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THE ROLE OF OPINION LEADERS IN DIGITAL COMMUNICATION NETWORKS: A SOCIAL NETWORK ANALYSIS STUDY ON STARLINK CONTENT ON YOUTUBE

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Abstract

This research aims to identify the key actors involved in Starlink-related content shared by the @NanangMrk YouTube channel and examine their roles, numbers, and impacts within the communication network. The study employs an exploratory quantitative approach, utilizing Social Network Analysis (SNA) with Gephi 0.10.1 software. The research analyzed 2,721 comments from Starlink content posted by @NanangMrk between May 19-20, 2024, and sampled 2,128 actors or nodes using netlytic.org (communalytic.org) data collection techniques. This study was guided by the innovation diffusion theories. Findings reveal that the communication network's most influential actors connecting with others are @NanangMrk, @agps4418, @dedy6885, @MAKI-db9it, and @Mojojoba. Closeness centrality values indicate that 51 actors have strong connections with others, whereas betweenness centrality analysis demonstrates that @NanangMrk functions as a key communication link between clusters. As a significant opinion leader, @NanangMrk has extensive connections within the network, rendering these actors the most reliable sources of information or opinion leaders for promoting the Starlink product. The network is substantial, but the communication intensity is relatively low, decentralized, and predominantly unidirectional, with a small system diameter and radius. Consequently, it was concluded that utilizing YouTube's social media platform effectively disseminates information and reaches a broader audience regarding Starlink. Future research should incorporate group-level analyses with diverse themes.

Keywords: *Opinion leader digital, Social network analysis, Actor level, System level, Starlink.*

Introduction

Digital transformation and the internet have fundamentally altered the global communication landscape, significantly impacting various platforms, with YouTube emerging as a dominant force in video content distribution (Meutia, 2021). Digital transformation is particularly significant in the media industry, as it guides strategic decision-making and enables companies to keep pace with technological advancements (Prabawati & Premananto, 2023).

The transition toward digital communication necessitates a modification in leadership approach, requiring leaders to not only cultivate digital literacy but also to leverage emerging technologies for enhanced governance and decision-making processes (Evans Einstein, William Tulungen, et al., 2022).). For instance, on platforms such as YouTube, the dissemination of information regarding innovations like Starlink is frequently mediated by prominent figures in the technology sector, whose credibility and influence significantly shape public opinion. Similarly, religious leaders have effectively functioned as opinion leaders during critical periods, such as the COVID-19 pandemic, to disseminate government policies to the broader public, illustrating the influence of leadership in times of crisis (Syarifah Kusumadewi Kinanggi et al., 2022).

In the digital age, the role of opinion leaders in shaping communication networks has become increasingly prominent, especially in the context of social media platforms such as YouTube. Opinion leaders must adapt their communication strategies to effectively engage with digital audiences, capitalizing on the interactive nature of these platforms (Rafiku Rahman, 2023; Daniel Ronda, 2016)

Di era digital, peran opinion leader dalam membentuk jaringan komunikasi menjadi semakin menonjol, terutama dalam konteks platform media sosial seperti YouTube. Pemimpin opini harus menyesuaikan strategi komunikasi mereka untuk terlibat secara efektif dengan audiens digital,

memanfaatkan sifat interaktif dari platform ini (Rafiku Rahman, 2023; Daniel Ronda, 2016). Political leaders also recognize the potential of digital platforms for policy dissemination; however, the efficacy of such endeavors may vary depending on their digital literacy and the engagement of their target audience (Iman Surya et al., 2021). This phenomenon is particularly pertinent in the context of highly technical subject matter such as Starlink, wherein digital opinion leaders exert significant influence in shaping consumer perceptions and informing public comprehension of complex technological innovations (J. Candra & R. Oktavianti, 2019).

To effectively engage with the digital generation, leaders must not only articulate their message with clarity but also establish credibility, utilize online media platforms, and demonstrate a high degree of digital literacy (Assiroji, 2021). The persistent significance of communication as a fundamental leadership competency remains evident as leaders continue to allocate a substantial portion of their time to managing communication activities across various domains, including politics, technology, and religion (Puji Kusuma Wardani & Alfian Zainul Akbar, 2020). Through platforms such as YouTube, opinion leaders in the digital realm, especially on topics such as Starlink, serve as important figures in guiding public discourse, reinforcing the importance of leadership in digital communication networks.

Social network analysis (SNA) has emerged as a valuable tool for identifying opinion leaders and analyzing digital activism across various platforms. Studies have explored its application in a variety of contexts, ranging from entrepreneurial discussions on Twitter (Wibisono, 2023) to political hashtag movements (Rinaldo et al., 2023; Eriyanto, 2020).

SNAs can reveal key actors, network structures, and influential nodes in online discussions (Almeida et al., 2018; Momtaz et al., 2011). Researchers have leveraged the SNA to identify potential opinion leaders in areas such as child health promotion (Guldbrandsson et al., 2012) and product marketing (Bodendorf & Kaiser, 2009). This method has also been applied to visualize networks of activism and opinion leaders in social movements, as shown in the #FreeWestPapua case study (Ardiyanti et al., 2022). The study highlights the effectiveness of SNA in uncovering influential individuals, understanding the process of opinion formation, and analyzing the dissemination of information in digital networks across various domains.

