

A Scientometric Analysis of Social Media Use in Local Government Communication

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Abstract. This study aims to display the results of scientometric analysis from a database related to the use of social media in local government communication. In line with social media users increasing everywhere, the use of social media in government doesn't stop at the central government level, but also local governments. This study used 166 documents consisting of journal articles and conference proceedings between 2013-2022. Then the data is processed by Scientometric analysis using the CiteSpace app. Based on the analysis of the Scopus Bibliometric database, it was found that research on related themes shows fluctuations in the number of studies within ten years. The highest number of studies occurred in 2021 (36 documents) and the lowest number of studies occurred in 2013 (8 documents). In addition, it was also produced that the United States (44 documents) became the most contributing country and Nurmandi, A (4 documents) became the author with the most contributions in this research with related themes. Meanwhile, the results of the Scientometric analysis using CiteSpace resulted in 9 clusters including public sector adoption, Facebook content, case study, American local government, local government use, e-government interactivity, enabling smart participation of local governments, American grass root, and multi-level functionality..

Keywords: Scientometric analysis, social media, interaction, communication, local government.

1 Introduction

Social media including social networking applications such as Facebook, Twitter, Blog, Wiki, and Youtube are understood as social interaction tools [1]. In the past decade, social media has played an increasingly important role in the lives of modern society [2]. Social media is considered part of the web 2.0 revolution characterized by user content, online interaction, community building, and content sharing in social environments [3], [4]. When viewed from its function, social media has seven functional blocks including identity,

conversation, sharing, presence, relationship, reputation, and group/community [5]. A person or an institution can also take advantage of using social media in the form of more frequency of interaction at a lower cost [6].

In government, social media is seen as a tool to increase community engagement through communication, discussion, and coordination of public and/or social activities [7], [8]. In addition, the use of social media for government also has benefits in the form of efficiency, accountability, convenience, transparency, and increased trust and democracy [9]–[12]. Governments can also benefit from social media to integrate information and gather citizen opinions in formulating policies and making decisions [13]. But in reality, the potential value of social media has not yet been fully realized and the acceptance of social media-based services is still an issue [14]. Moreover, there are various social media-based service activities that still lack effective feedback between the government and the community [1], [12].

As closely related to communication, interaction is important in government. If assumed broadly, local government is the most important generator of interaction between government and society [15]–[17]. Therefore, local governments need to benefit from the existence of social media. Public administration bodies, especially local governments, have begun to utilize social media such as expanding coverage and increasing the possibility of feedback from the public regarding government issues from the public [18]. However, an evaluation report on municipal governments based on five categories of privacy, security, usability, content, services, and community engagement shows that community engagement is the least important of the five categories [19]. Therefore, local governments need better tools to increase citizen engagement [20]. The important role of local government in improving interaction between government and citizens is an interesting topic to research. Therefore, the purpose of this article is to examine the trend of research publications on social media and local government communication over the last ten years using bibliometric and scientometric methods.

2 Method

This article is concerned with the scientometric analysis of research on social media and local government communication. To obtain empirical evidence, a database derived from Scopus from 2013 to 2022 was collected. In collecting the data, the following search queries were used: (TITLE-ABS-KEY("Local Government") AND TITLE-ABS-KEY("Social Media") AND TITLE-ABS-KEY(Communication) AND PUBYEAR > 2012 AND PUBYEAR < 2023). Based on the query, the keywords entered into the search field are "Social Media", "Local Government", and Communication by limiting the publication year from 2013 to 2022. In addition, the search query is also limited based on document type and language. The document types to be analyzed are articles and conference proceedings. While the language limitation is English. The resulting data is 165 documents. Furthermore, the data is displayed in a graph as follows: documents by type, documents by year, documents by country, documents by author, documents by affiliation, documents by subject, and documents by source.

Furthermore, after the entire database is displayed and analyzed, the data extraction results are then entered into CiteSpace to be analyzed for visualization mapping, clustering, and analysis based on the timeline. The scientometric approach is used to analyze the visualization results and cluster summaries generated from CiteSpace. The results of the analysis then become the conclusion of this article.

