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Social Network Analysis on Odd-Even Policy in Bogor City

Imsar Gunawan[1], Manik Sunuantari[1*], Yoedo Shambodo[1]

[1]Universitas Al-Azhar Indonesia
Jl. Sisingamangaraja No. 2 Kebayoran Baru, Jakarta 12110 - Indonesia
[*]Corresponding author: manik.sunuantari@uai.ac.id

Abstract
Social network analysis (SNA) has been widely used in epidemiology to understand how the structure of the relationship is formed in the odd-even policy implemented in the city of Bogor. SNA can also be an appropiate tool for mapping the effectiveness of a policy. The public policy implemented by the Mayor of Bogor regarding odd-even policy in Bogor shaped various responses from the community. This study aims to determine the effectiveness of the Odd-Even policy through Twitter's hashtagh #GanjilGenapBogor. The theory used was media convergence theory, with the concept of User Generated Content (UGC). The method used was network analysis with a qualitative approach. The results indicated that the users of Twitter's social media showed various responses to this issue. The responses formed various conversations among the users. From these conversations, the Popularity Centrality of the actors involved was formed. Each actor plays a role in the formation of public opinion. Actors who are involed in these conversations, played an important role in creating interrelated group communication networks. The exchange of information carried out by the main actors in the communication network aims to see how much influence is generated to the followers or members of the network created by the main actor. This circumstance brings up one dominant actor, which is called 'opinion leader'. In addition, this response resulted in the emergence of news sentiments. Sentiments that appear in the public tend to be negative. These sentiments touched 55% of the total coverage on various news media platforms.
Keywords: Epidemiology; Odd-Even Policy; Social Network Analysis; Twitter; User Generated Content;

Introduction

Various efforts have been made by the government in order to deal with the post-COVID-19 situation. A number of policies have been issued by the government to overcome the post-pandemic effects in various sectors. By the means of news released by Kompas Pedia, several policies issued by the government are the implementation of social distancing, large-scale social restrictions (PSBB), the ban on homecoming tradition and the new normal (Gitiyarko, 2020). Various new policies were also implemented to limit the emergence of new cases of COVID-19, one of which was the odd-even policy for motorized vehicles in the city of Bogor.

The odd-even policy is different from that of DKI Jakarta whose goal is to limit the number of vehicles themselves. The reason for implementing this policy in Bogor, according to Bogor Mayor Bima Arya as quoted by Kompas.tv, is to curb the addition of COVID-19 cases in Bogor City (Permatasari, 2021). This is because the city of Bogor is one of the

tourist destinations for the people of Jakarta – Bogor–Depok–Tanggerang-Bekasi (Jabodetabek). During the COVID-19 pandemic, tourism trends underwent some changes as quoted in Tempo that there were five tourism trends that changed during the new normal period in the wake of the pandemic. The five trends are: (1) solo trips; (2) nature tourism as a destination: (3) guidelines for cleanliness, health, safety and the environment (CHSE concept); (4) domestic tourists, and (5) the gradual opening of tourist destinations (Kustiani, 2020). In addition, as reported by tirto.id, that the tourism trend during the COVID-19 pandemic was staycations and road trips (Prinada, 2020).

This touristic trend answers the need for fulfilling travel and enjoying vacation trips with family or friends without worry about violating the health protocols. Tour travel does not mean that people need to travel far away, but nonetheless it still has the opportunity to create a crowd in a certain place. This happened when the new normal discourse was conveyed, and as a result, popular tourist destination Puncak in Bogor was invaded by tourists (Umar, 2020).

Therefore, as an effort to prevent the transmission of COVID-19, the Bogor City government has issued an odd-even policy. Traffic flow needs to be regulated in order to provide convenience for the community to move. The odd-even policy is the choice of the Bogor City government to anticipate the increasing spread of COVID-19.

