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Social Network Analysis of Basic Necessity Scarcity on Twitter: Evidence from Indonesia

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Abstract: The scarcity of basic necessities, a popular discussion topic in Indonesia, poses significant challenges to the citizens. Indonesians frequently comment on the issue on social media, including Twitter, which is perceived as a democratic public space to express opinions, interests, and information discursively in establishing communications as part of intercultural dialogues. The current study aims to analyse relevant communication networks and content regarding the topic of fundamental necessity scarcity in Indonesia on Twitter. Specifically, a cross-sectional design was employed with social network analysis (SNA) and content analysis (CA) conducted on public Twitter accounts. The study discovered a low communication intensity between nodes due to the existing dominance of several central actors. Simultaneously, the most frequently employed words were food, oil, cooking, the task force, and the hashtag phrase "*punishthehoardersofcookingoil*". Auto-coded sentiment results demonstrated 8,963 references at neutral levels, 566 with moderately negative degrees, 500 with high negative levels, 90 with moderately positive, and 21 with highly positive degrees. The findings propounded that Twitter is an online public space, allowing autonomous and unrestricted debates on pertinent topics.

Keywords: Communication Network, Conversations on Twitter, Dialogues, The Intensity of Communication, Social Network.

1. Introduction

Based on the Presidential Regulation of the Republic of Indonesia (Peraturan Presiden Republik Indonesia) No. 71/2015 (Perpres Ri, 2015), basic necessities are goods related to citizens' lives with high levels of needs and importance in supporting welfare. Apart from accurately allocating household expenditures nationally, determining the types of basic necessities is essential, as all relevant provisions would significantly influence the national inflation rate and sufficient intake of nutritional contents (Perpres Ri, 2015). Based on Perpres Ri (2015), the central government determines three categories of basic necessities, namely agricultural products (rice, chilli, soybean, and others), industrial products (sugar and cooking oil), and livestock and fisheries (eggs, beef, milk, and tuna). The availability of the necessities is under the control and responsibility of both central and regional governments to ensure the quantity, quality, and pricing of goods. Issues would occur when supply disruption exists, or pricing is highly different from the reference price, hence negatively impacting trading activities and the availability of basic necessities for the community (Perpres Ri, 2015).

Gafar (2008) explicated that basic necessities are goods highly related to citizens' quotidian routines, owing to several characteristics. Particularly, basic necessities are the high demand for daily requirements, including food with crucial instrumentality to fulfil fundamental needs compared to non-basic goods (Pujiati, 2020). In Indonesia, the increase in the price of basic necessities is ubiquitous before, during, and after national religious holidays, such as Ramadan and Eid al-Fitr. The trend is triggered by high specific demands when supply readiness for a specific event is low. Resultantly, the price of goods continues to elevate while the number of goods remains or tends to decrease before a scarcity is observed (Pujiati, 2020). Anggun (2008) also emphasised the importance of basic necessities to the national economy. For example, the scarcity of cooking oil as one of the necessities would produce significant negative economic and political impacts on the country (Anggun, 2008).

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The Internet emerged as a medium for diversity in the digital era, wherein numerous social, economic, political, and religious discourses are observed on social media (Rohimi, 2021). For instance, each Twitter user subjectively comprehends content being posted, distributed and accessed on the platform. Comments from social media users are also integral in establishing a social network, including comments on basic necessity scarcity, which was a major Indonesian household issue in 2022. Accordingly, the present study sought to determine the establishment of a communication network regarding the issue of basic necessity scarcity in Indonesia on Twitter. Similarly, the study investigated the content of every relevant message conveyed by Twitter users regarding the issue of basic necessity scarcity. Social network analysis (SNA) and content analysis (CA) were employed for the current study objectives. The SNA is the process of analysing and visualising social structures and interactions developed by users in online communities (Stokman, 2001). The SNA also allows the appraisal of respective individual behaviours, interaction patterns, and the relationship between the former two variables (Stokman, 2001). Meanwhile, the CA could delineate the characteristics of contents and depict inferences from the contents (Kriyantono, 2020).

2. Literature Review

2.1 Social Media

Social media comprise user-generated content and interactions through digital technologies (Kaplan & Haenlein, 2010) to enable individuals in creating, sharing, and exchanging relevant information (Taprial & Kanwar, 2012). Russo et al. (2008) elucidated that social media facilitate online communications, networking, and collaborations. Social media are also employed as a public relation tool to communicate and exchange ideas (Fitriyah et al., 2020), express personal thoughts or opinions, exchange information with other users, and influence or manipulate users to accept generated content (Fitriyah & Nurhaeni, 2021). According to Taprial and Kanwar (2012), social media are a powerful medium, as individuals require constant communication by perusing, listening, and responding to opinions and perspectives shared on social media. Resultantly, online conversational contents are widely and globally disseminated (Taprial & Kanwar, 2012).

Taprial & Kanwar (2012) expounded on several inherent properties of social media, which allow a highly effective role in exchanging information than conventional media as follows:

1. Accessibility with minimal effort, skills, and costs for users to express personal opinions.
2. Speed in sharing and communication, which ensures instantaneous availability of relevant content when being generated.
3. Interactivity provides ample opportunities for bidirectional communications and adequate interactions with other users.
4. Longevity or volatility of social media content when being posted, with the editing function available for the original user.
5. Reachability by the internet for social media users' continuous access to commenting and sharing information.

Specifically, Twitter is one of the three most significant players in social media, with multiple global users aside from Facebook and Google (Taprial and Kanwar, 2012).

