

Trend Analysis of Article Publication on Hybrid E-Government Using Scopus Database

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Abstract

This study analyzes published scientific articles regarding hybrid e-government published in Scopus. The keyword 'hybrid AND e-government' is used to search for English scientific articles from the Scopus database and is limited to journals only. Then use VOSviewer to provide ease of formation and visualization of bibliometric maps. Since the emergence of articles on hybrid e-government, the number of publications has fluctuated every year. Forty-six articles have been published on hybrid e-government alone, with Malaysia being the most prominent in publications with six publications. Furthermore, the word "e-government" also leads to the word with the highest number of uses. In addition, there are several links between authors and keywords. From the results of the analysis, it can be identified developmental status and leading trends in terms of major journals, countries, affiliations, authors, and also words. This can help researchers and other practitioners better understand hybrid e-government states.

Keywords: *Bibliometric, Hybrid E-Government, ManagementTechnology, Visualization*

Introduction

Policies made by the central government, provincial governments, and district/city governments are unable to penetrate remote areas due to a lack of access to information resources and media. Information and communication technology development has enabled

the private sector to adopt the Internet as a communication medium, leaving the public sector behind. This is what drives the public sector to create e-government. E-government is the use of information technology by government agencies to improve relations with citizens, businesses, and other government units. This can be used to provide better citizen services, improve interaction with business and industry, empower communities, or improve government management. (Zaied et al., 2018).

E-government refers to developing new public services and service delivery models that use digital technology and government and citizen information system assets (Oumkaltoum et al., 2021). An e-government architecture is being developed to improve the performance of state apparatus and accelerate innovation by providing a secure, autonomous, and transparent digital system. The development of e-government architecture has been hampered due to policy complexity and/or lack of flexibility and adequate technology. E-government integration is the interaction between government agencies, businesses, and citizens. The four e-government formations are government to citizen (G2C), government to government (G2G), government to business (G2B), and government to employee (G2E) (Sedek et al., 2015).

The development of ICT has enabled the growth of online public services, which has increased rapidly due to citizen awareness of the Internet. E-Government increases efficiency and good governance by increasing transparency, reducing administrative corruption, improving service delivery, improving civil servant performance, empowering citizens, and increasing government finances (Zaied et al., 2018). *E-Government* is an information system that combines technical and human elements. Where it covers all uses of information technology in the public sector. E-Government is very important to improve the performance of the public sector and provide solutions to problems in the public sector. As a science related to human interaction, management, and E-Government are closely related. Therefore, e-Government covers various fields and does not depend on the government or society alone. These fields include the public sector, information technology, culture, politics, and management. The management approach to E-Government can be assessed by classifying E-Government responsibilities, namely Centralized, Decentralized, and Hybrid (Heeks, 2006).

Based on this classification, the hybrid method is the most appropriate way to carry out E-Government management because, in the hybrid method, everyone makes decisions and is not based on an existing hierarchical system, either separately or in an integrated manner. The Hybrid E-Government Method combines expertise in information technology and the public sector to mediate between various parties. Therefore, the hybrid method is often considered

the best choice for building and managing e-government. (Heeks, 2006).

Therefore, by using bibliometric analysis, the purpose of this study is that the authors want to construct and visualize publications regarding hybrid e-government from Scopus data. This bibliometric analysis will also use VOSviewer software as a tool. VOSViewer is software designed to create and visualize bibliometric maps (van Eck & Waltman, 2017).

Methodology

This research uses descriptive bibliometric analysis based on literature data on the topic of hybrid e-government in Scopus. Bibliometric analysis is a widespread and accurate method for examining and analyzing large amounts of scientific data. This technique is intended to understand the interrelationships between journal citations and summarize current research topics (Donthu et al., 2021).

In this study, the data used in the bibliometric analysis were taken from Scopus. Then use VOSviewer to provide ease of formation and visualization of bibliometric maps. This method is carried out to collect literature efficiently and establish mutual relations between publications. By the end of March 2023, 46 publications had been retrieved from the Scopus database using the following keywords "TITLE-ABS-KEY (hybrid AND e-government) AND (DOCTYPE, "ar") AND (LIMIT-TO (LANGUAGE, "English")." The results received have been downloaded in RIS format to be processed using VOSviewer to visualize and analyze trends in bibliometric form. VOSviewer allows the creation of keyword maps based on network shares.