The odd-even policy in the city of Bogor has drawn various opinions that have emerged in the community. Each party certainly has its own reasons for responding to this policy. Twitter as a social media platform is one of the media that is used to voice public opinions. The various opinions conveyed, of course, have goals and objectives according to the wishes of the sender. Twitter is one of the social media that can be used to strengthen relationships between users, and even influence the opinions of other users. The odd-even policy is trending on Twitter because it is widely discussed by its users with the name of #GanjilGenapBogor. The #GanjilGenapBogor policy set by the Bogor City government cannot be separated from the role of actors who interact via Twitter. Therefore, Twitter can also be used as a medium to shape public opinion, as well as social control over odd-even policies.

Theoretical Framework

The public policy's process is inseparable from the demands, needs, interests and agenda setting desired by the government. Public policy is made as a form of answer to the problems that arise in the midst of people's lives with various interrelated factors.

The scope of public policy is very broad because it covers various fields and sectors such as economic, political, social, cultural, legal and so on. In terminology, the notion of public policy is very broad, depending on which point of view we interpret it. According to Easton, it provides an understanding that public policy is the authoritative allocation of values for the whole society or as the implementation of values forcibly to every member of society (Taufiqurokhman, 2014).

In addition, Robet Eyestone defines public policy as "the relationship between a government unit and its environment". Many people think that the definition is still too broad to understand, because what is meant by public policy can cover many things. According to Nugroho (Taufiqurokhman, 2014), there are two characteristics of public policy. They are: (1) Public policy is something that is easy to understand because it is things that are done to achieve national goals; (2) Public policy is something that is easy to measure, because the measure is clear, that is the extent to which progress has been made in achieving the goals that have been taken.

Public policy certainly undergoes various changes in accordance with the conditions and the environment. This change is referred as policy reform as an inherent aspect of a public policy. Policy formulation, policy implementation, and policy evaluation are public policy activities carried out based on that interest, to achieve the objectives of the policy as expected. In addition, according to Hayat, policy reform has dimensions and approaches that are comprehensive, dynamic and flexible. Having values that are built in policy is a process of change for the better. According to (Hayat, 2018), the dimensions of policy reform are:

Context. The context in the policy contains two elements, that are macro and micro. On the macro aspect, the policy context has a strategic role in the objective aspect of the policy. As the essence of policy, context becomes an important barometer for policy, whether the policy is in accordance with the

needs of the community or not. Does the policy have relevance to the program being launched. How the policy is made and implemented. Meanwhile, in the context of micro policy, it is a form of policy that is more concrete, specific, and detailed. The policies implemented are more technical in nature and directly in contact with the community. The policies are concrete in accordance with the needs expected by the government. In addition, the micro aspect is in the form of programs launched by policy makers to be implemented. These programs are realized according to their provisions, needs and designations, so that the policies can be implemented properly;

Arena. Policy also has an arena that is an important part in achieving its goals. The policy arena is a policy dimension that plays an important role in accommodating policies, including rules and regulations in policies that serve as guidelines in implementing policies. Provisions or regulations are basic concepts that must be carried out by policy makers so as not to get off the predetermined setting;

Process. The last dimension is process. Process is the key to achieving goals. The process becomes a central part of a policy. A good policy can have bad consequences if the process is not good. Each process determines the outcome of the policy. Policy is determined by the process. It is the process that becomes important in achieving the objectives of the policy.

Social Network Analysis

Social network analysis (SNA) has now moved from a suggestive metaphor to a computer analytic approach, with theoretical statements, methods, social network analysis software, and the researchers themselves. The analysis is carried out on a whole-to-part basis; from structure to relationships with individuals; from behavior to attitude. Analyst typically studies the entire networks (also known as complete networks), all ties that contain certain relationships within a given population, or personal networks (also known as egocentric networks), the ties that certain people have, such as their "private community." The difference between an entire/complete network and a private/egocentric network largely depends on how the analyst collects the data. That is, for groups such as companies, schools, or membership associations, analysts are expected to have complete information about

who is on the network, all participants being potential egos and nodes. Personal/egocentric studies are usually carried out when ego identity is known, but not its alteration.