2.2 Twitter As a Social Networking Site

Twitter was launched in 2006 before expanding a global phenomenon with over 400 million short messages (tweets) daily (Kumar et al., 2014). The platform allows users to post at most 140 characters, which becomes an alternative form of online communication globally. The platform unidirectionally and bidirectionally connects individuals, media outlets, non-profit organizations (NGOs), and other organisations by serving as a real-time information source (Kumar et al., 2014). Fatoni & Anestha (2021) described Twitter as an extensive social networking site for rapid communication, with speed and ease as the major elements for communication at all societal levels. Twitter allows users to publish and exchange tweets immediately, which the dissemination of news could be performed instantaneously to most users.

Kusuma (2009) delineated several major features on Twitter, namely the timeline containing a list of tweets from Twitter users, followed by account owners and tweets performed by the account owners sorted in the most recent order. Another feature is direct messaging (DM), which allows users to send messages to other followed users privately, including trending topics extensively discussed by Twitter users. Public tweets generally contain information limited to 140 characters. Tweets also sequence the latest news (categorised under the section of "*what's going on*") related to the users' preferred themes or discussion topics. Users could reply with a tweet or response tweet (RT) to an existing tweet, with the retweet function sharing the entire content of tweets from other account owners or users. Meanwhile, the Follow tab allows perusal of the following accounts and information submitted by other users. Followers are groups of users who follow an account. Concurrently, the mention (@) function utilises a symbol to indicate and notify the username of other users who will be invited to communicate. When writing a tweet, the symbol is at the beginning of the intended user's username. Hashtags (#) are also employed to mark a keyword for a discussion topic, which ensures effortless search and participation by other users.

2.3 Social Networks and Social Network Analysis

The popularity of social networks increases with the ability to deliver computer content via Really Simple Syndication (RSS) as another type of data exchange (Morris & Ballantine, 2015). Wanda & Jie (2021) explicated that a social network contains a broad environment with millions of nodes and edges. Social networks have also

become a common application connecting individuals worldwide in sharing data, such as videos, photographs, and messages. Social networks allow users to control respective communities and connections, with social networking sites promoting internet adoption. Social networking alters the method of information exchange, with relevant apps transforming the connection types in professional and personal relationships. With the availability of text, audio, and video, social media has become the latest communication approach based on personal interests and needs (Morris & Ballantine, 2015).

Dijk (2006) expounded social networks as social systems with concrete ties in abstract relationships established since the invention of speech. Social networks encompass social agents, including individuals, groups, organisations, and societies, and the links between social agents created by interaction actions (Dijk, 2006). Contemporarily, social networks produce small worlds and clusters connected by a short chain of intermediaries. Hicks et al. (2020) suggested SNA in visualising the invisible flow in an online social network by identifying different types of interactions, relationships, and roles among users. The analysis could observe the community structure, depict the network structure, and visualise the relationship between social agents before developing a research model (Su et al., 2020). Previous studies demonstrated social networks operating at various levels ranging from a group of families to nationally (Fitriyah & Nurhaeni, 2021; Gandasari et al., 2018, 2022; Hicks et al., 2020; Selden & Goodie, 2018). Thus, the SNA plays a critical role in determining problem-solving solutions, organisational processes, and the extent of individuals' success in goal accomplishment (Mastan & Christianto, 2021). Prior researchers in other disciplines also applied SNA to assess individuals, groups, organisations, and communities (Gandasari et al., 2022; Lei et al., 2021; Parnell, 2018; Selden & Goodie, 2018; Storey et al., 2021; Tahmasebi & Askaribezayeh, 2020).

2.4 Research On Twitter With SNA

Social networking issues are examined through SNA, with past Twitter studies employing SNA in the fields of social science (Bahri & Widhyharto, 2021; Budi & Pamungkas, 2020; Sari et al., 2021; Tous-Rovirosa & Dergacheva, 2021), computer science (Alwafi, 2021; Morales-I-gras et al., 2021; Yang et al., 2021), medicine (Bedford-petersen & Weston, 2021; Moukarzel et al., 2021; Nazar & Pieters, 2021), engineering (Fani et al., 2020; Madani et al., 2020; Rathnayake, 2021) and business management and accounting (Battisti et al., 2021; Park et al., 2020; Watanabe et al., 2021). From the analysis results on Scopus for Twitter, 276 articles published from 2006 to 2021 employed SNA. The top five countries are the United States with 85 articles, the United Kingdom with 41 articles, Spain with 28 articles, South Korea with 19 articles, and Germany with 18 articles. Publications from Indonesia remain limited, with only 3 articles available (Bahri & Widhyharto, 2021; Budi & Pamungkas, 2020; Sari et al., 2021). Therefore, more research on Twitter through SNA is required.

2.5 Content Analysis

Content analysis (CA) portrays the characteristics of contents and subsequent inferences (Kriyantono, 2020). The CA enables replicable and valid inferences from texts or other applicable sources in relevant contexts (Krippendorff, 2004). The CA identifies units according to five selective facets, namely physical, syntactical, categorial, propositional, and thematic (Krippendorff, 2004). Two flow structures are available in CA, with the first structure as the flow of transmission and the second as the flow of production and exchange of meanings (Eriyanto, 2011). The transmission paradigm perceives communication as a message delivery method, which is a static, linear, and unidirectional relationship from media to audience (Eriyanto, 2011). Meanwhile, the meaning exchange paradigm considers communication as a constant process of spreading and producing created meanings. All messages are not static and simultaneously formed by both sender and receiver (Eriyanto, 2011).

3. Methodology

3.1 Research Design

The current study employed a cross-sectional design, with SNA and CA conducted on public Twitter accounts. The Netlytic software was utilised for network analysis and visualisation of public data from cloud-based social media platforms to investigate various online communities and conversations, such as comments on Twitter. The Nvivo software was also employed for sentiment analysis.

3.2 Data Collection

Online conversational data on Twitter were collected via Netlytic and Nvivo software, with the measurement illustrated in Table 1.

