two concepts are related (Kent Baker et al., 2020) and helps to identify emerging trends (Kumar et al., 2021; Sanguankaew and Vathanophas Ractham, 2019). In the present study, we used co-occurrence networks to identify and analyze the distribution of keywords. According to Agostini et al. (2020), "The larger the node and the keyword, the greater the weight (i.e. the number of articles a keyword appears in). Thicker lines mean more frequent co-occurrence (i.e. the number of articles in which the keywords appear together with another keyword). The smaller the distance between the nodes, the stronger their relationship (in terms of how many papers these two keywords appear in together and relatively comparing co-occurrence with other keywords). The same colour of the nodes and keywords means they belong to the same cluster of related keywords." The keyword co-occurrence network was drawn for the author's keywords, and default options were selected for the analysis (i.e., automatic layout and normalization by association using Louvain's clustering algorithm with 50 nodes, as shown in Figure 8). The term "economic growth" has the most nodes, indicating that it is the most commonly searched keyword.

Moreover, four clusters emerged from the data: red, blue, green and purple. The red cluster is the central theme, dominated by words such as economic growth, energy consumption, electricity consumption, etc. The blue cluster highlights words such as renewable energy, energy efficiency, energy security, etc. The

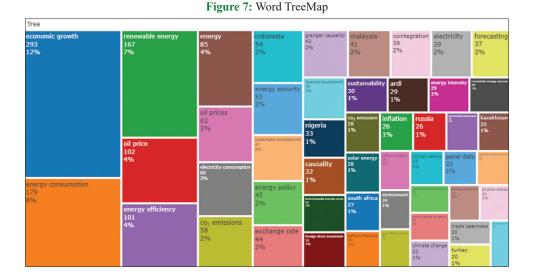
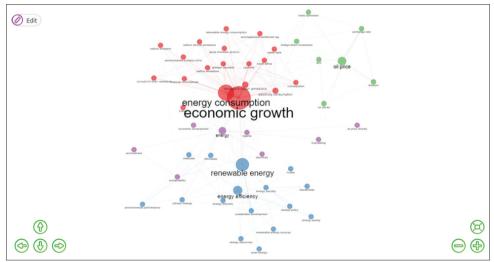


Figure 8: Co-occurrence network



green cluster includes words like oil price, exchange rate, foreign direct investment, etc. The purple cluster covers words like energy, electricity, forecasting, etc.

3.2.3. Thematic map

The themes featured in research papers are constantly changing, especially when comparing recently published studies to older publications. A two-dimensional thematic map displays the typological topics (Ingale and Paluri, 2022). Figure 9 depicts the progression of the topics, and the data reveals various sub-themes that have been addressed frequently. From 2013 to 2018, the left side displayed different popular themes. Eight themes are listed, each with a size based on how often they are used. The concept of "economic growth" had the highest occurrence, followed by "oil price" and "renewable energy"

From 2019 to 2020, the second half of the middle portion displays several popular themes. Some of the themes that arose during this period represent an evolution of the content of previous themes. For example, the theme "economic growth" emerged from the themes "economic growth," "carbon emission," and "oil price," demonstrating that it is an extension of prior research on those themes. The most common theme in this area is "economic growth." During this period, "Russia," and "corporate social responsibility" were some of the newly emerged themes. The third part (on the right-hand side) displays the most frequently used themes from 2021 to 2022. Figure 9 shows eight themes that are extensions of various themes from earlier research.

3.3. Intellectual Structure

By examining the collaboration between authors and countries, intellectual structure describes how diverse authors impact the scientific community (Ingale and Paluri, 2022). We used the cocitation network to determine the intellectual structure.

3.3.1. Co-citation analysis

In bibliometric analysis, Small (1973) highlighted, "The frequency with which two units are quoted together is known as co-citation." The intellectual structure of the most important publications in a field of study is frequently examined using co-citation analysis. Moreover, Aria and Cuccurullo (2017) noted that "co-citation of two articles occurs when both are cited in a third article" when a researcher references the work of one author alongside the work of another in a new document; this is known as the co-citation of authors (Culnan, 1986). Figure 10 illustrates three groups of authors denoted by three colours.

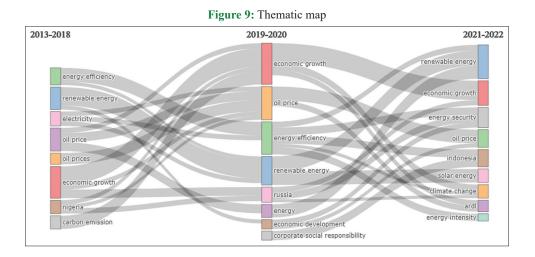
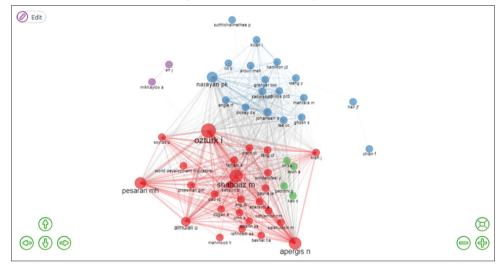


Figure 10: Co-citations analysis



The unit of study is research papers, the number of nodes is 50, and the Louvain clustering technique is used. In cluster 1, according to the highest betweenness centrality metrics, N. Apergis is considered the most influential author, followed by M.H. Pesaran and U Almulali. In cluster 2, with the highest betweenness centrality scores, PK Nrayan is revealed to be the most influential author, followed by S Johansen and P Sadorsky. In cluster 3, P Pedroni is the most influential author, and Finally, Mikhaylov has the highest betweenness centrality measures in cluster 4. The documents in each cluster form a group with common themes, indicating the subject's most essential and timely advancements.