This study relies on the ego to provide information about the identity of the nodes and there is no expectation that the various egos or collections of nodes will be tied to each other. Hybrid networks may be valuable to examine the entire/complete network that is expected to include opinion leader outside those with formal public position. For example, company employees often work with non-company consultants who may be part of a network that cannot be fully determined prior to data collection.

Social network analysis has been used widely in epidemiology to understand the patterns and forms of communication that occur within a population. The evolution of social networks can sometimes be modeled using agent-based models, providing insight into the interactions between the rules of communication, the spread of rumors and social structures. SNA can also be an effective tool for mass surveillance, for example the Total Information Awareness program conducts an in-depth research on strategies for analyzing social networks to determine whether US citizens are a political threat or not (Tsvetovat & Kouznetsov, 2011).

Social Network Analysis is an approach used to analyze relationships that occur in a case. SNA is a method that comes from different domains such as theory, graphs, sociology, physics and computer science to study human relations using graph theory, with the use of graph theory making SNA able to examine the structure of social relations in a group (Tomasoa et al., 2019).

Rogers & Kincaid (1981) state that the network becomes very important to be observed related to human behavior through the communication structure that is formed in a system. Meanwhile, Allaho and Lee state that SNA is a social analysis that links between social networks that are formed in the midst of society and can be described from the links formed from a phenomenon (Allaho & Lee, 2015). The effectiveness of communication in a network can be determined from the level of relationships and the quality of relationships that occur in the network (Rogers & Kincaid, 1981).

In communication networks, actors, whether individuals, groups or organizations, are connected through social interactions such as responding to an issue, sharing knowledge and alliances (Luthfie, 2018). The communication network will form a map to determine the position of each connected actor. The position of opinion leaders is a very important position in the communication network in a system. Opinion leaders play a key role in designing or managing information source and innovation both internally and externally (Gunawan et al., 2017).

Social Media

Social media is a collection of software that allows individuals and communities to communicate, gather, share, and collaborate. This is in accordance with what was conveyed by Sari et.al who said that social media is a media platform that focuses on the existence of users who facilitate them in their activities and collaboration (Sari et al., 2018).

The power possessed by social media lies in user-generated content (UGC), which means that the content shared on the media is generated by its users. This is in stark contrast to the mainstream media which is controlled by an editor. Therefore, social media can be seen as an online medium (facilitator) that strengthens the relationship among its users as well as a social bond. In essence, with social media, various two-way activities can be carried out in various forms of exchange, collaboration, and getting to know each other in written, visual and audiovisual forms. Social media begins with three things, namely Sharing, Collaborating, and Connecting (Noor, 2011).

Social media has evolved far beyond the function of social networks. Currently, various social media have emerged with various characters and their respective advantages, such as LinkedIn, MySpace, Facebook, Twitter, Wiser, Google+ and so on. They have evolved into current sources of news and entertainment as well as incorporate the functions of old online communities including chat rooms, listservs, instant messengers, and newsgroups (Straubhaar et al., 2012). Nowadays, social media is also a place for digital marketing activity, such as social media maintenance, social media endorsement and social media activation.

There are several characteristics of social media, namely: (1) Network, an infrastructure that connects computers with other hardware. This connection is necessary because communication may occur if computers are connected, including data transfer; (2) Information, becomes an important entity in social media because social media users create representations of their identities, produce content, and perform interactions based on them; (3) Archives, for social media users, archives become a character that explains that information has been stored and can be accessed anytime and through any device; (4) Interactivity, social media forms a network among users that does not only expand friendships or followers, but must be built with interactions among these users: (5) Simulation of society, social media has the character of being a medium for society in the virtual world. Social media has a uniqueness and pattern that in many cases is different and is not found in a real society.

Just like social media that continues to be popular in the world, social media such as Twitter is a site that is quite popular in the world. This media provides updates related to various information through statuses submitted by its users in a simple and concise display. This media only has 140 characters, its users can easily access various information. In addition, users can also easily share the most up-to-date information and send messages quickly (Juditha, 2014).