Results and Discussion

Publication Output and Growth of Research Interest

During 17 years, 46 articles were published, as shown in Figure 1 The oldest publication was in 2005, with one article published. In the following year, 2006, there was no increase in the number of published articles; even in 2007, no articles were published on hybrid e-government. In 2008 and 2009, the number of published articles on hybrid e-government increased again, with the number of published articles as many as two each year. However, this decreased again in 2010, with only one published article on hybrid e-government. In 2011, the number of published articles related to hybrid e-government increased significantly. Namely, five articles were published that year. In 2012 there was another decline but not too significant, whereas, in 2012 alone, there were four articles related

to hybrid e-government published. In 2013 the number of published articles was the same as in 2011, namely five published articles. In 2014 there were only two related articles published. In 2015, there was the highest number of articles published related to hybrid e-government, with the number of published articles reaching six articles. However, in the following year, 2016, there was a significant decrease where no articles were published that year. The articles on hybrid e-government were published again in 2017 with two article publications. In 2018 and 2019, three articles were published each year, and in 2020, it experienced a decline again, whereas, in 2020 there was only 1 article published. In 2021 article publications increased again, with five articles published. Moreover, most recently, in 2022, there were three published articles where this has decreased when viewed from the previous year.

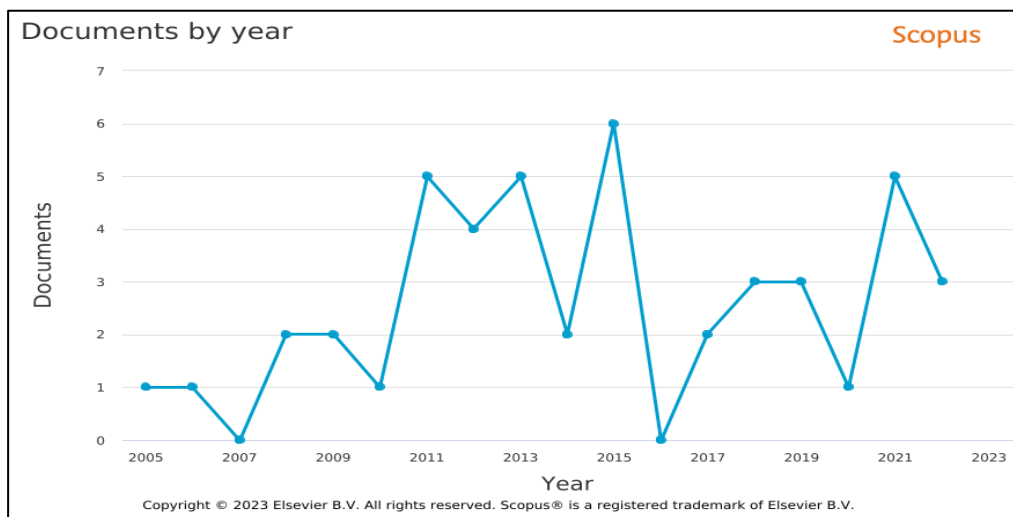


Figure 1. The development of hybrid e-government publications

Source: Scopus (2024)

Selected Journal

The analysis results, as shown in Table 1, show four journals with the most productive journals owned by different publishers. The most productive journal in publications is the International Journal Of Electronics Government Research, with two publications. This figure covers 4.34% of the total number of articles. The journal has a Scopus Q2 index. Then followed by the Journal Of Theoretical And Applied Information Technology, International Journal Of Business Information Systems, and International Journal Of Advanced Computer Science And Applications, with two articles published each. This number covers 4.34% of the total articles published for each journal. Each of these journals has a Scopus Q index.

Table 1. The journal with the most publications with its Scopus index from hybrid e-government publications

No	Journal	Number of Publications	Scopus Index
1	International Journal Of Electronic Government Research	2	Q2
2	Journal Of Theoretical And Applied Information Technology	2	Q3
3	International Journal Of Business Information Systems	2	Q3
4	International Journal Of Advanced Computer Science And Applications	2	Q3

Source: The data is processed by the author (2024)

The most influential articles in research on hybrid e-government can be seen in Table 2. There are five articles with the highest number of citations. Analysis of the number of citations shows not only the quality of the publication but also its popularity and influence in the research field (Garrigos-Simon et al., 2018). An article belonging (Janssen & Zuiderwijk, 2014) entitled "Infomediary Business Models for Connecting Open Data Providers and Users" ranks first in the number of citations with 117. The second most cited article is owned by (Al-Hassan et al., 2015), with 109 citations. Then the third most cited article is owned by (Shambour & Lu, 2011), with 82 citations. Then the following two articles are owned by (Lu et al., 2010) and (Tavana et al., 2013) with 71 and 53 citations, respectively. From the five journal sources, the article has a Scopus Q1 index.