Table 1: Data Collection

Category	Definition
1. Text Analysis	The 'Keyword Extractor' function was employed to identify popular topics in the dataset through word frequency. The results were visualised on the 'Word Cloud tab outlining popular topics.
2. Network Analysis	The measurement results of name network and chain network analysis were network visualisation and network properties.
a. Diameter	The longest distance between two network participants depicts network size by calculating the number of nodes from one end to another.

b. Density	The percentage of available ties to the total possible ties in a network. The density was calculated by dividing the number of connections by the number of possible ties to depict the distance between participants in a network. The measurement is complementary to the diameter in assessing the speed of information flow. If the density is close to the value of 1, a community with frequent conversations between users would be observed. If the value is closer to zero, the finding suggests no connection between users in the network.
c. Reciprocity	The percentage of connections in a bidirectional communication to the total connections. A higher value suggests a larger number of participants with bidirectional conversations, while a low reciprocity value postulates unidirectional conversation.
d. Centralisation	The average centrality degree of all nodes within a network. When a network demonstrates a value closer to one, the result posits the existence of several central participants dominating the information flow in a network. Contrarily, a value closer to zero propounds decentralisation, wherein information flows more freely between participants.
e. Modularity	Modularity determines whether clusters represent distinct communities in a network. A higher value illustrates a distinct division between communities in the Netlytic software. A lower value, usually below 0.5, suggests that clusters overlap more frequently, with the network potentially containing a core group of nodes.
3. Report	Obtained statistical data on the platforms of Source Data # of Posts Over Time and Top Ten Posters based on in-degree centrality and Top 10 Users based on out-degree centrality.
4. Sentiment Analysis	Coding sentiment based on polarity classification. The Nvivo 12 plus software was employed as an analytical tool to identify user sentiments based on polarity classification.
a. Highly Negative	Highly unsupportive and negative tweets with disapproval, disparagement, and rejection.
b. Moderately Negative	Unsupportive and negative tweets with criticism, belittlement, and rejection.
c. Neutral	Impartial and neutral tweets.
d. Moderately Positive	Supportive and positive tweets with compliments, flatters, and approval.
e. Highly Positive	Highly supportive and positive tweets with compliments, flatters, and approval.

This study implemented a realist approach with a population of Twitter users conducting conversations regarding the topic of basic necessity scarcity. The study collected 1,000 tweets on March 19, 2022, with the subsequent three days limited to 1,000 tweets retrieved daily due to the restriction on a free Netlytic account. The tweets were collected through keywords in the form of search strings relevant to "*basic necessities*" without applied filters as follows:

1. Search Keywords: "*staple food AND staple goods AND staple goods AND food staples AND groceries OR National Food Agency OR Food Task Force*".
   All search terms were inserted in Bahasa Indonesia. For the English reporting purpose of the present study, all search terms were translated into English.
2. Filters by languages: Any
3. Only include tweets containing: No Filter
4. Exclude tweets containing: No Filter
5. Minimum number of retweets: Zero

After scrutinising the contents of Twitter conversations, the current study categorised the issue of basic necessity scarcity based on the discussions conducted by Twitter users as follows:

1. Text analysis by employing the 'Keyword Extractor' function to identify popular topics in the dataset measured by the word frequency. The results were visualised on the 'Word Cloud' tab listing popular topics.
2. Sentiment analysis, which coded Twitter users' sentiments based on polarity classification. Polarity classification is a binary classification approach in which feelings are labelled as expressing either an overall positive or an overall negative sentiment or neutral (Liu et al., 2012). Positive tweet data provided approval and support for statements on attitudes or policies. Negative tweets contained the contents from Twitter users responding negatively, criticising, condemning, or providing disapproval statements. According to the Indonesian Dictionary or Kamus Besar Bahasa Indonesia (KBBI), criticism is a response occasionally accompanied by a positioning or negative evaluation of a work, opinions, and contents (Kemdikbud, 2019). Meanwhile, neutral tweets were users' tweets containing unsentimental information. The CA stages through the NVivo software include importing text documents into the software, organising codes through cases with classifications and attributes, exploring queries, applying code and matrix queries, and performing visualisations, such as matrix coding.

4. Results and Discussion

4.1 Patterns in Communication Networks

4.1.1 The Name Network (Who Mentions Whom)

A name network denotes a communication network established based on personal names in the message-mining process. To discover the connections in the name network, a participant should choose from two options. The participant could either connect a sender to all names in the messages or connect individuals with names co-occurring in the same messages. Upon analysing the name network (a 'who mentions whom' network), the Twitter communication network for the topic of basic necessities consists of 1,631 posters with ties and 4,885 ties, including self-loops. The network contains the following properties, namely a diameter of 16, a density of 0.000588, a reciprocity value of 0.031770, a centralisation value of 0.043700, and a modularity value of 0.865800. Specifically, a diameter of 16 suggests that the distance from one node to another is 16 steps, while a density of 0.000588 (close to zero) indicates that no actual node is connected to the network. Thus, the communication intensity between nodes is low.

A reciprocity value of 0.031770 exhibits a reciprocal relationship, albeit relatively low, with only several actors performing unilateral or bidirectional communications. Meanwhile, the centralisation value of 0.043700 demonstrates the existing dominance of several central actors, with the modularity value of 0.865800 indicating a distinct division between communities represented by clusters in the Netlytic software. Summarily, the name network measurement revealed that participants' interactions in discussing the issue of basic necessities were limited and superficially, as indicated by the low intensity of communications. Only several participants performed bidirectional communications. Several actors were divided into respective clusters based on communication patterns. The Netlytic software categorised the network into 5 clusters with numerous nodes and assigned the same colour to nodes or actors in the same cluster (see Figure 1).