Material and Methodology

This study uses a network analysis method with a qualitative approach, which uses tweet data (bigdata) with the hashtag #ganjilgenapbogor to provide a description of a situation as clearly as possible for the object under study. According to (Neuman, 2014), network analysis research explains the mapping of relationships that are built on an actor using a sociogram so that it helps us to see and understand the structure of complex social relationships. Through this research, it is hoped that we will be able to find out how effective odd-even policy is in preventing the spread of new COVID-19 cases in the city of Bogor.

The data analysis technique used consists of three interrelated sub-processes: data reduction, data presentation, and conclusion/verification, as stated by Miles & Huberman in (Denzin & Lincoln, 2009). While

the method of data validity is done by using triangulation, which is performing data checking by utilizing information outside the existing data as a comparison to the data itself.

Result and Discussion

This study uses the data from the Twitter social network taken from January 1 to July 2021 which is then used as a dataset. The data collected is in the form of accounts, tweets, retweets, mentions, replies, as well as the date and time using the hashtag #GanjilGenapBogor. Every account that creates status using this hashtag will become a node and every tweet, retweet, mention and reply will become a relation of the node.

This study focuses on community activities and responses related to the implementation of the odd-even policy, this explains the relation that occurs and becomes the main key in the dissemination and exchange of news on Twitter social media. The hashtag #GanjilGenapBogor emerged as a result of the implementation of policies in cutting off or minimizing the spread of COVID-19 cases in Bogor City by the City Government starting on February 7, 2021. The spread of the #GanjilGenapBogor tweet can be seen sociometrically in Figure 2.

Looking at the graph of the conversation regarding the odd-even policy presented in Figure 3, we can see the movement of the conversation started before the odd-even policy was implemented. The public responded to the policy in various forms, some were supporting the policy, some were against the policy and some were neutral.
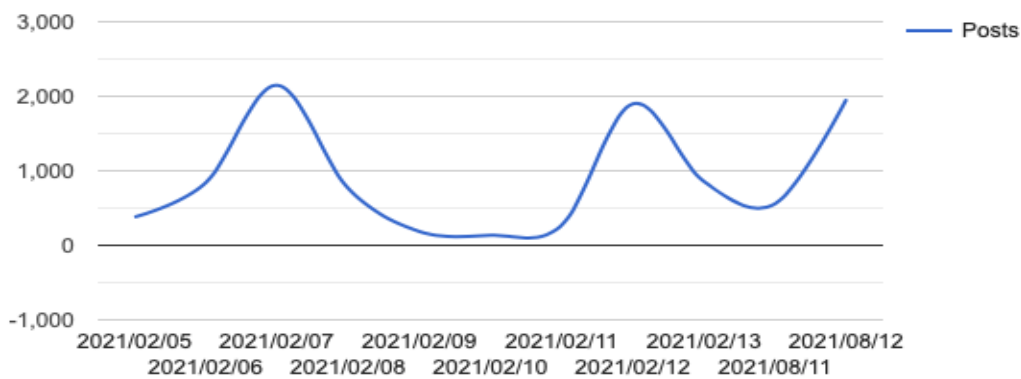
**Figure 1.** Graph of Odd-Even conversations in Bogor City

The results of the analysis show that the peak of the conversation occurred on the second day after the implementation of the policy. More than 2000 conversations took place on that day, that was the peak of the conversation on social media Twitter. Then, the conversation graph slopes down to near the 0 point. This condition happened because the conversation process is only in the reply and retweet process. In addition, the policy is delayed by the timing of its implementation. This policy also only applies on weekends.

This is done to anticipate the movement of crowding activities by the community in tourist locations in the Bogor area. This is a form of anticipation carried out by the Bogor City government in minimizing the growth rate of Covid-19 cases in its area. The conversation again increased towards the weekend and peaked at the end of the weekend, and decreased again at the beginning of the week. This is a form of a cycle of public opinion trends on Twitter social media.