New media serves as a new space for the public to communicate, socialize, and exchange information virtually. New media often becomes a place for society to share information, express opinions, and provide criticism to certain parties. Activities on new media platforms like YouTube often feature hot and trending topics discussed by many. Typically, a keyword or topic within a video becomes the focus of discussion in the content. This writing will discuss the trending video on YouTube with the topic "Starlink," uploaded by @NanangMrk, which has garnered 2,721 comments. YouTube provides various features that make it easier for users, such as video annotations, video speed controls, video downloads, and the Trending Video feature. The trending feature on YouTube displays a ranked list of videos that are currently hot topics. The "Starlink" product has become a hot topic on YouTube because, on May 19, 2024, a satellite internet service was launched by renowned tech figure Elon Musk named Starlink. Elon Musk is known for creating many advanced technologies, including the Tesla car, famous for its auto-pilot feature. Starlink, a satellite internet network, aims to provide high-quality internet access, especially in remote areas that traditional telecommunication infrastructure finds hard to reach. For this reason, many content creators, particularly on YouTube, have reviewed the Starlink product.

One of the content creators who reviewed the Starlink product and became a trending video on May 19, 2024, is the account @NanangMrk, with the title "Fast & Cheap Internet in Remote Areas with Poor Signal, Using Starlink Indonesia." In this video, @NanangMrk demonstrates how Starlink can provide an internet speed of 223 Mbps in areas with limited network access. The researcher conducted data crawling using Netlytic.org from the "Starlink" video discussed on the YouTube channel @NanangMrk on May 20, 2024

This study will examine how digital opinion leaders in connected networks among actors in Starlink content published by @NanangMrk accounts on the YouTube platform using the Social Network Analysis method. So, the analysis of communication patterns and the influence they create in disseminating information related to "Starlink" content from @NanangMrk accounts on YouTube

social media as the formation of digital opinion leaders. As such, this article aims to contribute to the literature on the role of digital opinion leaders in modern communication networks.

Research Objective (s)

The objective of this study is to identify the digital opinion leader by key actors in the communication network, examine the relationships between these actors, and determine the volume of communication as well as the extent of the social network concerning the "Starlink" topic on the @NanangMrk account on YouTube.

Literature Review

The Concept of Opinion Leaders in Digital Communication

The role of opinion leaders in communication has long been a central focus of communication theory, dating back to Katz and Lazarsfeld's (1955) work on the two-step flow of communication, which described how certain influential individuals mediate information between mass media and the public. This traditional view of opinion leadership has been transformed in the digital era, where the rise of social media has empowered individuals, often referred to as digital opinion leaders, to shape public opinion on a large scale. These individuals now play a pivotal role in online platforms by influencing others' perceptions, behaviors, and decision-making (Abidin, 2018).

Characteristics and Influence of Digital Opinion Leaders

In the digital context, opinion leaders often emerge in the form of social media influencers, bloggers, and YouTubers who possess a substantial following and are perceived as knowledgeable and credible by their audience. According to Casaló, Flavián, and Ibáñez-Sánchez (2020), digital opinion leaders on platforms such as Instagram and YouTube can significantly affect consumer attitudes and behaviors, particularly in areas such as brand loyalty and product awareness. These leaders use their platforms to engage directly with their followers, offering opinions, reviews, and endorsements that carry weight due to their perceived expertise and authenticity (Berger, 2016).

The Role of Digital Opinion Leaders in Political and Social Discourse

In addition to their influence on consumer behavior, digital opinion leaders are instrumental in shaping political and social discourse. Surya, Prawira, and Yudhistira (2021) emphasize the importance of digital opinion leaders in political communication, noting that political figures increasingly use digital platforms to disseminate policies and mobilize public support. However, the effectiveness of these efforts varies depending on factors such as the digital literacy of the audience and the credibility of the leader. This view aligns with previous research on the diffusion of innovations, which suggests that leaders in social networks serve as gatekeepers of information, selectively promoting or challenging new ideas (Rogers, 2003)

Social Network Analysis (SNA)

Previous research using Social Network Analysis aims to understand the relationships and roles among actors in a network and produce a visual diagram of social network relationships. One example of such research is titled "Digital Rhetoric and Social Network Analysis of the Millennial Chinese Generation through YouTube" by Sinta Paramita and Lydia Irena (2020). This study discusses how to explain the complexity of network communication in content and understand the digital rhetoric developed by the Chinese millennial generation in creating digital content at the system level. This study uses rhetoric theory to analyze communication, whether in writing, speech, or other communication forms. Another example of research using Social Network Analysis is a study titled "Communication Network Structure Analysis of #Seagames2022 on Twitter Using Social Network Analysis (SNA)" by M. Aulia Akbar et al. (2022). This study examines the type of relationships and communication network structures that occur through the hashtag #SEAGames2022 on Twitter, involving various actors on the platform at the system level. A graph theory approach is used in this research to analyze relationships and roles among actors in a network and visualize the social network relationship diagram.