3 Basic Theory

3.1 Scientometric Analysis

Scientometrics has an overview of a research field that provides a valuable source of input for conducting systematic reviews [21]. Meanwhile, in terms of its role, systematic reviews play a crucial role in scientific communication [22]. In terms of systematic reviews, the current trend is to enhance systematic reviews with the help of science mapping tools [23]. In practice, such mapping tools use a bibliographic record of a research field and produce an overview of the underlying knowledge domain as in CiteSpace [24], and VosViewer [25]. By definition, scientometrics is the study of the quantitative aspects of scientific communication, research and development practices, and science and technology (S&T) policy with the aim of advancing science using network relationships between authors and texts [26].

3.2 Social Media and Local Government

Social media is defined as a group of internet-based applications built on web 2.0 technologies that enable the creation and exchange of user-generated content [27]. Social media was originally designed for socializing, sharing photos, and connecting with friends, not work-related activities like today [28]. Now that social media has become a part of everyday life, many organizations are trying to integrate social media into their work [29]. Social media has also expanded and is used all over the world [30]. The widespread benefits of social media have also been adopted by the public sector. In government, social media has been successful in enhancing various positive outcomes such as transparency, accountability, cross-sector collaboration, citizen participation, and improving public services [31]–[33].

3.3 Interaction and Communication

Communication theory is divided into three different perspectives: communication as a one-way construction process (constructing meaning), communication as a two-way construction process (adding meaning), and communication as a diachronic meaning construction process (developing meaning). Communication as a one-way construction process managed to become the initial focus of mass communication theory. One-way communication is interpreted as a one-way process where the sender does something to one or more recipients. This perspective views the success of communication as sufficient when the message has reached the recipient. In contrast, communication is viewed as a two-way process where interaction is important. However, there are different interpretations of what "interaction" means. Interaction means not only mutual dialog, but also acting and influencing each other. Meanwhile, in the view of communication as a process of developing meaning, interaction is equally important. The difference is that in the development of meaning, interaction focuses more on social action [34].

4 Findings and Discussion

4.1 Analysis by Documents Type

The database that has been obtained comes from Scopus with a time span of 2012 to 2022. The database search was carried out by limiting the form of publication, namely articles and

conference papers. Therefore, the following is a diagram of the comparison of the two forms of documents.

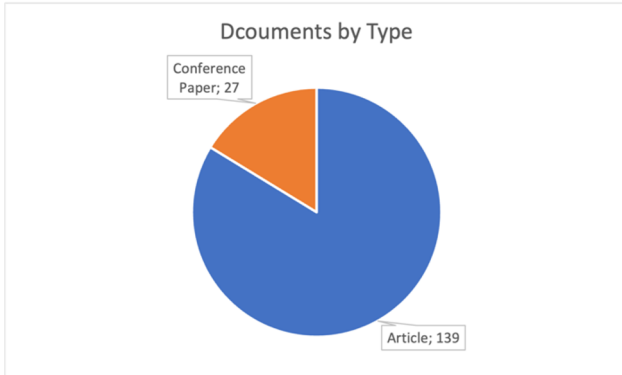


Fig. 1. Documents by Type

Fig. 1. shows the form of publications analyzed for research trends. Articles have a greater quantity of 139. While the remaining 27 were published in the form of conference papers.

4.2 Analysis by Year

Research related to the use of social media has become a lot of research since the Covid-19 pandemic. This needs to be done to develop and expand the scope of research on social media. The use of social media by the government has expanded to the local government level. Local governments try to take various benefits from the existence and development of the use of social media. Researchers make the results of the data that has been collected into an academic finding.

Fig. 2. below shows the trend of research on the theme of social media in local government communication.