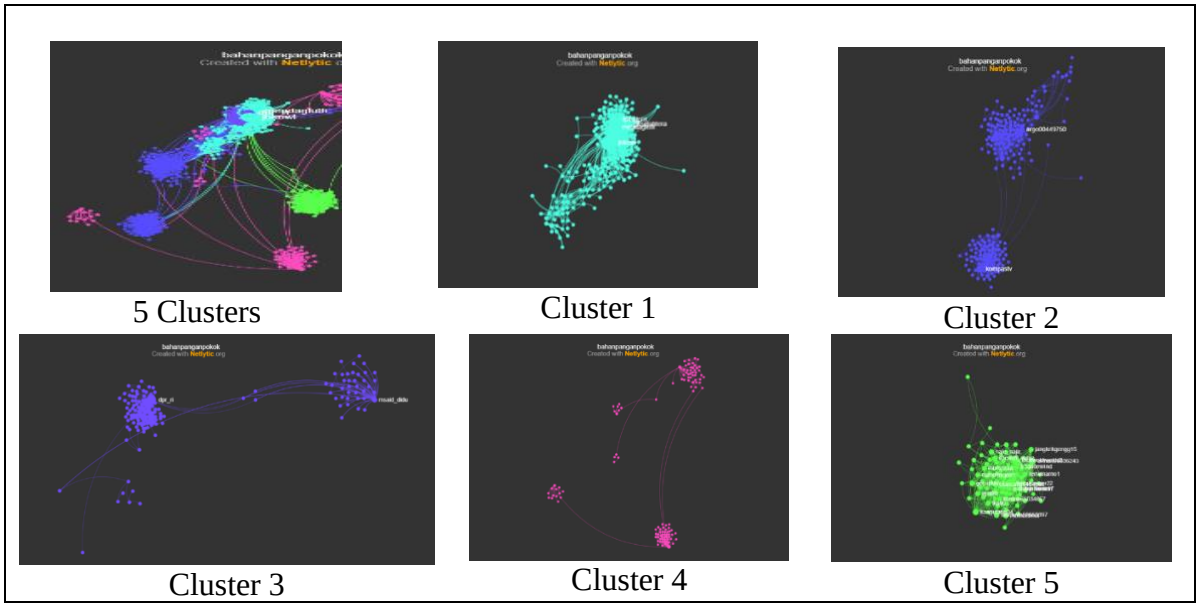

Figure 1: The Name Network Visualisation Generated from the Analysis of a Twitter Stream of Comments regarding Basic Necessities

Cluster 1 is in green, with four (4) sender nodes possessing the largest mentions, namely '@jokowi' (a total degree of 226 and an in-degree of 226), '@mendaglutfi' (a total degree of 162, an in-degree of 157, and an out-degree of 5), '@fpksdprri' (a total degree of 73, an in-degree of 69, and an out-degree of 4), and '@pksejahtera' (a total degree of 74, an in-degree of 67, and an out-degree of 7). Cluster 2 is in blue, with four (4) sender nodes containing the largest mentions, namely '@kompastv' (a total degree of 101 and an in-degree of 101), '@argo00449750' (a total degree of 55, an in-degree of 0, and an out-degree of 55), '@kemendag' (a total degree of 48, an in-degree of 48, and an out-degree of 0), and '@divhumas_polri' (a total degree of 47, an in-degree of 47, and an out-degree of 0). Cluster 3 is in purple, with two (2) sender nodes consisting of the largest mentions, namely '@dpr_ri' (a total degree of 140, an in-degree of 140, and an out-degree of 0) and '@msaid_didu' (a total degree of 37, an in-degree of 37, and an out-degree of 0).

Cluster 4 is in pink, with five (5) sender nodes containing the largest mentions, namely '@uplu7' (a total degree of 50, an in-degree of 0, and an out-degree of 50), '@ganjarpranowo' (a total degree of 26, an in-degree of 26, and an out-degree of 0), '@still_hendro' (a total degree of 13, an in-degree of 1, and an out-degree of 12), '@bbravo911' (a total degree of 11, an in-degree of 0, and an out-degree of 11), '@geloraco' (a total degree of 10, an in-degree of 10, and an out-degree of 0). Cluster 5 is in light green, with five (5) sender nodes possessing the largest mentions, namely '@freestranger22' (a total degree of 91, an in-degree of 29, and an out-degree of 62), '@triokwekkwekki2' (a total degree of 81, an in-degree of 0, and an out-degree of 81), '@arthan38836243' (a total degree of 65, an in-degree of 0, and an out-degree of 65), '@kangutang04' (a total degree of 42, an in-

degree of 15, and an out-degree of 27), '@momocimol' (a total degree of 29, an in-degree of 6, and an out-degree of 23).

(Stokman, 2001) elucidated that measures based on the degree and the number of directly connected points indicate the communication activity of a specific point. In directed networks, centrality in terms of out-degrees and in-degrees should be distinguished. In friendship choice networks, the number of received choices (in-degree) generally indicates centrality (popularity), whereas centrality in influence networks is based on the number of outgoing relationships (out-degree; Stokman, 2001). The present results demonstrated that '@jokowi', '@mendaglutfi', '@fpksdprri', and '@pksejahtera' mentions belonged to cluster 1, while '@kompastv', '@kemendag', and '@divhumas_polri' were in cluster 2. Cluster 3 contained '@dpr_ri' and '@msaid_didu' mentions, whereas cluster 4 consisted of '@ganjarpranowo' and '@geloraco'. Cluster 5 comprised '@freestranger22', which was the popular mention with an in-directed form mentioned or retweeted from other users.