Social Network Analysis (SNA) and Digital Opinion Leadership

The study of digital opinion leaders has been further advanced by the use of Social Network Analysis (SNA), which provides a framework for analyzing the structure of online communication networks and identifying key actors who hold influence within these networks (Wasserman & Faust, 1994). Through the application of SNA, researchers can map the relationships between individuals and organizations on digital platforms, revealing the centrality of certain opinion leaders in the dissemination of information (Borgatti, Everett, & Johnson, 2018). The role of these leaders in guiding public opinion is particularly evident in specialized communities, such as those discussing technological innovations like Starlink on platforms like YouTube (Rahman, 2023).

Innovation Diffusion Theory

The theory developed by Everett M. Rogers (1962) is one of the important theories used to understand how innovation (whether in the form of technology, ideas, or information) spreads among members of a social system. This theory focuses on the process of spreading innovation through various communication channels over time among individuals in a community or social network. There are five main categories in this theory, namely innovators, early adopters, early majority, late majority, and laggards. Opinion leaders play an important role in accelerating or slowing the diffusion of innovation, and their role can be identified through various indicators in social network analysis.

Methodology

In this research, the subjects are the users or accounts that participated in writing and replying to comments on the Starlink video from @NanangMrk on the YouTube social media platform. Meanwhile, the object of this research refers to the target or topic being studied. Therefore, the object of this research is the keyword "Starlink," which was widely discussed by YouTube social media users or accounts on May 20, 2024.

In a research study, an appropriate method is required so that the research can be conducted properly and accurately, allowing the researcher to gain an understanding of the issue being studied. Therefore, the researcher employs the qualitative research method to guide the understanding in structuring this research. Quantitative research can be defined as a process of generating knowledge using data in the form of numbers as tools to analyze explanations about what is being studied (Kasiram, 2008).

The data collection technique used by the researcher is through the Netlytic.org website, which helps the researcher and others understand the operations of online groups and discover how information flows within a network. Data was collected by crawling data on the Netlytic.org site from May 19, 2024, to May 20, 2024. After that, the data will be processed using Gephi software, which can assist in data analysis to reveal patterns and trends, highlight outliers (individuals or elements that are separate from the main body or system) specifically, and provide insights into the data. Gephi combines built-in functions with a flexible architecture to explore, analyze, spatialize, filter, cluster, manipulate, and export all types of networks. Gephi allows users to discover network properties and data since it is based on a visualization and manipulation paradigm.

Results

1. Actor-Level Communication Network Analysis of "Starlink" @NanangMrk

Actor-level or centrality analysis in a complete network analysis shows the position or status of a node within the overall communication network and how prominent and central that actor is. There are four methods to measure centrality in actor-level analysis, which include calculating degree centrality, closeness centrality, betweenness centrality, and eigenvector centrality.

1.1 Degree Centrality Analysis

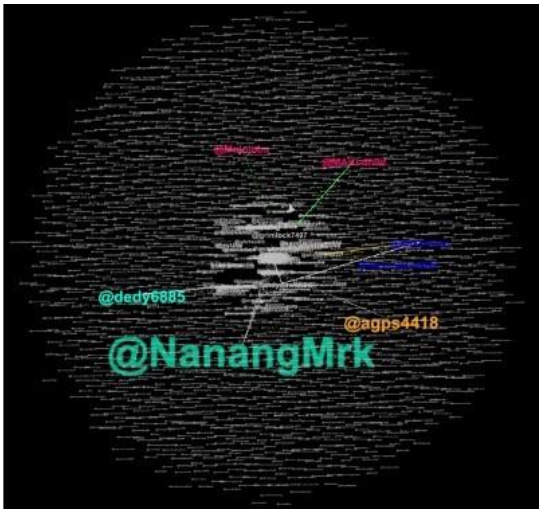
Degree refers to the number of connections an actor has with other actors in a network, indicating the level of popularity of that actor within the social network. Degree centrality has directions, which include in-degree, the number of relations directed toward the actor, and outdegree, the number of links directed outward from the actor.

Table 1: Degree in Gephi

Label	In-Degree	Out-Degree	Degree
@NanangMrk	28	1	29
@agps4418	7	4	11
@dedy6885	8	2	10
@MAKI-db9it	2	4	6
@Mojojoba	2	4	6

Source: Researcher's data processing

Table 1 explains that there is an actor with the highest degree value, namely @NanangMrk, with a total of 28. Additionally, four other accounts rank among the five most frequently contacted accounts, aside from @NanangMrk: @agps4418 with a total of 11, @dedy6885 with 10, and both @MAKI-db9it and @Mojojoba with a value of 6.



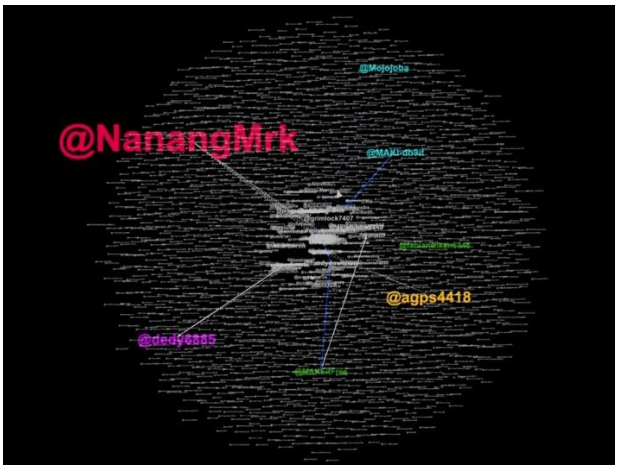
Picture 1: Visualization of Degree Content for Starlink @NanangMrk
Source: researcher's data processing