Table 2. 5 frequently cited articles from hybrid e-government publications

No	Publication Title	Journal	Number of Citations	Scopus Index
1	Infomediary Business Models for Connecting Open Data Providers and Users	Social Science Computer Review	117	Q1
2	A semantic enhanced hybrid	Decision Support Systems	109	Q1

	recommendation approach: A case study of e-Government tourism service recommendation system			
3	A hybrid trust-enhanced collaborative filtering recommendation approach for personalized government-to-business e-services	International Journal of Intelligent Systems	82	Q1
4	BizSeeker: A hybrid semantic recommendation system for personalized government-to-business e-services	Internet Research	71	Q1
5	A hybrid fuzzy group ANP-TOPSIS framework for assessment of e-government readiness from a CiRM perspective	Information and Management	53	Q1

Source: Data processed by author (2024)

Notable Countries and Affiliations in Publications

Figure 2 shows the ten most productive affiliates contributing to the growth of research activity related to hybrid e-government. University of Technology Sydney is the leading affiliate, with four publications accounting for 8.69% of total publications. Then followed by the Academy of Criminalistics and Police Studies, Universiti Sains Malaysia, Universiti Teknologi MARA, Korea University of Technology and Education, Université Sidi Mohamed Ben Abdellah, Tarbiat Modares University, University of Namibia, each affiliate having two publications. Each of these affiliates accounts for 4.34% of total publications. Then the Turkish Army Academy and State University of Novi Pazar have a number of publications totaling one, with each affiliate covering 2.17% of the total publications. Based on these data, it can be seen that not many affiliates have conducted research related to hybrid e-government. This can be seen from the absence of affiliates with more than four publications related to hybrid e-government. The number of four is the highest, and most affiliates only have two publications.

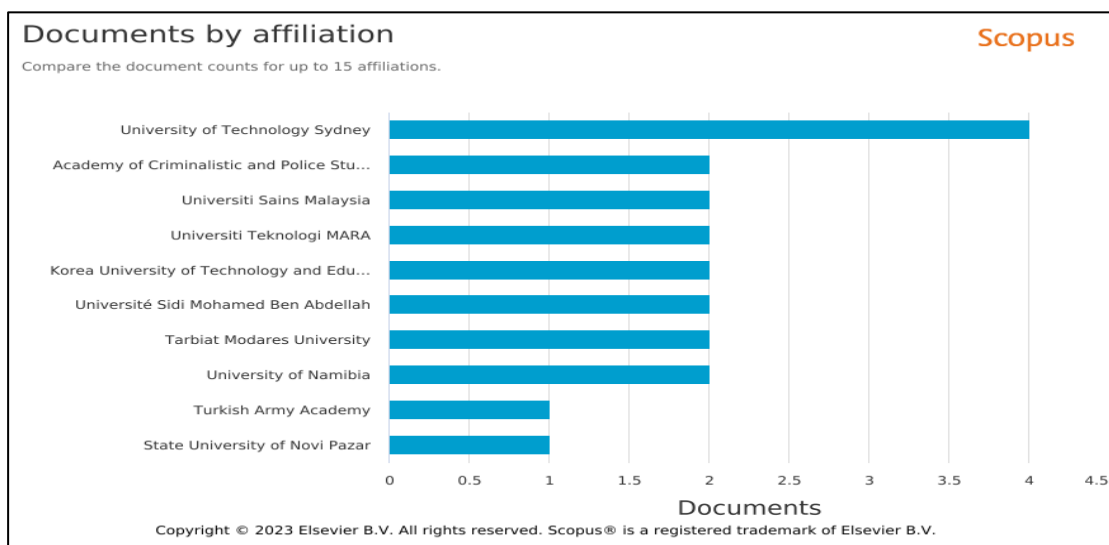


Figure 2. Affiliate with the most publications on hybrid e-government

Source: Scopus (2024)