The mention consisted of numerous links from other actors linked to respective accounts. Similarly, the mentions of '@argo00449750' in cluster 2, '@uplu7', '@still_hendro', '@bbravo911' in cluster 4, and '@freestranger22', '@triokwekkwekki2', '@arthan38836243', '@kangutang04', and '@momocimol' in cluster 5 were the renowned mentions with an out-directed form. The mentions were influencers in producing outgoing relationships in respective clusters by mentioning or retweeting other users to disseminate information. Numerous conversations are driven or amplified by the influencers to connect different users and serve as opinion leaders and authority sources (García & Daly, 2016; Sanawi et al., 2017) or a single charismatic and popular individual with star-shaped network (Himelboim et al., 2017). Moukarzel et al. (2021) expounded that influencers are identified based on real-time interactions on social media (replying, mentioning, or being mentioned on Twitter). Summarily, more frequent interactions between actors or nodes in a conversation signify the more important role of the actor or node in the network (Fatoni & Anestha, 2021).

4.1.2 The Chain Network (Who Replies to Whom)

A chain network (a 'who replies to whom' network) refers to a communication network established on the posting behaviour of participants. The Netlytic software could display various options for tie discovery, from connecting a sender to the last user in the post chain to connecting a sender to all users in the reference chain with decreasing weights. Upon conducting a network analysis on the chain network, the communication network for the conversation topic of basic necessities on Twitter comprised 4,289 posters with ties and 6,954 ties, including self-loops. The network contains the following properties, namely a diameter of 24, a density of 0.000219, a reciprocity value of 0.024140, a centralisation value of 0.118900, and a modularity value of 0.861900. Particularly, a diameter of 24 postulates that the distance from one node to another is 24 steps.

A density of 0.000219 (close to zero) indicates that no single node is connected to the network due to the low intensity of communication between nodes. A reciprocity value of 0.024140 suggests a reciprocal relationship, albeit relatively low. Specifically, only several actors conducted unilateral or bidirectional communications. A centralisation value of 0.118900 demonstrates the existing dominance of several central actors, while a modularity value of 0.861900 indicates a distinct division between communities represented by the clusters in the Netlytic software. Several actors were divided into respective clusters based on the actors' communication patterns. The Netlytic analysis categorised the chain network into 5 clusters with numerous codes and assigned the same colour to nodes or actors in the same cluster (see Figure 2).

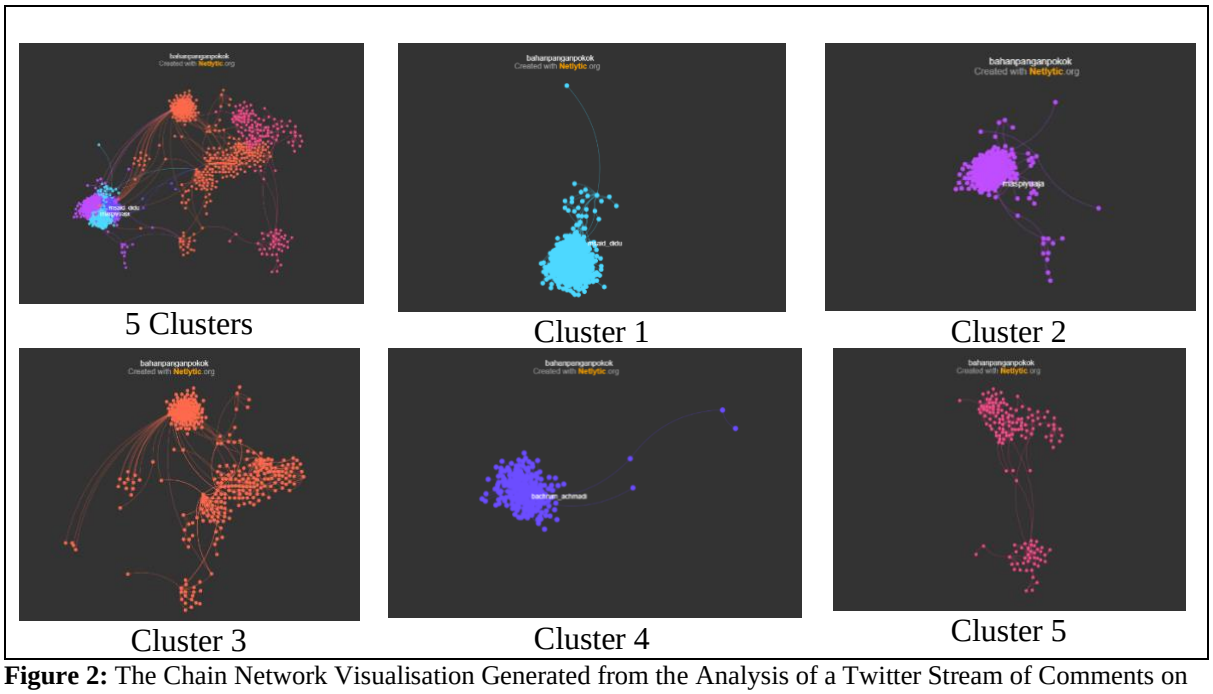

Figure 2: The Chain Network Visualisation Generated from the Analysis of a Twitter Stream of Comments on Basic Necessities

Cluster 1 possessed a single large node, namely '@msaid_didu' (a total degree of 1,213, an in-degree of 1,212, and an out-degree of 1). The node posted a message on March 17, 2022, which was related to "*The cooking oil case is proof of how dangerous it is if food is controlled by a few people who are part of an oligarchy. The state must be present to secure food through State Enterprises*". The node contained 1,213 connections with other nodes. Cluster 2 contained the largest node, namely '@maspiyuaja' (a total degree of 622, an in-degree of 621, and an out-degree of 1). The node posted a message on March 17, 2022, which was related to "*Srilanka is Troubled Due to Food Scarcity and Price Increases Triggered by Government Policies, the State's Debt is Increasing https://t.co/OMrtlCY9yV https://t.co/utgFXvZgQ5*". The node comprised 622 connections with other nodes. Cluster 3 consisted of the largest node, namely '@mendaglutfi' (a total degree of 171, an in-degree of 165, and an out-degree of 6). The node posted a message on March 17, 2022, which expressed that "*I'm not giving up and will continue to fight the food mafia! Rapat Kerja dengan Komisi Perdagangan@DPR_RI selengkapnya > https://t.co/ed7XnauKBd*". The node contained 171 connections with other nodes.