In a directed network, in-degree refers to the number of edges or relationships directed toward an actor within the network. This indicates how many other actors contact or direct relationships with that actor. Table 2 explains that the account with the highest in-degree value is the channel owned by @NanangMrk, with a total of 28 incoming links to that actor. Based on this, it can be interpreted that the @NanangMrk channel is the most contacted (in-degree) account by other social media users on YouTube who are also involved in the communication network regarding the "Starlink" content by @NanangMrk. Additionally, four other accounts are among the five most contacted accounts: @dedy6885 with eight links, @agps4418 with seven links, @we1ang with three links, and @MAKI-db9it with two links. Therefore, it can be concluded that the account @NanangMrk is the most contacted in the video content "Starlink" by @NanangMrk, with a total of 28 links.

Table 2: In-Degree in Gephi

Label	In-Degree	Out-Degree	Degree
@NanangMrk	28	1	29
@dedy6885	8	2	10
@agps4418	7	4	11
@we1ang	3	1	4
@MAKI-db9it	2	4	6

Source: Researcher's data processing



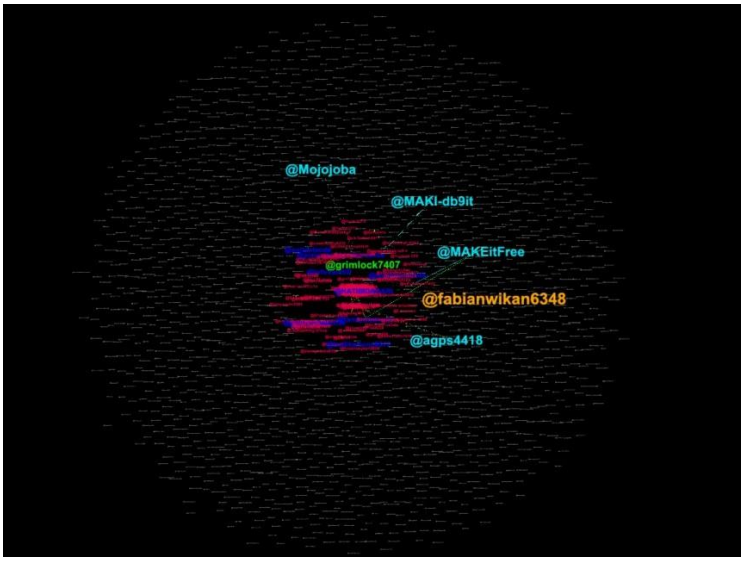
Picture 2: Visualization of In-Degree Content for Starlink @NanangMrk
Source: researcher's data processing

In a directed network, out-degree refers to the number of links that go out from an actor. It can be understood that out-degree represents the actor who reaches out to other actors in a network. Table 3 below explains that there is a node with the highest out-degree, which is @fabianwikan6348 with a value of 5, followed by @agps4418 with 4, @MAKEitFree with 4, @MAKIdb9it with 4, and @Mojojoba with an out-degree value of 4. These five accounts are the nodes that most frequently contact other accounts in the comment section on the "Starlink" content by @NanangMrk on YouTube. Therefore, it can be concluded that the channel @fabianwikan6348 is the actor who most frequently reaches out to others within the network. This means that the @fabianwikan6348 account actively plays a role in distributing information to other actors.

Table 3: Out-Degree in Gephi

Label	Out-Degree	In-Degree	Degree
@fabianwikan6348	5	0	5
@agps4418	4	7	11
@MAKEitFree	4	1	5
@MAKI-db9it	4	2	6
@Mojojoba	4	2	6

Source: Researcher's data processing



Picture 3: Visualization of Out-Degree Content for Starlink @NanangMrk
Source: researcher's data processing

1.2 Closeness Centrality Analysis

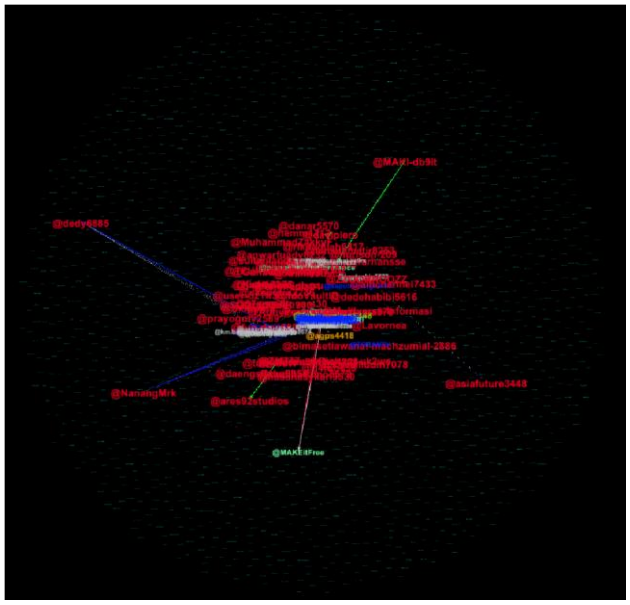
Closeness centrality is a centrality measure that visualizes how close an individual (node) is to all other actors in a network. This closeness can be measured by how many steps (paths) an actor requires to contact or be contacted by other actors in a network. The higher the value (closer to 1), the more connections the node has.