In Figure 3, there are numbers regarding the ten most productive countries in conducting research on hybrid e-government based on the number of articles published. With six publications, Malaysia is ranked first as the most productive country in conducting research related to hybrid e-government. This number covers 13.04% of all existing publications. In second place, followed by Australia with a total of five publications. This amount covers 10.86% of the number of existing publications. In the following ranking are Germany, Iran, South Korea, and the United States, each of which has three publications. This number also includes 6.52% in each country in all existing publications. After that, there are Canada, Greece, Iraq, and Morocco, each of which has two publications, which account for 4.34% of the number of publications for each country. Based on this, research related to hybrid e-government is rarely carried out in various countries. Therefore, research on this topic in several countries can still be investigated further.

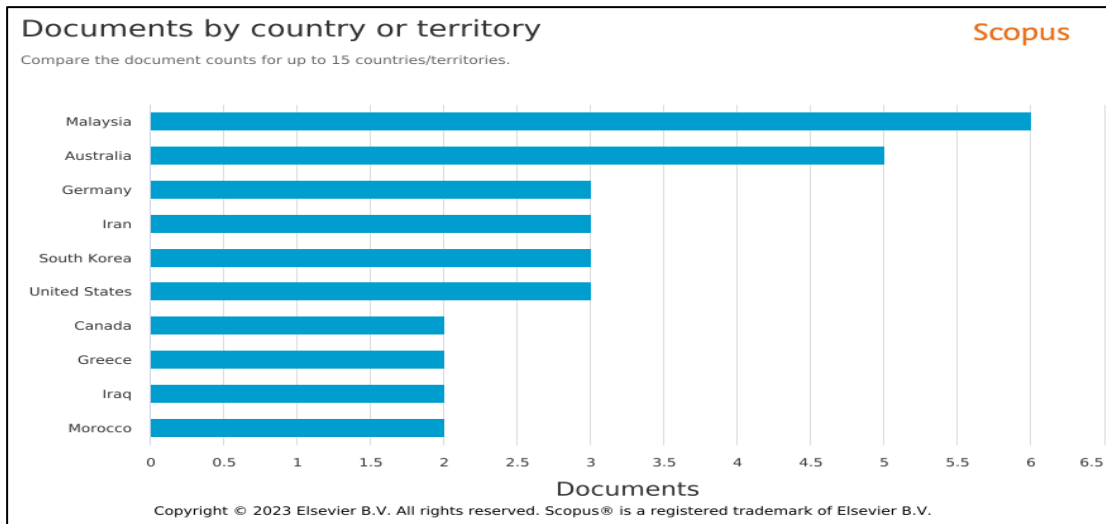


Figure 3. Countries with the most publications on hybrid e-government

Source: Scopus (2024)

Author Analysis

The next analysis focuses on the main author network. Figure 4 shows the results of the co-authorship analysis, which includes 2 clusters consisting of 11 authors and 31 link strengths. Regarding the number of authors, the first cluster in red on the left of the image consists of 6 items and the second cluster in green on the right of the image with five items. According to link strength and the number of documents, the list is led by Šimić, g with a link strength of 10 and total documents of 2, followed by all authors in the green cluster with each total link strength of 4 and total documents of only 1, then followed by all authors in the red cluster each with a total link strength of 6 and a total of only 1 document. Not many authors are related to each other, and not much has been researched on hybrid e-government.