Cluster 4 possessed the largest node, namely '@bachrum_achmadi' (a total degree of 273, an in-degree of 273, and an out-degree of 0). The node posted a message on March 18, 2022, which conveyed that "*Trade Minister Lutfi: No, I don't give up on the Food Mafia. If you just talk about frogs, that's fine, boss! The fact is that the price of cooking oil has skyrocketed. The food mafia wins, and the people suffer*". The node possessed 273 connections with other nodes. Cluster 5 contained the largest node, namely '@mamparg' (a total degree of 42, an in-degree of 42, and an out-degree of 0). The node posted a message on March 16, 2022, which was about "*The National Police are indeed the best, the National Police's Bareskrim Food Task Force team uncovered a case of alleged cooking oil hoarding in Banten. From this case, it was found that a total of 24 tons of cooking oil were stored in the warehouse https://t.co/7FBQXP0d2z*". The node comprised 42 connections with other nodes.

4.2 Dataset Statistics

Figure 3 illustrates the source data of posts within a certain period. Specifically, 3,674 posts were related to the Twitter conversation regarding basic necessities on March 16, 2022, 4,083 posts on March 17, 2022, and 2,243 posts on March 18 2022. Figure 4 depicts the top 10 posters concerning the topic of basic necessities on Twitter. Particularly, the '@pangan_rotsen' account contributed 15% (61 posts) to the total posts, the '@SagitaDewi90' account with 14.3% (58 posts), the '@Petrus02762030' account with 11.6% (47 posts), the '@RithaTheresia93' account with 10.8% (44 posts), the '@sariagri_id' account with 9.9% (40 posts), the '@kesinilahsob' account with 9.9% (40 posts), the '@jutine_pangan' account with 9.1% (37 posts), the '@lourdes_pangan' account with 6.9% (28 posts), the '@SupardinPardin3' account with 6.7% (27 posts), and the '@UnitNagreg' account with 5.9% (24 posts).

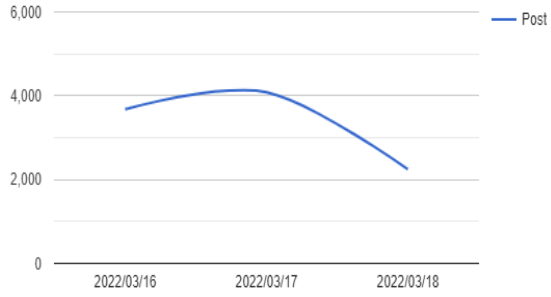

Figure 3: Source Data of Posts Over Time

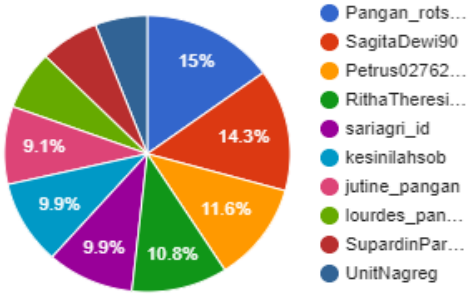

Figure 4: Top 10 Posters

Figure 5 portrays the in-degree centrality of the top 10 users based on the Twitter conversation topic regarding basic necessities. Particularly, the '@Jokowi' account was connected to 226 users, the '@mendaglutfi' account with 157 users, the '@dpr_ri' account with 140 users, the '@kompastv' account with 101 users, the '@fpksdprri' account with 68 users, the '@pksejahtera' account with 66 users, the '@poldajateng' account with 48 users, the '@kemendag' account with 48 users, the '@erickthohir' account with 47 users, and the '@divhumas_polri' with 47 users. The degree score demonstrated that the '@Jokowi' account was popular. The '@Jokowi' account achieved the highest in-degree score of 226, which indicated 226 connections with other actors.

Figure 6 illustrates the out-degree centrality of the top 10 users based on the Twitter conversation on basic necessities. Specifically, the '@050100triokwekkwekki2' account was connected to 81 users, the '@arthan38836243' account with 65 users, the '@freestranger22' account with 61 users, the '@argo00449750' account with 55 users, the '@uplu7' account with 50 users, the '@iiizahrah' account with 45 users, the '@parewalagi' with 41 users, the '@alamanda_maroon' account with 41 users, the '@pangan_rotsen' account with 39 users, and the '@s3creth_m4ntz' account with 29 users. The findings revealed that the '@triokwekkwekki2' account was a popular account with an out-degree score of 81. Although the account was not linked to large numbers of actors in the networks, the account could disseminate the largest amount of information with an out-degree score of 81.