Table4: Closeness Centralityn Gephi

Label	Closeness Centr...
@MAKI-db9it	1.0
@dedy6885	1.0
@asiafuture3448	1.0
@sultanlaode	1.0
@InfoVaultID	1.0
@budihartono8572	1.0
@NanangMrk	1.0
@ares92studios	1.0

Ssource: Researcher's data processing

In Table 4 above, the actor with a value of 1.0—considered a perfect score—shows how close the average distance is between the actor and all other actors in the network. Based on the table of closeness centrality, there are 51 actors (or 2.4%) who have a perfect closeness centrality score of 1.0, meaning these actors only require, on average, one step to contact other actors in the network. This is calculated by dividing the total shortest paths between one actor and all other actors in the network.



Picture 4: Visualization of Closeness Centrality Content for Starlink @NanangMrk
Source: researcher's data processing

1.3 Betweenness Centrality Analysis

Betweenness centrality represents an actor's or node's position as an intermediary in the relationships between other actors within a network. This concept is significant because it relates to the control and manipulation of information. Actors functioning as intermediaries play a critical role in determining the membership and flow of information among other actors in the network. The higher the betweenness centrality value (closer to 1), the more significant the actor's role in the network becomes.

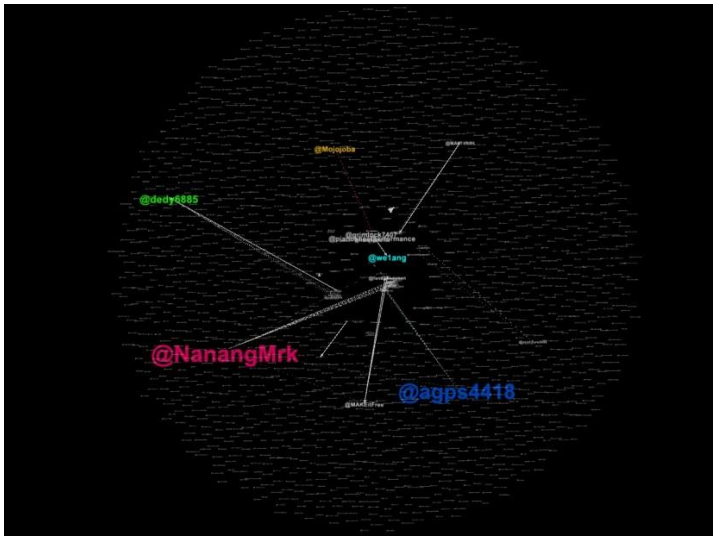
Table5: BetweennessCentralityin Gephi

Label	Betweenness Centrality
@NanangMrk	0.000008
@agps4418	0.000008
@dedy6885	0.000004
@we1ang	0.000003
@Mojojoba	0.000002

Source: Researcher's data processing

Table 5 above indicates that the actors (nodes) with the highest betweenness centrality are the accounts @NanangMrk and @agps4418, each with a betweenness centrality value of 0.000008. This suggests that @NanangMrk and @agps4418 are the most influential nodes or actors in terms of serving as intermediaries or connectors between other actors regarding the dissemination of information related to the "Starlink" content by the channel @NanangMrk.

In addition to @NanangMrk and @agps4418, the next accounts with the highest betweenness centrality include @dedy6885 with a betweenness centrality of 0.000004, @we1ang with a value of 0.000003, and @Mojojoba with a value of 0.000002. These accounts are users of YouTube who engaged with the "Starlink" video content posted by @NanangMrk to express their opinions, critiques, thoughts, and views on the launch and review of the Starlink product by SpaceX.



Picture 5: Visualization of Betweenness Centrality Content for Starlink @NanangMrk
Source: researcher's data processing

1.4 Eigenvector Centrality Analysis

Eigenvector Centrality is a significant measure used to evaluate the influence or strength of a node (or actor) within a network. It identifies actors that function as connectors between previously unconnected individuals. The closer an actor's eigenvector centrality score is to 1, the more important their role is within the network. This measure assigns greater weight to actors who are connected to other actors with similarly high levels of connectedness, highlighting not just the number of direct connections but the quality of those connections in terms of influence and centrality.