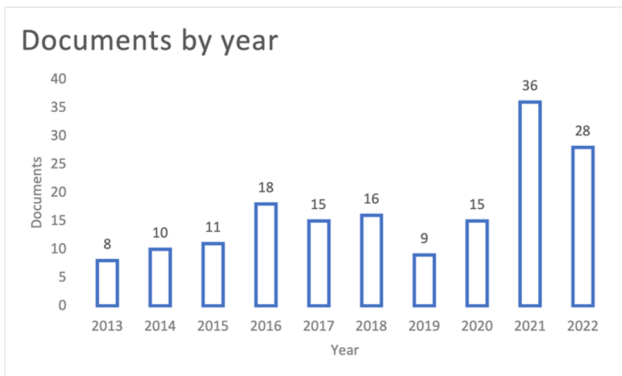


Fig. 2. Documents by Year

Fig. 2. shows research and publications on the social media in government communications from 2013 to 2022. During the first four years, Scopus-indexed publications have increased from year to year. In 2013, there were 8 documents that were successfully published and indexed by Scopus. An increase occurred in 2014 which amounted to 10 documents, 2015 amounted to 11 documents, and 2016 amounted to 18 documents. Meanwhile, in 2017 there was a decrease in the number of publications to 15 documents which then increased again by 1 document in 2018. In 2019, the number of publications regarding the use of social media

as a means of local government communication again experienced a decrease in quantity where only 9 documents were successfully published. However, in 2020 and 2021, the number of published documents increased again, namely 15 documents in 2020 and 36 documents in 2021. This is a drastic increase in the number of publications in 2021 although in 2022, the number of published documents decreased again.

4.3 Analysis by Country

There were 44 countries and 1 unknown that contributed to the research and publications on this theme. Of these 44 countries, there are 15 countries with the most contributions. These countries are the United States, United Kingdom, Indonesia, Spain, Portugal, Australia, Poland, China, Unknown, Switzerland, Sweden, Belgium, Italy, Germany, and Canada. While documents whose origin is not recognized there are 5 published documents.

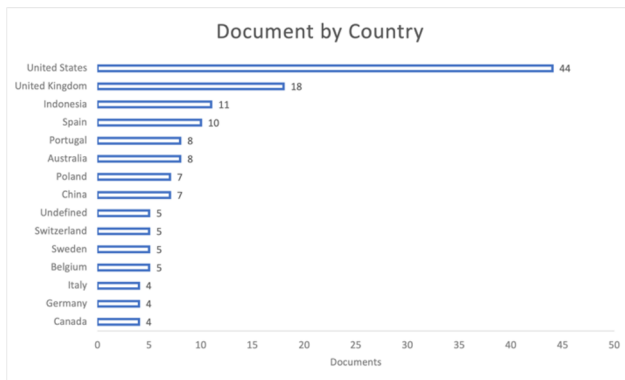


Fig. 3. Documents by Country

Fig. 3. shows the United States as the country with the largest contribution to research on social media in local government communication. The United States alone has 44 Scopus-indexed publication documents related to this theme. In second place is the UK with 18 published documents and Indonesia in third place with 11 published documents. Meanwhile, the fourth position is filled by Spain with a total of 10 documents, Portugal 8 documents, Australia 8 documents, Poland 7 documents, China 7 documents, and unrecognized 5 documents. The countries with a total of 5 published documents include Switzerland, Sweden, and Belgium. In the bottom three contributing countries, there are Italy, Germany, and Canada with a total of 4 published documents.

4.4 Analysis by Author

Research related to the theme of using social media for government communication tools has seven authors with the highest number of publication documents and the number of citations. The number of documents and the number of citations have different results. The following is a graph of the authors based on the number of publication documents.

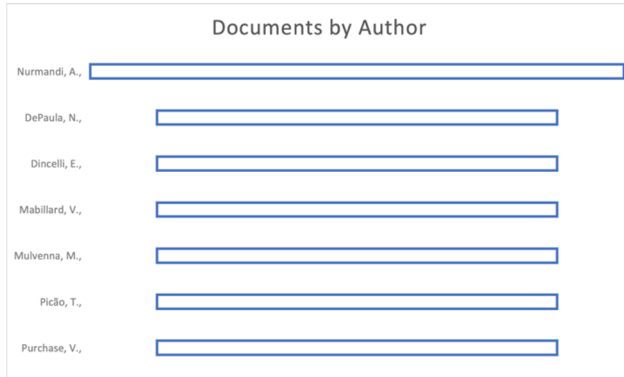


Fig. 4. Documents by Author

Fig. 4. above shows the seven authors with the highest number of Scopus indexed publication documents. In the first position is Nurmandi, A. with 4 documents. Meanwhile, the second to seventh positions have the same number of documents, namely 3 documents. The authors who fill these positions are DePaula, Dincelli, Mabillard, Mulvenna, Picao, and Purchase.