Conversations through Twitter social media will shape public opinion. This opinion is an accumulation of personal users about the response they have to the policies issued by the government. This is in accordance with the opinion of Dan Nimmo in (Juditha, 2014) which says that public opinion is a process that combines thoughts, feelings, and suggestions expressed by public individuals towards policies made by government officials related to security and social order.

These conversations can be visualized through Figure 2 which is called sociometry of the relationship that is built on the spread of tweets using the hashtag #GanjilGenapBogor which was posted 7481 times as of May 2, 2021.
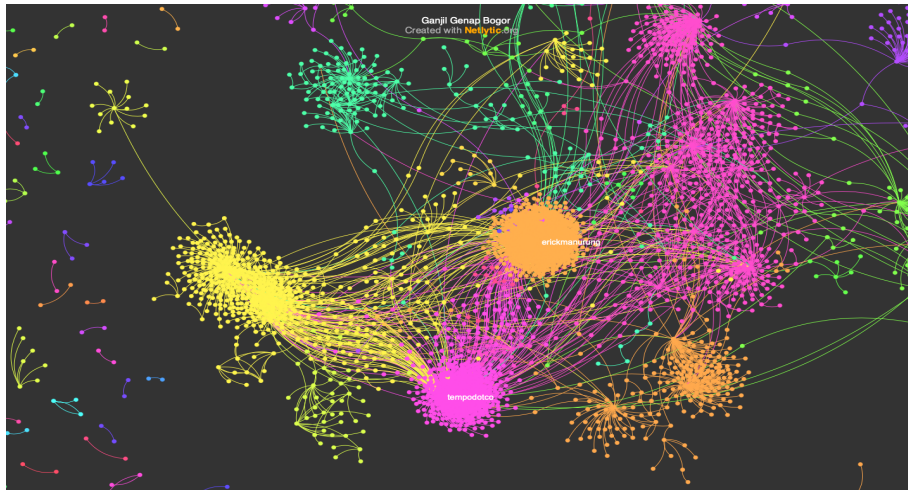
Figure 2. Sociometry of the #GanjilGenapBogor conversation on Twitter
Source: Questionnaire #15

In the visualization, it can be seen that there are patterns of distribution that occur and the formation of communication network groups among twitter user actors. These groups are often referred to as click. On the click, various focus of conversation occurs, this can also be said to be a cluster of conversations. According to (Luthfie, 2018) the click became a place for the center of conversation where each individual or actor tends to communicate with one individual. (Prasanti & Fuady, 2018) said that clicks are built on communication networks, mostly formed on proximity and similarities to an issue.

In this cluster, we can see the direction of the conversation being formed, some leading to the policy and some highlighting the method used to socialize the policy. This spotlight takes various forms, ranging from support to criticism. This condition will shape public sentiment regarding the policy.

Actor Popularity

In the odd-even policy communication network of Bogor City, there are actors who are considered as the main actors who have some influences. These influences were seen from the highest level of popularity or referred to 'the degree centrality' which has a role in spreading news and creating network groups. Network groups in which #GanjilGenapBogor distribution relationships are formed. We can analyze the level of popularity of these actors from the degree centrality (DC) in the relationships formed.
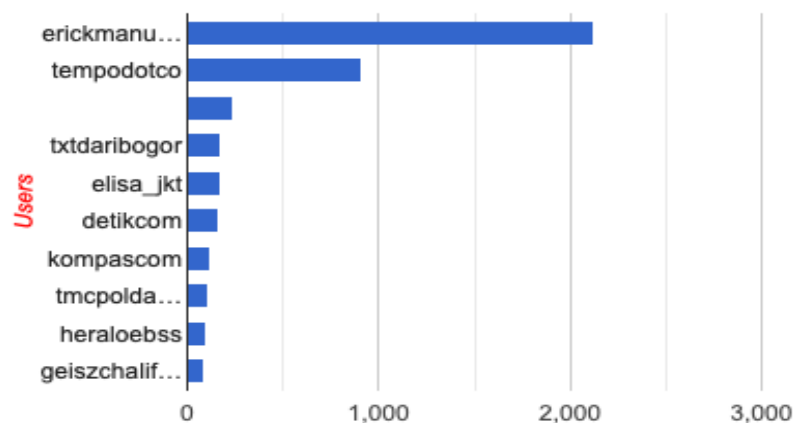
Figure 3. Degree Centrality by node