Table 6: EigenvectorCentrality in Gephi

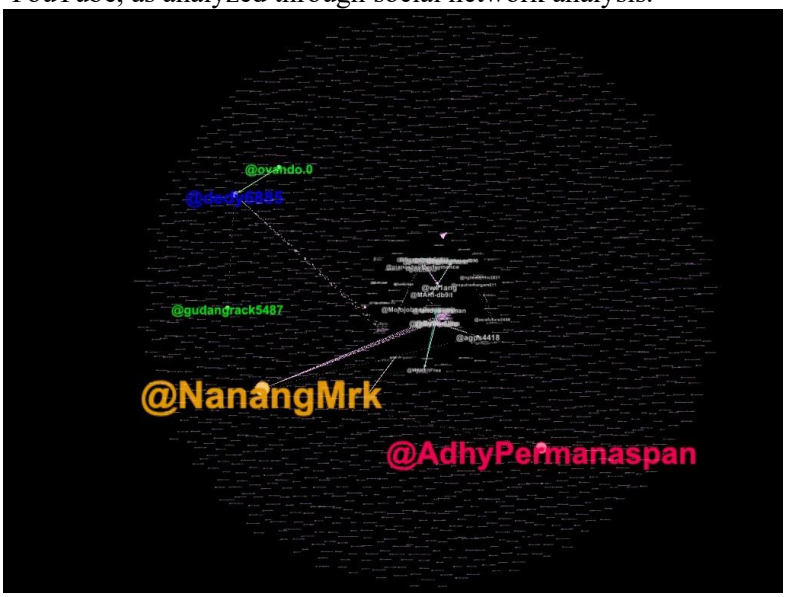
Label	Eigenvector Centrality
@NanangMrk	1.0
@AdhyPermanaspan	0.817073
@dedy6885	0.452342
@ovando.0	0.312866
@gudangrack5487	0.312866

Source: Researcher's data processing

In Table 6, it is explained that the network related to the Starlink video content by @NanangMrk on YouTube shows that the actor with the highest eigenvector centrality is @NanangMrk, with a perfect score of 1.0. Based on the eigenvector centrality data found in Table 4.7, the account @NanangMrk is a crucial or highly popular actor, meaning that the spread of information on the topic of Starlink uploaded by @NanangMrk on YouTube has effectively disseminated through social network analysis.

The second most important account, with a high eigenvector centrality score, is @AdhyPermanaspan, with a value of 0.817073. This value is the closest to 1, indicating that @AdhyPermanaspan holds a near-central role in information distribution. Next, @dedy6885 has an eigenvector centrality score of 0.452342, followed by @ovando.0 and @gudangrack5487, both with a score of 0.312866. These accounts can be considered to have a significant presence and are relatively

popular in terms of information dissemination within the Starlink video content network by @NanangMrk on YouTube, as analyzed through social network analysis.



Picture 6: Visualization of Eigenvector Centrality Content for Starlink @NanangMrk
Source: researcher's data processing

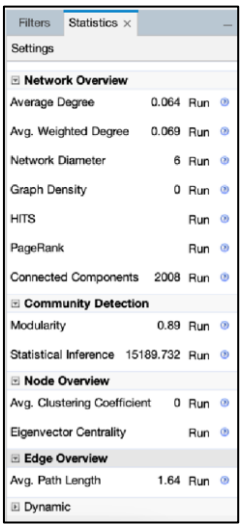
2. System-Level Communication Network Analysis of "Starlink" @NanangMrk

Table 7: Network System Data for Starlink Content by @NanangMrk

Data	**Analysis**
Size	2128
Density	0.00003005
Reciprocity	0.235294117647059
Centralization	0.00889
Distance	1.64
Diameter	6

Source: researcher's data processing

In the system-level analysis, there are five key dimensions: size, density, reciprocity, centralization, and distance (including diameter). The goal of system-level analysis is to assess the overall scope and structure of the communication network, allowing a comprehensive view of its size and characteristics.



Picture 7: Statistic Data Content for Starlink @NanangMrk
Source: researcher's data processing

2.1 Size Analysis

In a network, size refers to the total number of members or actors within a communication system. The size of a network determines the cohesiveness of communication, whether in a small or large network. Typically, communication intensity is higher in smaller networks compared to larger ones. Table 7 above explains the network structure of the Starlink content by the @NanangMrk channel, showing that the network size consists of 2,128 actors (nodes). This indicates that the social communication network surrounding the Starlink content by @NanangMrk is classified as large, given the significant number of actors and relationships involved.

2.2 Density Analysis

Density analysis measures the ratio between the number of links (relationships/ties) present in a network and the number of possible links. Density illustrates the intensity of communication among network members. A network with high density indicates frequent interactions between its members, while a network with low density suggests that members interact less frequently. In Table 7, the network structure of the Starlink content by the @NanangMrk channel shows a density value of 0.00003005. The formula for calculating density is the total number of interactions in the network divided by the total possible interactions in a directed network (N*(N-1)). This means there are approximately 0.00003005 * 2128 * 2127 = 136.0139928 connections. Given that the range of density values lies between 0 and 1, it can be concluded that the communication structure within the Starlink content network on @NanangMrk's channel has a low density.

2.3 Reciprocity Analysis

Reciprocity analysis visualizes the relationships between actors or members in a communication network, focusing on whether these interactions are one-way or two-way. This analysis reveals whether the nodes (actors) actively engage with each other or if the communication is primarily unilateral. High reciprocity values indicate that many actors are engaging in two-way conversations, while low reciprocity values suggest minimal or one-sided interactions. In Table 7, the communication network structure of the Starlink content by the @NanangMrk channel shows a reciprocity value of 0.235294117647059. The range for reciprocity values lies between 0 and 1. This indicates that the interactions among actors or members in the comment section of the Starlink post by @NanangMrk are predominantly one-sided. Therefore, this communication network exhibits low intensity in terms of mutual interaction.

2.4 Centralization Analysis

Centralization analysis in communication networks measures the average positioning of all actors within a network. It illustrates the extent to which the flow of information is concentrated among nodes or actors. A high centralization value (close to 1) indicates that certain actors dominate the information flow, while a low centralization value (close to 0) signifies a more decentralized network

where information is broadly disseminated among numerous members. The closer the value is to 1, the more central actors there are that control the information flow in the network.