Furthermore, the authors are analyzed based on the highest number of citations per document. The following is a table of the 7 data with the highest citations that researchers have collected.

Table 1. The Most Cited Author

Author	Title	Source	Citation
[35]	<i>Transforming the communication between citizens and government through AI-guided chatbots</i>	Government Information Quarterly	178
[36]	<i>The role of social media in local government crisis communications</i>	Public Relations Review	170
[37]	<i>Social Media Use During Disasters: How Information Form and Source Influence Intended Behavioral Responses</i>	Communication Research	164
[38]	<i>Social media in emergency management: Twitter as a tool for communicating risks to the public</i>	Technological Forecasting and Social Change	151
[39]	<i>Social Media and Local Government: Citizenship,</i>	Local Government Studies	105

	<i>Consumption and Democracy</i>		
[40]	<i>Social media adoption at the American grass roots: Web 2.0 or 1.5?</i>	Government Information Quarterly	96
[41]	<i>Evaluating the use and impact of Web 2.0 technologies in local government</i>	Government Information Quarterly	94
[42]	<i>Toward a typology of government social media communication: Democratic goals, symbolic acts and self-presentation</i>	Government Information Quarterly	89
[43]	<i>Twitter as a tool for citizen engagement: An empirical study of the Andalusian municipalities</i>	Government Information Quarterly	81
[44]	<i>Twitter as a tool for citizen engagement: An empirical study of the Andalusian municipalities</i>	Disasters	65

Table 1. above shows the ten authors with the largest number of citations. The first position is Androutsopoulou who examines the transformation of communication between communities using AI with 178 citations. While in the second and third positions there are Graham and Liu with 170 and 164 citations respectively. Furthermore, there are Panagiotopoulos and Ellison and Reddick with 151, 105, and 96 citations respectively. The bottom four positions consist of Sivarajah, DePaula, Bonsón, and Jung with 94, 89, 81, and 65 citations respectively. The number of citations can indicate the relationship between documents from each author.

4.5 Analysis by Affiliation

There were 160 affiliates or institutions that contributed to this research. Of these affiliations, the 7 highest affiliations related to the research theme of social media in local government communication were taken.

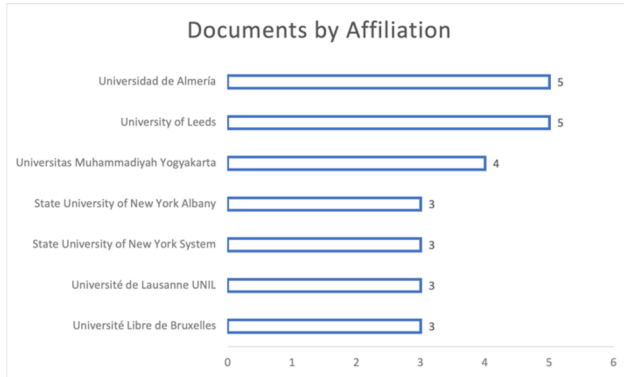


Fig. 5. Documents by Affiliation

Fig. 5. above shows that Universidad de Almeria and University of Leeds are the most contributing affiliates with 5 Scopus indexed publication documents. Furthermore, Universitas Muhammadiyah Yogyakarta has 4 published documents. State University of New York Albany, State University of New York System, Université de Lausanne UNIL, and Université Libre de Bruxelles have 3 published documents.

4.6 Analysis by Subject Area

Research on this theme is classified from 21 scientific groups. Of all the scientific clumps, researchers took 7 clumps with the most documents.

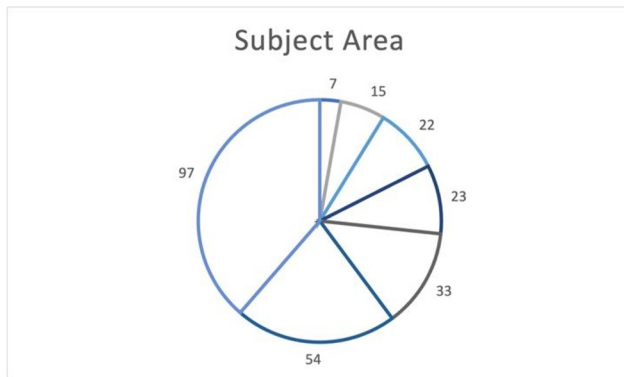


Fig. 6. Documents by Subject Area

Fig. 6. shows how various disciplines have researched the use of local government social media. The figure shows that the social science discipline has the highest number of documents with 97 Scopus-indexed publications. Furthermore, the computer science family occupies the second position with 54 documents and the business, management and accounting family with 33 documents. Health and natural sciences occupy the fourth and fifth positions with 23 and 22 documents respectively. Meanwhile, the bottom two are engineering and economics with 15 and 7 documents respectively.