Based on Figure 3, it is known that the results of the degree centrality analysis show the population of actors or users on the Twitter social media network in spreading the #GanjilGenapBogor news. It can be seen that the actors with a high population include:

erickmanuxxx (2120 degree), tempodotcoxxx (911 degree), Mdy_asmaxxx (236 degree), txtdariboxxx (173 degree), elisa_jktxxx (172 degree) and 5 other accounts with a distribution value of degree centrality- the numbers are 158, 115, 107, 98, 88. This shows that these actors are spreading news and information either by retweeting, mentioning, or replying. According to (Bratawisnu & Alamsyah, 2018) the greater the measurement of the centrality of an actor in a social network, the more important his role is.

Figure 4 shows a tweet made by Erickmanxxx by conveying critical news to the Bogor City Government regarding how to socialize the Odd Even Bogor policy which is too excessive, in addition to paying more attention to the safety of the PR team from the Bogor City Government. This tweet received various responses from other users by retweeting, replying and liking the tweet. The results of this response formed a great relationship and became a trending on the Twitter social network. Netizens deplore the socialization action, not in the context of the policy, but in how to package the message, such as one of the Bogor City Public Relations staff who was seen sleeping in front of the window of the official car used by the Mayor of Bogor (see Figure 4). That position, without any safety equipment and only held by other staff on either side of the car. The two staff were also without safety equipment in carrying out their duties. Instead of getting public support, this method brings criticism.

Figure 4. One of the tweets from erickmanxxx

Opinion Leader

The account with the name erickmanxxx is the opinion leader or key actor of this discussion. According to (Tomasoa et al., 2019) key actors are individuals or actors who play an important role in the spread of hashtags, especially actors who carry out information exchange activities. In addition, (Chatfield & Brajawidagda, 2012) said that an opinion leader has a strong influence and has a big role in disseminating information. Information that is centralized on an individual who is a member of the clique is called an opinion leader (Kusumo & Charina, 2021).

This is proven by the level of centrality generated. When viewed from the level of centrality achieved by the account, the reason for the high level of public trust in the

information submitted by erikmanurxxx is the credibility possessed by the account user. This is in accordance with Sharon Wilson's statement in (Suraya, 2019) who said that the level of trust and credibility of young people's information sources still relies on traditional media. However, traditional media fails to provide information for young people so they use additional information from alternative news sites. Alternative news sites are also classified on how accurate the site is and it is necessary to verify the credibility of the online media source.

Public Sentiment Regarding the Implementation of the Odd-Even Policy in the City of Bogor

The results of the analysis (Figure 5) show that the form of sentiment that appears in the public through news reports tends to be negative sentiment. This sentiment touched 55% of the total coverage on various news media platforms. This means that the message conveyed by the Bogor City Government is less effective, so it is necessary to evaluate how to deliver the policy to the public, both from the packaging or the substance of the policy. This way this policy can be well received by the public. Even though the policy is coercive, if it was packaged properly it will give a different impression to the recipient. It can be packaged using contemporary language, or taking a certain dramatic angle that will give a different effect.