In Table 7, the structure of the network concerning the Starlink content by the @NanangMrk channel indicates a centralization value of 0.00889. This suggests that the communication network around the Starlink content by @NanangMrk is decentralized, as the links are directed towards many actors within the network. This means that the degree of connectivity for the Starlink content by @NanangMrk is calculated as 0.00889 * (number of nodes – 1) = 0.00889 * 2127 = 19. This implies that there are 19 actors that are interconnected, either directly or indirectly, within the network.

2.5 Diameter & Distance Analysis

Diameter analysis measures the farthest distance between two actors within a network. In contrast, the average distance indicates the average number of steps or paths required for all actors to interact with one another. In Table 7, the structure of the network concerning the Starlink content by the @NanangMrk channel shows that the diameter is valued at 6, with an average distance of 1.64. This indicates that the distribution of actors within the network is spread out rather than clustered, as evidenced by the relatively large diameter value. It can also be stated that the Starlink content network by @NanangMrk is a dense network, as it has a comparatively small average distance. Each actor requires an average of 1.64, or roughly two other actors, to interact with one another within the communication network.

Discussion

Discussing the context of digital communication networks, an opinion leader has a significant influence in disseminating information and shaping public opinion. Based on the results of the analysis presented, **@NanangMrk** plays the role of the main opinion leader in the communication network related to **"Starlink"** content on YouTube. This can be explained through various actor-level analysis methods, namely degree centrality, closeness centrality, betweenness centrality, and eigenvector centrality.

Degree centrality indicates the number of connections an actor has with other actors in the network. In this case, @NanangMrk has the highest degree score of 29, consisting of 28 in-degree and one out-degree. A high degree signifies that many other users in the network are directing interactions or relationships to this account. As such, @NanangMrk has become the center of attention in discussions related to "Starlink," as other users consider it a credible and reliable source of information.

This shows the context of degree centrality, @NanangMrk is an opinion leader because it is the most popular actor who is contacted by other users in the network. This shows that the content and opinions shared by @NanangMrk have a great influence on other members of the network.

Closeness centrality measures how close an actor is to other actors in the network or how quickly an actor can access and disseminate information. A closeness value close to 1.0 indicates that the actor can reach other users quickly. @NanangMrk has a high closeness centrality, which indicates that the account is strategically positioned to quickly disseminate information to all other actors on the network. In other words, other users can easily be reached or contacted by @NanangMrk.

As an opinion leader, high closeness centrality allows @NanangMrk to become a center for the rapid and effective dissemination of information in the network. This strengthens its role as a key liaison in the distribution of information related to technological innovations such as Starlink.

Betweenness centrality measures an actor's role as a liaison or intermediary between other actors in the network. A high value of betweenness indicates that an actor is among many relationships with other actors, so it has an important role in disseminating information between groups in the network. @NanangMrk and @agps4418 have a high value of betweenness, which indicates that they function as important intermediaries in the flow of information. They help ensure that information can flow from one group to another.

In this role, @NanangMrk not only disseminates information directly but also assists in connecting other actors who may not be directly connected to each other. This strengthens its role as an opinion leader who mediates the flow of information in the network.

Eigenvector centrality is a measure of an actor's influence by taking into account the quality of

the connections they have. Actors with high eigenvector values are connected to actors who also have great influence. @NanangMrk has a perfect Eigenvector Centrality (1.0), which shows that this account not only has a lot of connections but also connects with other influential actors. These actors, such as @AdhyPermanaspan and @dedy6885, also play an important role in the dissemination of information within the network. With a high eigenvector centrality, @NanangMrk not only becomes an opinion leader in the network but also plays a role in connecting other important actors. This shows that these accounts have a significant influence on disseminating information to a wider audience.

The discussion of the results of the system level in the analysis of communication networks is decentralization and information coverage. At the system level, the analysis of the "Starlink" content-related network shows that the network has low density (0.00003005), low reciprocity (0.235), and low centralization (0.00889). This indicates that this communication network is decentralized, with actors who are relatively scattered and do not interact intensely. However, a network diameter of 6 and an average distance of 1.64 indicate that although the network is decentralized, most actors require very few steps to interact with each other. This suggests that information can spread quickly even if the network is not dense.

In the context of the system, network decentralization shows that @NanangMrk's influence as an opinion leader is widespread, with other actors scattered but still able to access information quickly. This indicates that @NanangMrk plays an important role in bringing together other actors in a relatively fragmented network.

The relevance of innovation diffusion theory in the context of communication network analysis conducted on "Starlink" content by @NanangMrk account is relevant to explain how technological innovations such as Starlink are introduced, adopted, and disseminated through digital communication systems. Both actor-level analysis and system-level analysis show the dynamics of information dissemination that are consistent with the principles of innovation diffusion. Opinion leaders play an important role in accelerating the diffusion process by becoming the main source of information for early adopters and the majority in a social network. In the analysis, @NanangMrk acted as the opinion leader with the highest degree of centrality (29), which shows that he is an information center for many other actors in the network connected to the topic of "Starlink." In this network, @NanangMrk has 28 in-degrees, which signifies that the account is the main center of attention contacted by other users. This means that @NanangMrk was one of the first parties to adopt and deploy Starlink's innovations in the network, and other users rely on the content generated by these accounts to understand those innovations.