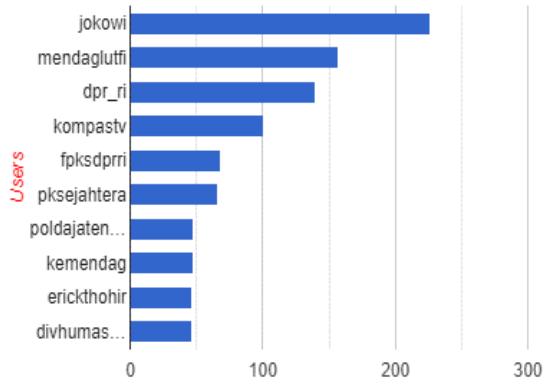

Figure 5. Top 10 Users based on In-degree Centrality

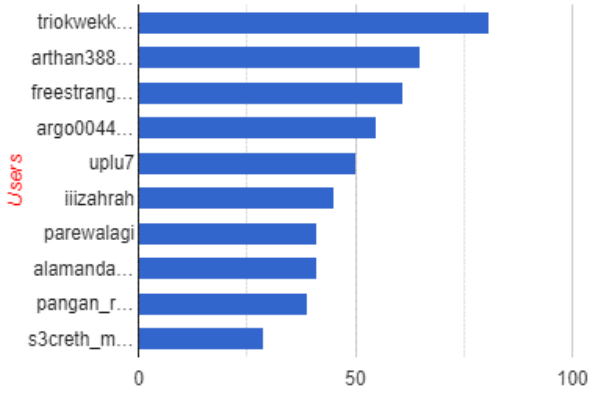

Figure 6. Top 10 Users based on Out-degree Centrality

4.3 Most Frequently Employed Words as A Popular Topic

After conducting text analysis through the Netytic software with a keyword extractor, with approximately 30 words or phrases related to the topic of basic necessities most frequently appearing. Several common words not indicating the topic were excluded, such as which, how, as a result, present, and person. The Word Cloud for comments related to basic necessities is portrayed in Figure 7. Particularly, the five words or phrases that appeared the most were food, oil, cooking, the task force, and the hashtag phrase "*punishthehoardersofcookingoil*". The number of words was 12,616 for food, 5,457 for oil, 5,008 for cooking, 3,914 for the task force, and 2,299 for the hashtag phrase "*punishthehoardersofcookingoil*". As Indonesia is the largest palm oil producer globally, national vigilance factors, including the threat of cooking oil scarcity caused by the recent spike in vegetable oil prices, should be duly considered. Supply and demand factors are also the main factors elevating the pricing of cooking oil and contributing to the scarcity of cooking oil. Hence, Indonesia should improve its national food security (Alrasyid et al., 2022).

Figure 7: Word Cloud Extracted from the Comments regarding Basic Necessities

Cooking oil is one of the basic necessities for Indonesians; it has strategic and multipurpose properties. These two properties make cooking oil have an important role in the Indonesian economy (Anggun, 2008). Since the beginning of 2022, the cooking oil price in Indonesia has increased significantly. While cooking oil was generally available in large quantities in various Indonesian supermarkets previously, limited supplies and low availability are observed for cooking oil currently due to the pricing issue (Dewi, 2022). The high demand and declining supply of cooking oil resulted in scarcity, which triggered a significant pricing increase across Indonesia. As cooking oil is a fundamental need for the quotidian needs of the community, the scarcity poses significant challenges for Indonesians (Andriessa, 2022).

The Indonesian government endeavours to eliminate subsidies as cooking oil is increasingly scarce in various regions. Although the cooking oil subsidy policy has been abolished, the basic necessity remains unavailable in the market. Despite the average price of cooking oil per litre surpassing IDR25,000, the increase in cooking oil prices did not reduce long queues at supermarkets, small shops, grocery stores, and traditional markets (Yafiz, 2022). The situation was contributed to by the scarcity of cooking oil, which engendered panic buying and hoarding of cooking oil. Therefore, the government established a task force to prevent cooking oil hoarders and resolve the issue of increasing cooking oil prices and scarcity of cooking oil. As the issue generated life difficulties for the citizens, numerous related comments are observed on social media, including Twitter.

4.4 Sentiment Analysis

The SA produced data grouping results through the Nvivo 12 software. The auto-coded sentiment results discovered 8,963 references with neutral sentiments, 566 references with moderately negative sentiments, 500 references with highly negative sentiments, 90 references with moderately positive sentiments, and 21

references with highly positive sentiments. Figure 8 illustrates the relevant findings and examples of references from each category.

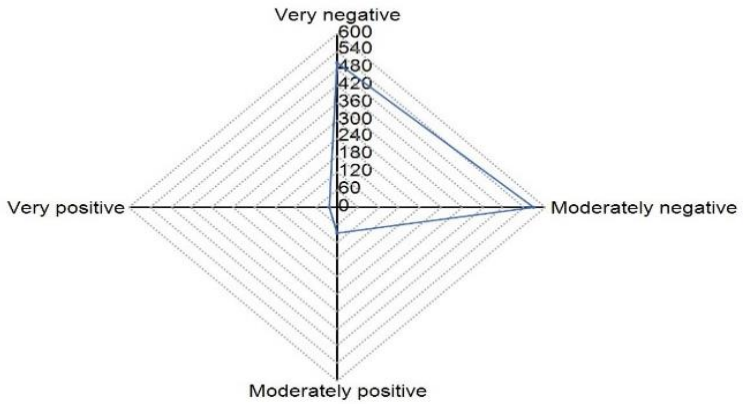

Figure 8: Auto-Coded Sentiment Results

Several content references disseminated by users demonstrated highly negative sentiments as follows:

The minister is weak, you can't fight against the food mafia, you're weak! 🤣🤣🤣👎👎👎
Why don't you step back boss, blame the people for hoarding cooking oil in the kitchen, panic buying then the Russia-Ukraine war...
If you're afraid of the food mafia, it's better to resign!!!
@BuronanMabes @mohmahfudmd Just like this bastard, don't dare anything else with the food mafia, the coordinating minister is useless!
@CNNIndonesia Pak Jokowi... if the trade minister doesn't work, he has to be fired; maintain that the trade minister cannot eradicate the food mafia; in Indonesia, there will be massive inflation, goods will become scarce, don't use the Russia-Ukraine war as the reason for rising prices; why can't the trade minister eradicate the food mafia because he's an idiot.