4.7 Analysis by Source

Based on Scopus database analysis, 95 publication sources were found. Of the total publication sources, the following is a graph of 7 publication sources.

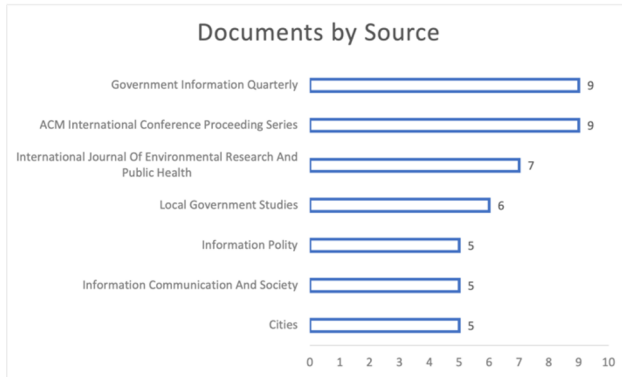


Fig. 7. Documents by Source

Fig. 7. above shows Government Information Quarterly and ACM International Conference Proceedings Series as the sources that publish the most Scopus indexed documents, namely 9 documents. While positions 3 and 4 are International Journal of Environmental Research and Public Health and Local Government Studies with 7 and 6 documents respectively. The last three positions with a total of 5 published documents are filled by Information Polity, Information Communication and Society, and Cities.

4.8 Scientometric Analysis Results Using CiteSpace

CiteSpace is a Java application for analyzing and visualizing co-citation networks [45]. The main purpose of this application is to help analyze emerging trends in a scientific domain. In the latest version of the application, CiteSpace allows users to label clusters of co-citation networks. Cluster labeling is related to the clarity and relatedness of co-citation networks [24]. The bibliographic data extracted from Scopus is then analyzed and processed using CiteSpace to determine and visualize the network between existing documents. **Fig. 8.** below shows the results of cluster visualization and co-citation networks generated from CiteSpace.

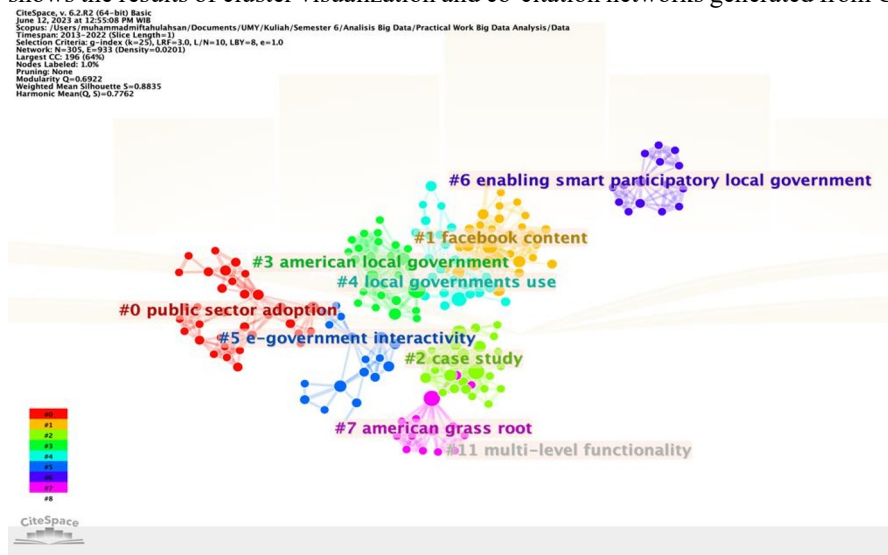


Fig. 8. CiteSpace Cluster Visualization

The results of the analysis and visualization resulted in 9 largest clusters grouped based on the log-likelihood ratio (LLR) label. Each color above indicates the corresponding cluster. To clarify the results of the analysis, the following is a table of the 9 largest clusters generated.