Innovation diffusion theory divides the group of innovators and early adopters. The group of innovators are those who are the first to adopt the innovation and introduce it to the wider network. Based on degree centrality, @NanangMrk can be seen as innovators who introduce Starlink-related content to a wide audience, while other accounts, such as @agps4418 and @dedy6885, that have lower degree centrality scores may be included in the group of early adopters who immediately follow in the innovator's footsteps. Early adopters act as validators of innovation and disseminate more information to other users. In these results, @agps4418 and @dedy6885 played a crucial role in helping to spread innovation to other actors in the network, which was reflected in their engagement through high out-degree and in-degree levels.

Then, the context of innovation diffusion with the influence of high closeness centrality shows that actors can spread innovation quickly to many other actors in the network. The results of the analysis indicate that @NanangMrk exhibits a high closeness centrality (1.0), suggesting that it possesses the capacity for efficient access by other actors and can rapidly disseminate information about Starlink innovations throughout the entire network. @NanangMrk occupies an optimal position to expedite the diffusion process, as the information disseminated through this account can reach other actors with minimal intermediary steps.

For high centrality betweenness, it shows the role of @NanangMrk as the main intermediary in the network. Innovation diffusion theory identifies that individuals who have a position as a liaison often accelerate the spread of innovation by bridging various groups or communities within a social network. @NanangMrk and @agps4418 have significant betweenness centrality, suggesting that they act as intermediaries between different parts of the network. These are important in the process of

diffusion of innovations, as they allow the dissemination of information across the boundaries of different groups.

Eigenvector Centrality and Opinion Leader Influence with a perfect eigenvector centrality value (1.0), @NanangMrk at the center of the network, ensures that Starlink innovations spread quickly and effectively through the entire network. Other accounts, such as @AdhyPermanaspan and @dedy6885, which have a high eigenvector centrality, also play the role of additional information disseminators that strengthen the diffusion process of innovation. In innovation diffusion, opinion leaders with high eigenvector centrality could disseminate innovation more effectively because they have connections with influential individuals in the network.

In addition, the relevance of innovation diffusion theory at the system level is that the size of the network affects the speed and pattern of innovation spread. The Starlink network by @NanangMrk consists of 2,128 actors, which shows that this innovation has attracted the attention of many users. Large networks like this show vast diffusion potential, although challenges also arise when it comes to reaching each user effectively. The role of opinion leaders such as @NanangMrk is important for bridging groups of actors that may be more difficult to access, especially in the context of decentralized networks because they have large networks. Density analysis shows that this network has a low density (0.00003005), which indicates that the intensity of interaction between actors in this network is not very strong. However, in the context of innovation diffusion, this low density can signal that the innovation is in the early stages of diffusion, where adoption by most users may still be low. Opinion leaders like @NanangMrk help overcome density limitations by serving as the main liaison that spreads information to different parts of the network that may be separate.

A low reciprocity (0.235) indicates that most interactions in the network are one-way, where users receive more information than provide feedback. This is common in the early stages of innovation diffusion, where users are still in the stage of receiving information and are not yet fully engaged in two-way discussions. This indicates that @NanangMrk acts as the main disseminator of information, while most other users act as recipients of information related to Starlink innovations.

Low centralization (0.00889) indicates that the network is decentralized, where no single actor fully controls the flow of information. This reflects a diffusion pattern of innovation that spreads widely through various groups within the network, with opinion leaders such as @NanangMrk and @agps4418 playing a major role in facilitating the spread of innovation among these groups. In a decentralized network, innovation can spread faster if it is supported by an effective opinion leader who connects various actors in the network.

The large diameter of the network (6) and the small average distance (1.64) indicate that, although these networks are widespread, most actors can reach each other easily. This means that information about Starlink innovations can spread quickly, even though the network is large and scattered. In the context of innovation diffusion, this relatively small distance suggests that opinion leaders such as @NanangMrk play an important role in accelerating the spread of innovation, as information can easily pass through several steps between actors in the network.

Conclusion

Finally, at the actor level, eigenvector centrality shows that @NanangMrk is the opinion leader, with a perfect eigenvector centrality value. The @NanangMrk account is the most popular actor among all actors due to the large number of relationships it holds with other actors. The "Starlink" content by @NanangMrk on YouTube has been utilized by actors with large followings and influence to spread marketing messages to a broad audience. A digital opinion movement regarding the Starlink content by @NanangMrk has been spearheaded by dominant actors who play an active role in the success of this Starlink marketing campaign. @NanangMrk plays the role of a key opinion leader who accelerates the process of spreading innovation among various user groups. Through degree centrality, closeness, betweenness, and eigenvector centrality, these accounts have succeeded in disseminating information effectively and played an important role in expanding the adoption of Starlink innovations.

At the system level, even though the network is decentralized and has a low density, information can spread quickly thanks to opinion leaders such as @NanangMrk. The link between innovation diffusion theory and network analysis results shows how technological innovations such as Starlink can

spread among actors in digital social networks, with opinion leaders serving as the main drivers of the innovation adoption process.

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