3.4. Social Structure

We analyzed social structure to determine how authors, institutions, and countries collaborate in publication.

3.4.1. Collaboration network of authors, institutions, and countries

A cooperation network shows how writers, organizations, and nations collaborate on a specific topic. In a scientific study,

collaboration is the most formal kind of intellectual engagement among researchers (Kent Baker et al., 2020). Coauthoring scientific publications is assumed to be a sign of collaboration (Zupic and Čater, 2015). Figure 11 depicts several authors; some have connections, while others do not. The relationships between the writers can be seen in the groups of colour equations and the lines linking various names. Each square's size also indicates how many studies on this subject have been published.

There are nine clusters of authors. Cluster 1 (red) shows the collaboration between Mahmood, Alkhateeb, Hassan and Sultan. The second cluster (blue) indicates the collaboration between Adam, L.O. Saidi and A.A. Muthalib. The third cluster (light green) shows the collaboration between Khobai and P. Le Roux. The collaboration details between other clusters and authors are given in Figure 11.

Figure 12 shows four clusters of institutional collaboration. Covenant University dominates cluster 1, collaborating with the University of Lagos, the University of Nigeria and Landmark University. In cluster 2, the Financial University under the

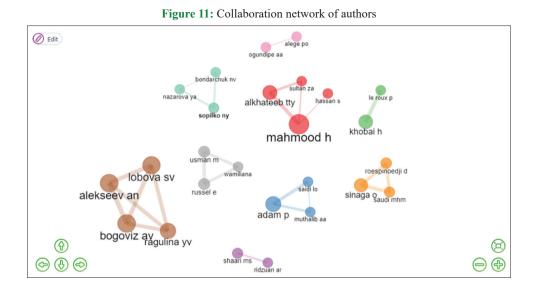
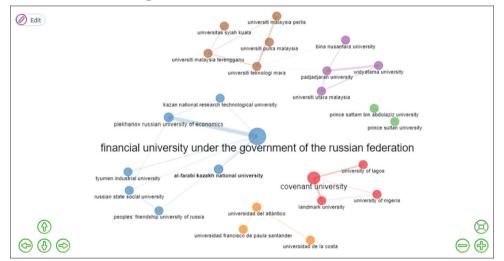


Figure 12: Collaboration network of institutions



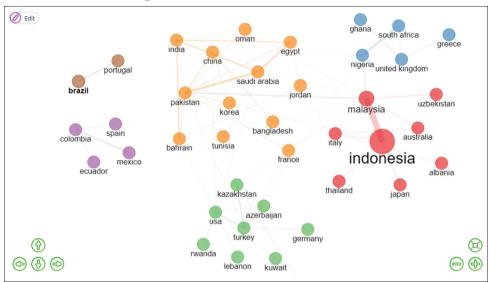


Figure 13: Collaboration network of countries

Government of the Russian Federation collaborates with the Plekhanov Russian University of Economics and other universities, as shown in Figure 12. Prince Sattam Bin Abdulaziz University collaborates the most with Prince Sultan University in cluster 3. The collaboration network of other universities is shown in Figure 12.

Figure 13 depicts how each nation collaborates globally. The node sizes correspond to the number of articles each country produced, while the interconnecting lines' width signifies the partnership's strength (Wang et al., 2019). Indonesia is the primary collaborator with other countries like Malaysia, and Uzbekistan in cluster 1. In cluster 2, Nigeria, South Africa, Greece, the U.K. and Ghana collaborate. In cluster 3, the U.S.A. Turkey, Kazakhstan, Azerbaijan, etc., collaborate. Similarly, collaboration details of other countries are presented in Figure 13.

4. CONCLUSION

The study examined 2194 documents published between 2013 and 2022. The results showed an upward trend in publications from 2013 to 2022, with a yearly growth rate of 21.92%. To identify the most productive, cited, and impactful authors, we looked at each author's output in terms of papers published, total citations, and h-index. The results showed that Mahmood is the most relevant author by the number of papers published, with twenty papers and an h-index of 10. The most-cited author is Mikhaylov, with 429 citations in total. This survey revealed that Indonesia is the most productive country with 1158 publications, while Malaysia received 1,153 citations, making it the most productive university in overall publications.

We used authors' keywords, TreeMap, word cloud and co-occurrence analyses to identify the frequently used and co-occurring keywords. The results show that there are 4782 authors' keywords in total. Of these keywords, "economic growth" is the top keyword, with more than 293 occurrences. To answer the question, "What is the current state of collaboration among authors, institutions, and countries?" we employed cocitation and content analysis to investigate intellectual and social research structures. There are nine clusters of authors. Cluster 1 (red) shows the collaboration between Mahmood, Alkhateeb, Hassan and Sultan. The second cluster (blue) indicates the collaboration between Adam, L.O. Saidi and A.A. Muthalib. The third cluster (light green) shows the collaboration between Khobai and P. Le Roux. The collaboration details between other clusters and authors are given in Figure 11. The result shows four clusters of institutional collaboration. Covenant University dominates cluster 1, collaborating with the University. Indonesia is the primary collaborator with other countries like Malaysia, Uzbekistan, in cluster 1.

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