Negative sentiment may also increase if there are any triggers, or there are other parties who take advantage of certain situations to prompt public opinion. Opinion is directed by the author of the message, according to his purpose. Therefore, it is necessary to monitor any news regarding policies made by the Bogor City government. Monitoring is needed to evaluate the implementation of the policies made, before making changes or cutting off the policies. Thus, evaluation is carried out not only at the beginning and end of policy implementation, but also when the policy is implemented in order to make improvements.
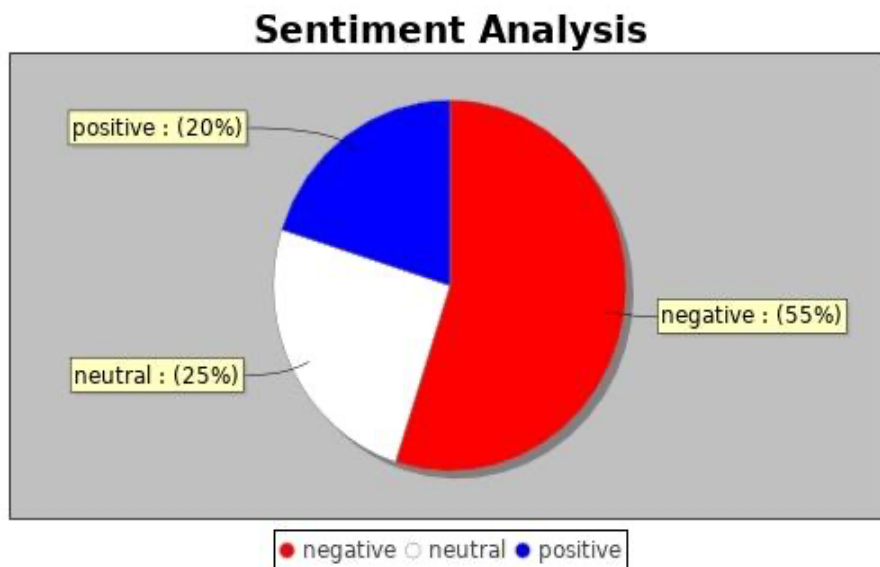
Figure 5. Public sentiment regarding the odd-even policy of Bogor City

News related to a phenomenon or problem that is disseminated through social media will get a quick response from the public, especially if the news is related to the public interest. This is in accordance with the results of research (Alkatiri et al., 2020) which stated that a problem or phenomenon will be responded and disseminated very quickly by social media users with various comments and even hashtags to become trending topics. In addition, (Korniawan, 2020) said that the public in Indonesia will be very concerned about a phenomenon related to social issues that occurs around them.

In addition, news related to the public interest is relatively encouraging the public opinion. Based on the phenomenon of determining the odd-even policy for the City of Bogor, it is hoped that the relevant parties who will carry out a report are expected to be more careful to see the opinions that are built. The effect of choosing the media to spread the

information, especially social media, must be considered from the start. Reporting must also be monitored to see current developments. This condition is needed to prevent bias-viewed, related to social issues that will develop in the midst of society.

Conclusions

The results of this research explain that through the analysis of the Twitter social network, one can see the responses given by the public regarding the policies made by the government. The use of Social Network Analysis (SNA) can be used to calculate the Degree Centrality (DC) or the popularity centrality of the actors involved. In addition, we can also identify the main actors and how important the role of each actor is in the formation of public opinion. Actors who play an important role in forming and creating communication network groups are called opinion leaders.

The exchange of information carried out by the main actors in the communication network aims to see how much influence is generated on the followers or members of the network created. This can be seen from the emergence of one dominant actors in the conversation. These discussions formed various public responses regarding the odd-even policy implemented by the Bogor City Government. Some of the responses were positive, neutral and even negative, as a form of assessing the public's response to a policy. The response that appears can also encourage the public to carry out the policy as something that is feasible and not on the basis of coercion.

This response was caused by the emergence of news sentiment in the media. Sentiments that appear in the public tend to be negative sentiment. This sentiment touched 55% of the total coverage on various news media platforms. This means that the message conveyed by the Bogor City Government is less effective, so it is necessary to evaluate how to deliver the policy to the public, both from the packaging or the substance of the policy.

This way this message can be well received by the public. Public acceptance is needed to strengthen a public policy, both at the beginning until the policy is implemented. This can be used as a reference for policy makers in implementing other related policies on an ongoing basis, moreover it can be synergized with other policies in other fields. Coordination

should be carried out for all stakeholders before the policy is implemented.

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