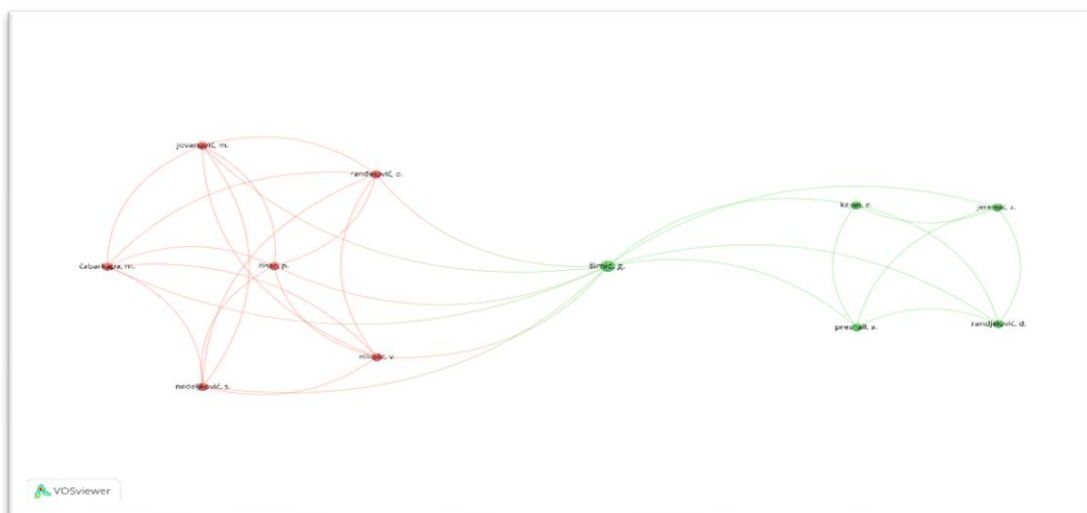


Figure 4. Network visualization on co-authoring of hybrid e-government publications

Source: VOSviewer (2024)

In addition, this study also looks at how many authors have publications on hybrid e-government. The results can be seen in Figure 5. Of the ten most prolific authors, no writer has more than three publications. The author with the highest number of publications is Lu. J with a total of 3 publications. Then followed by Khan, G.F., Nengomasha, C.T., Shambour, Q., Shayganmehr, M., and Šimić, G, each of whom has two publications. Then below it is followed again by Abedin, B., Adhab, A.H., Ahmad, K., and Al-Ani, A.K, each of whom has a number of publications of 1 publication. Based on this, it can be said that there are still not many authors who have conducted research on hybrid e-government and are related to one another.

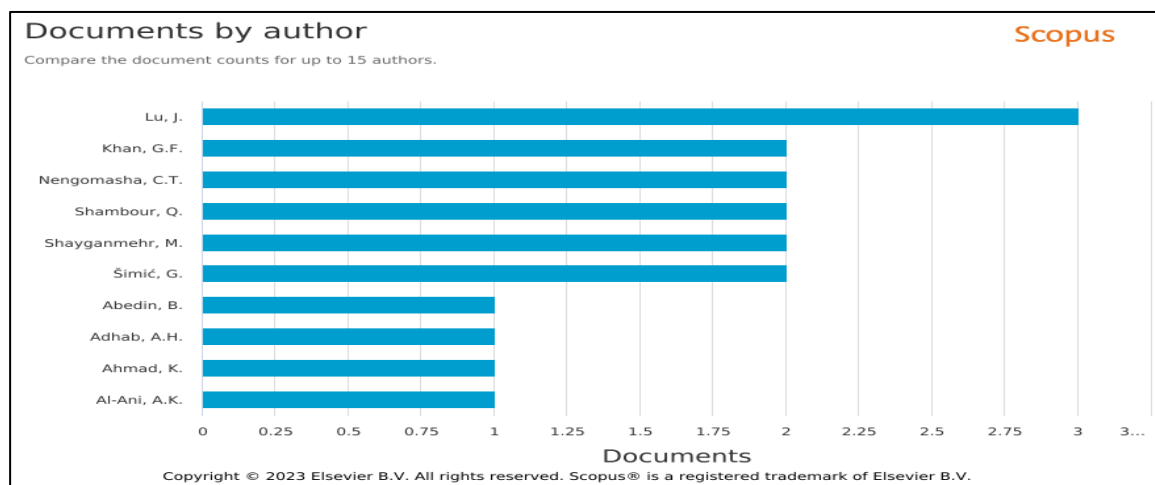


Figure 5. Top 10 authors of hybrid e-government publications

Source: Scopus (2024)

Keyword Analysis

This analysis studies the distribution of keywords that appear most often, investigated through co-occurrence (keywords that appear together in one article). The aim is to highlight the most relevant research topics related to hybrid e-government by focusing on the author's keywords in the abstract. After considering 46 articles related to hybrid e-government, the VOSviewer software shows 365 keywords. Figure 6 shows the main keywords and node sizes where the larger the nodes and keywords, the greater the weight, the smaller the distance between nodes, and the stronger the relationship they have.