Table 2. 9 Largest Cluster Table

Cluster ID	Size	Silhouette Score	Average Year	Label (LLR)
0	33	0.953	2010	Public Sector Adoption
1	31	0.929	2016	Facebook Content
2	28	0.843	2012	Case Study
3	27	0.831	2014	American Local Government
4	26	0.778	2015	Local Government Use
5	18	0.833	2011	E-Government Interactivity
6	15	0.97	2016	Enabling Smart Participatory Local Government
7	14	0.937	2009	American Grass Root
11	4	1	2010	Multi-Level Functionality

Based on Table 2. above, the cluster with the most documents is cluster 0 labeled (LLR) Public Sector Adoption with 33 documents. The silhouette score of the cluster is 0.953 which indicates a high silhouette score. The higher and closer to 1 silhouette score, the more homogeneous the documents in it [25]. The average document generated in cluster 0 is 2010. To clarify in terms of time, below is a timeline visualization.

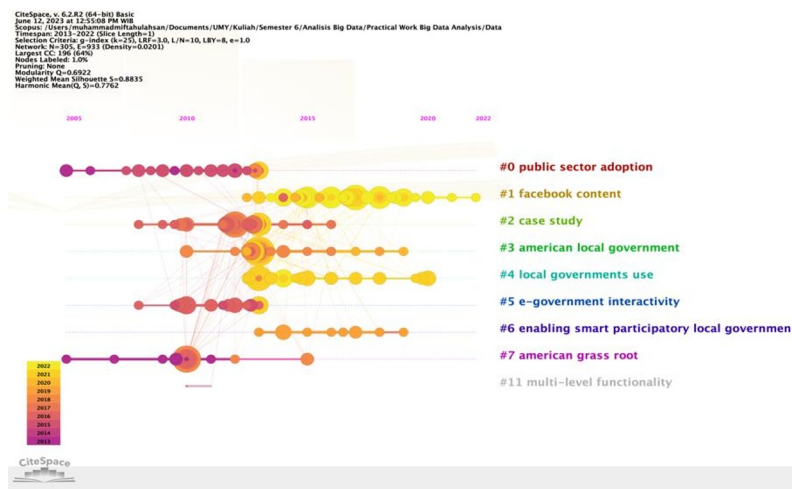


Fig. 9. CiteSpace Timeline Visualization

From the Narrative Summary that has been exported from CiteSpace, there are 9 largest clusters found inside it. Cluster#0 labelled Public Sector Adoption is the highest number of documents that has 33 members inside. In addition, the silhouette score of this cluster is also high at 0.953 which indicates a high homogeneity of the relationship between documents in this cluster. The most citing document in the first cluster is a study titled "Using twitter for dialogic communication: local government strategies in the european union" [46]. This article analyzes about local government Twitter use for dialogic communication at Eropa Union. The findings of this article show if local government are mostly unaware of dialogic social media benefit and this condition is open to improve. Even though, now, many social media strategy and daily tactics have also been adopted around the world as part of local Open Government Initiatives other than U.S government that has widely accepted before [47].

Cluster#1 has 31 members with silhouette score of 0.929 which is a high value among other clusters. In this cluster, the most citing document in this cluster is the document with entitled "Citizen reactions to municipalities' instagram communication"[20]. This article analyzes about reactions of citizen to municipalities (as local government form) communication at Instagram. This article found that when local government has a high debt, they don't maintain and actively use Instagram account. In addition, quality of content is more important than quantity of followers because there aren't have significant relationship between citizen reactions and number of habitats of municipality. Although the most citing article analyzes about Instagram platform, Facebook is still most studied with Instagram itself [48].

In cluster#2 Case Study become as a method to analyze social media trend which produces 0.843 silhouette score and has 28 members. The most article that cites from this cluster is article entitled "Assimilation of social media in local government: an examination of key drivers"[49]. In this article, it is found that technological competence, top management support, perceived benefits, and citizen readiness significantly affect social media assimilation in local governments. In addition, top management is the strongest predictor of social media assimilation in local government. In line with the cluster label, this article uses case study to analyze the result which is choose key driver in social media of local government. In addition, case study also used in the article entitled "Influence of Social Media on Youngsters: A Case Study in GC Women University Sialkot, Pakistan" which choose GC Women University Sialkot as the object of the case study [50].