Several content references disseminated by users exhibited moderately negative sentiments as follows:

Just disband, sir, if you can't fight the food mafia.
@KRMTRoySuryo2 The basic needs of the government's obligations in food security and people's rights in subsidies, the people can be creative if the ingredients are scarce, not chickens starving to death in rice barns, refusing to buy cooking oil not to support government policies but as a form of resistance to the oligarchic mafia.
@KompasTV Immune to the virus but everyone is in a food crisis 💔*.*
Not surrendering to the food mafia, but the Cooking Oil mafia.
#Jokowi Cabinet Failed
#KabinetJokowiFail https://t.co/1dussIGC4E
@detikcom Cooking oil is scarce, if not rare the price is very high, there are still many food mafia.
@tvOneNews you should blame the government ma'am, the government cannot stabilise prices and food, it's clear the trade minister can't control the cooking oil mafia, why do you often forget like this 😁*.*
@MendagLutfi @DPR_RI 🤣🤣🤣🤣 *Sir it's not legal to brag about fighting the food mafia with all the evidence but you can't fight back and the price of cooking oil is still expensive even though it's already subsidised* 😵😵😵😵😵😵*.*
@msaid_didu The government has lost to corruptors, oligarchs and food mafia including cooking oil.
If the government is unable to handle the cooking oil mafia, then how can the government control food stability.
Now the era is getting more sophisticated, why are there even more errors.
#ShameOnYou

Several content references disseminated by users demonstrated moderately positive sentiments as follows:

Good Job!
Please be trusted and really understand, drop fee.
Humans do have freedom of speech, but that doesn't mean we can have opinions that we don't know. Before commenting, let's learn what to say.
The City Government (Pemkot) of Palembang, South Sumatra, has confirmed that they will hand over supermarkets stockpiling cooking oil to the regional food task force (Satgas) to be processed according to existing regulations.
#BreakingNewsMetroTV Muhammad Lutfi (Minister of Trade): It is estimated that during the fasting month, the food supply will return to optimality and even tend to be over supply.
So that it can become a role model for world-class companies.
#WithETMerdekaBerdaulat https://t.co/PMFlJZmQVt

@dalem_abdhi Joos really 👍 this is important to do in PTPN's efforts to support national security, one of which is in the food sector through food self-sufficiency.
"DONT PANIC BUYING"
The people of Kutai Kartanegara are advised to buy cooking oil as needed.

Several content references exhibited highly positive sentiments as follows:

Hopefully:
- Best Solution
- Peace, for ALL.

The system-level communication network regarding basic necessities demonstrates a low communication intensity and reciprocal relationship between nodes, with only several conducting unilateral or bidirectional communications. Moreover, several central actors' dominance existed, with a distinct division between communities represented by the clusters. The '@Jokowi' account was popular with a degree value of 226, while the '@triokwekkwekki2' account could disseminate the largest information with an out-degree score of 81. Basic necessities are a popular discussion topic on Twitter before Ramadan 2022 in Indonesia, owing to inadequate availability. The CA results also discovered the extensively discussed themes related to basic necessities before approaching the month of Ramadan 2022, including food, oil, cooking, the task force, and the hashtag phrase "*punishthehoardersofcookingoil*". Twitter users' comments are highly diverse sentimentally, with 8,963 references demonstrating neutral sentiments, 500 references exhibiting highly negative sentiments, 566 references with moderately negative sentiments, 90 references with moderately positive sentiments, and 21 references with highly positive sentiments.

The results disclosed that the tweet contents conveyed negative opinions, which did not support the governmental performance in resolving cooking oil scarcity and the issue of hoarding by the alleged cooking oil mafia. The personal opinions on Twitter quickly influence each user, which forms a common perspective that transforms into a major public opinion. The convenience offered by Twitter also allows users to discuss certain topics in which cooking oil scarcity becomes a trending issue on social media (Wu & Huberman, 2007). Resultantly, the community discourse accelerates the formation of public opinions on a current issue (Juditha, 2014) in a democratic public space, where citizens could freely express opinions and interests while disseminating information. Nonetheless, opinions formed on social media would result in extreme behaviours of certain parties, including the usage of foul language, blasphemy, defamation, and other derogatory comments. According to Juditha (2014), derogatory comments would violate Law No. 11 of 2008 concerning electronic information and transactions (ITE). As such, internet users are required to understand the ethics of expressing opinions on social media politely and professionally.

The present findings demonstrated theoretically that Twitter serves as an online public space for autonomous and unrestricted debates and discussions. Due to the extensive employment of social media across the globe, the freedom of expression is increasingly expanded for constructive criticism of cultural practices as part of intercultural dialogues. Social media is also widely utilised by the general Indonesian public to develop public opinions on current issues (Juditha, 2014). Practically, the Indonesian government should consider and incorporate public opinions developed on social media for pertinent policy decisions. Furthermore, the issue of basic necessity scarcity concerns the citizens' livelihood in fulfilling fundamental needs and supporting the welfare of the community. Simultaneously, the Law on Electronic Information and Transactions (ITE), especially Article 27, requires ethics in communicating, conveying criticisms, and providing suggestions and opinions on social media. Further research on public opinions through social media is also required for a deeper understanding of the current topic. Before the advent of social media, expressing an opinion different from the authority or government to numerous citizens was highly unfeasible. Comparatively, the existence of contemporary social media creates a cultural shift by facilitating users to freely convey personal perspectives, especially regarding the current issue of cooking oil scarcity in Indonesia.

5. Conclusion

The present results on the system-level communication network demonstrated that the topic of basic necessities consisted of a diameter score of 16 points. Specifically, the community intensity and reciprocal relationship between nodes were low, with only several actors performing unilateral or bidirectional communications. Concurrently, the existing dominance of several central actors indicated a distinct division between different communities represented by the clusters. Certain actors were divided into respective clusters based on the actors' communication patterns through the Netlytic software, which produced five large networks. The '@Jokowi' account was popular with a degree value of 226, while the '@triokwekkwekki2' could disseminate the largest information with an out-degree score of 81. The top five most frequently employed words were food, oil, cooking, the task force, and the hashtag phrase "*punishthehoardersofcookingoil*". The SA findings also discovered 8,963 references with neutral sentiments, 566 references with moderately negative sentiments, 500 references with highly negative sentiments, 90 references with moderately positive sentiments, and 21 references with highly positive sentiments.

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