In Figure 6, it can be explicitly seen that VOSviewer shows 7 clusters. Figure 6 represents the 43 keywords with the most frequent co-occurrence. Clusters 1 and 2 have the highest number of keywords, namely nine. Cluster 1 is led by "decision making," followed by eight other words. Then cluster 2 is led by the word "government data processing" followed by eight other keywords. Then cluster 3 has six keywords, with one of the words being "genetic algorithm." Cluster 4 has six keywords, and one of those words is "collaborative filtering." Cluster 5 contains five keywords which include the word "cloud computing." Cluster 6 and Cluster 7 each have four keywords. For cluster 6, one is "electronic records," and for cluster 7, there is the word "e-government services."

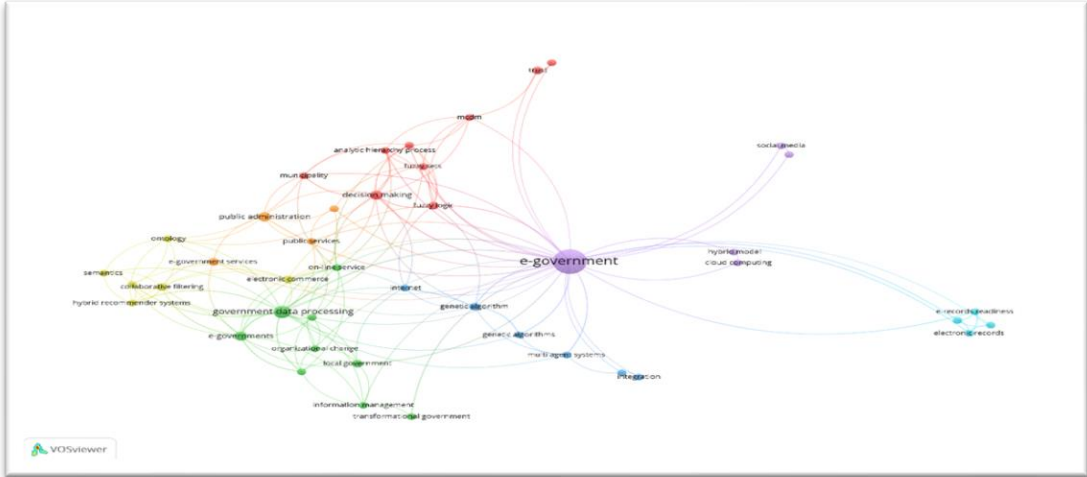


Figure 6. Network visualization on the co-occurrence of hybrid e-government publications
Source: VOSviewer (2024)

Then in table 3 shows the top 10 keywords, including the frequency of use and the total strength of the relationship. The word "e-government" has the most use, with 28 frequencies, and has a total relationship strength of 61. Then followed by the second word, "Government data processing," with seven times the total use and a relationship strength of 29. The third word is "Decision making," with a total usage of 4 frequencies and a total strength of the relationship of 19. The fourth-ranked word is "e-governments," with a total usage of 4 frequencies and a total strength of the relationship of 16. The next word is "collaborative filtering," with a total usage of 3 frequencies and a total relationship strength of 12. Then other words included in the top 10 words with the greatest frequency of use and total relationship strength include "analytic hierarchy process," "Fuzzy logic," "Websites," "Electronics commerce," and "Genetic Algorithm."

Table 3. Most used keywords + total link strength of hybrid e-government publications

No	Keyword	Total Usage	Total Link Strength
1	E-government	28	61
2	Government data processing	7	29
3	Decision making	4	19
4	E-governments	4	16
5	Collaborative filtering	3	12
6	Analytic hierarchy process	2	11
7	Fuzzy logic	3	11
8	Websites	2	11
9	Electronis commerce	3	10
10	Genetic algorithm	3	10

Source: Data processed by author (2024)

Conclusion

Based on the discussion, it can be said that the VOSviewer software can be used to conduct bibliometric analysis studies. In this study, it can be seen that the trend of publications regarding hybrid e-government has increased as well as decreased. By country, Malaysia has the most publications, with six publications. For the most publication affiliation held by the University of Technology, Sydney is the leading affiliation with four publications which cover 8.69% of the total existing publications. Based on the bibliometric co-authorship analysis, there are 2 clusters of 11 authors and 31 link strengths. In addition, the word that appears the most is “e-government,” with 28 times its use. Based on the bibliometric analysis of co-occurrence, it can also be seen that there are 7 clusters. The results of this analysis can help researchers and other practitioners better understand the situation regarding hybrid e-government.

Conflict Of Interest

The Author declares that there is no conflict of interest.

Fundings

None.

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