American Local Government as a label of Cluster#3 has a silhouette score of 0.831 and 27 members inside. Article entitled "Exploring dialogic strategies in social media for fostering citizens' interactions with Latin American local governments" become as the most citing article in this cluster [51]. This article analyzes about citizen online engagement in dialogic strategic at local government level. This article finding shows that in Latin America there is a positive influence of dialogic strategies on online citizen engagement that aims to encourage participation on social media. Local Government Use as the label of Cluster#4 has 26 members and 0.778 silhouette score. The silhouette score of this cluster is the smallest of the other clusters in this dataset. This indicates that this cluster has the lowest homogeneity. The most citing article in this cluster entitled "Citizen reactions to municipalities' Instagram communication"[20], the article that also the most citing article at Cluster#1 labelled Facebook Content.

Interactivity in E-Government Concept as a benefit from social media become into Cluster#5 label "E-Government Interactivity". This cluster has 18 members and 0.833 silhouette score that's mean the homogeneity of the cluster. Meanwhile, the most citing article in this cluster is an article titled "An empirical analysis of local government social media communication: models of e-government interactivity and public relations"[52]. This research uses three interactivity models from the concept of e-government, namely one way push, two way pull, and networking which are integrated with the theory of Excellence in public relations called impression management. The results of this study show that most of the interactivity of the

studied content refers to one-way communication and image management. So, the two way pull interactivity should be increasing together.

Two-way pull interactivity can be carried out with Enabling Smart Participatory Local Government which is also labeled as Cluster#6. This cluster has a total of 15 members and a silhouette score of 0.97 which is the second largest score. The most citting articles in this cluster is a article entitled “Capturing citizen voice online: enabling smart participatory local government”[53]. This article analyze about how social media no longer one-way or two way communication. It enables participatory decision-making processes by local governments.

As fundamentally social media research developing, article entitled “Social media adoption at the american grass roots: web 2.0 or 1.5?” which examines the factors that drive the adoption of social media by local governments and the move of local governments from web 1.0 to web 2.0. This study shows the results that the main drivers of the adoption of e-information and local government services are very consistent with previous research, namely government size, type and form of government, region of the country, education, e-government experience and separation of IT departments. This article also become as the most citting article in Cluster#7 labelled American Grass Root. This cluster has a silhouette value of 0.937 and 14 members.

In this systematic review article, Cluster#11 is the last cluster of the 9 largest clusters before that has only has 4 members inside. Meanwhile, with the least number of documents, this cluster has a silhouette score of 1 or a perfect score. This shows that the four documents have highest homogeneity between others 9 largest cluster before. This cluster has a document which most citting this cluster that is article entitled “Multi-level functionality of social media in the aftermath of the Great East Japan Earthquake”. This article analyze about multi level functionality after the Great East Japan Earthquake on March 11th, 2011. Meanwhile, this article found five social media function: interpersonal communications with others (micro level); channels for local governments; organisa- tions and local media (meso level); channels for mass media (macro level); information sharing and gathering (cross level); and direct channels between micro-/meso- and macro-level agents.

5 Conclusion

Overall, the conclusions of the article focusing on social media research trends in local government communications yield three main points. First, research trends on social media, local government, and communication increased rapidly in 2021 when the Covid-19 pandemic was happening and the role of social media was needed. In addition, as a superpower in the field of technology, the United States is the country that contributes the most research related to social media in local government communication.

Second, based on CiteSpace analysis, the 9 largest clusters related to this dataset were generated. Of the total 66 clusters found and the nine largest clusters, Cluster#0 is the cluster with the most documents which hsd 33 members inside. Meanwhile, the cluster with the highest silhouette score is Cluster#11 with a silhouette score of 1 even though it's only contain 4 members inside.

Third, when viewed from the timeline of each cluster, the last research trend related to social media in local government communication conducted was Cluster#1 labeled Facebook Content in 2022. Meanwhile, in the research trend timeline image, it can be concluded that there is a relationship between clusters within a certain period of time.

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