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A SOCIAL NETWORK ANALYSIS: EVALUATING ROLES OF OPINION LEADERS IN SHAPING PUBLIC OPINION ON COVID-19 NEWS

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Abstract

The essence of human communication is to convey meaning into understanding because communication without understanding does not result in desired behavioural change. Hence, this paper examined a social network analysis: evaluating the roles of opinion leaders in shaping public opinion on covid-19 news. 62,119 online posts from 11 social networks were examined to analyze the novel coronavirus disease information. These platforms include Facebook, YouTube, Twitter, Linkedin, Pinterest, WhatApp, Tiktok, Telegram, Snapchat, and Google Hangouts. Strong

influences, engagements, and hot values were the best predictors of opinion-leader classification across 11 Internet forums. This study abreast the Two-Step Flow theory, the characteristics of opinion leaders, and how they interpret media messages, all of which have much influence. The findings called into question traditional news sources because opinion leaders drew widespread attention to the health threat issues during the early stages of the COVID-19 outbreak. This study contributes to a better understanding of social network types, follower engagement, and maximizing the impact of opinion leaders in social networks. It concluded that during the COVID-19 outbreak, the roles of opinion leaders were to interpret government policies regarding the pandemic, explain non-pharmaceutical measures to stop the spread of COVID-19, and encourage the public to get the COVID-19 vaccine

KEYWORDS: **Two-step flow, Opinion Leaders, COVID-19, Social network, Public opinion.**

Introduction

Opinion leaders are members of a small social group who influence other members of their group Severin& Tankard (1979). According to Rogers et al. (1988), opinion leadership is the ability to influence people's behaviour in a particular way informally. Severin& Tankard asserted that opinion leadership is a two-step communication flow in which messages flow from the media to opinion leaders, who then pass them on to followers who regard them as influential. This implies that opinion leaders act as a conduit between the mass media and their followers, influencing their decision-making regarding innovation. As a result, the role of opinion leaders can be treasured, especially during the COVID-19 outbreak when people wanted more information about the virus. According to Katz &Lazarsfeld (1966), opinion leaders outnumber non-opinion leaders in terms of mass media exposure and thus have the potential to bridge the communication gap between the media and the public.

COVID-19 began spreading around the world in late 2019. In January 2020, the World Health Organization declared COVID-19 a public health emergency of international concern. Countries worldwide launched massive public health campaigns to combat the looming pandemic as the virus spread and deaths increased. Fulian (2020) observes that some of the non-pharmaceutical measures put in place to slow curb the transmission of the virus needed explanation more understandably for non-opinion leaders to adhere to them. According to Wei, Binli, & Nan (2020), during the peak of the coronavirus pandemic, opinion leaders provided insight into the characteristics of the virus, how it spreads, and how to best prevent and treat it to a public that was rapidly forming new attitudes and beliefs about the virus.

Indeed, public awareness of COVID-19 is arguably the most critical component of a successful public health campaign that helped contain the virus. Although there have been numerous studies on opinion leaders, most have focused on identification (Bakshy, Messing, &Adamic, 2015), characteristics (Winter &Neubaum, 2016), and influence. Few studies have been conducted on the roles of opinion leaders in shaping public opinion on COVID-19 news. This is the void that this research aims to fill. In line with this, this study examines previous literature on the various roles of media opinion leaders during the pandemic surge and reconciles it with the Two-Step Flow theory. Following the research, the study considered the objectives below:

1. To observe the roles of opinion leaders to shape public opinion on COVID-19 news
2. To examined the attribute of COVID19 news on social network forums.
3. To examine the social media platforms employed to discuss COVID-19 news.

The concept of opinion leaders

According to a study conducted by the Association of Communication Scholars and Professionals of Nigeria (ACSPN, 2018), opinion leadership is not a person's general characteristic but is limited to specific issues. Individuals who are opinion leaders on one issue may not be considered influential on another. In a later study, Lazarsfeld& Katz (1955) investigated the characteristics of opinion leaders. This study confirmed previous findings that personal influence appears to be more influential than media in decision-making. ACSPN (2018) agreed once more that influential individuals appear to be constrained in their opinion leading to specific topics, with no overlap among the individuals. The opinion leaders appear to be evenly distributed but similar across social, economic, and educational levels.

McQuail (2012) argued that opinion leaders were identified as having the most vested interest in their specific niche. They hold positions within their community that allow them to specialize in their respective fields. They are generally gregarious and sociable people. Finally, they had/have contact with pertinent information provided by sources outside their immediate circle. McQuail (2012) discovered that opinion leaders receive a disproportionate amount of their external information from media relevant to their niche. Oso, Soola, & Pate (2012) discovered that opinion leaders act as a source of social pressure to make a specific choice and a source of social support to reinforce that choice once made. Oso, Soola, & Pate (2012) contend that opinion leaders frequently rise to positions of power in their social circles. They are promoted to these positions due to their understanding of situations outside their immediate circle.

The Media and COVID-19 News

The media, through its reporting, plays a role during national health emergencies (Pieri, 2020). Public perceptions are shaped by the amount, content, and tone of news coverage on COVID-19. It frames contemporary public debates about policy responses, such as competing priorities for the timing or rigour of policies implemented. Under conditions of knowledge deficit, pandemic policymaking necessitates rapid, iterative responses and the coordination of multi-level public-health agencies and sectors (Rosella et al., 2013). In these trying times, the news media serves as a primary source of health information and uncertainty, vitally connecting health professionals, policymakers, and the general public (Hoffman &Justicz, 2016).

When the COVID-19 pandemic breaks out, public perceptions of the risks, disease-control measures, and associated political and policy discourses are shaped by media representations of complex, rapidly evolving epidemiological science. The COVID-19 pandemic provides an opportunity to assess the strengths and limitations of the media's pandemic coverage and provide insights for future news media coverage. This assessment also informs the communication strategies of public-health institutions and policymakers in the direction of clear public-health guidance and coordinated responses across health systems (Hoffman &Justicz, 2016).

Assessing Media Messages and Public Opinion

The messages the general public is exposed to in the media can significantly impact their perceptions and reactions to COVID-19 information and other social issues (Schmidt et al., 2018; Anderson et al., 2009). The effects of media can be viewed through the lens of social cognition, which refers to how people acquire, process, store, and apply social information (Swami, Chamorro-Premuzic&Furnham 2010, p.55-56). One social agent that can generate social information is the media, which communicates and draws attention to specific knowledge, ideas, values, norms, and behaviour.

The framing of an issue or topic to suggest which aspects of the issue are most important is one specific way that media coverage can significantly influence public opinion (Swami, Chamorro-Premuzic&Furnham 2010). Indeed, social cognition research has found that when making decisions, people do not consider all relevant evidence, and media framing can influence which subset of information is most relevant or sufficient to conclude (Shrum, 2002). The media also plays a vital role in informing public decisions by influencing information available when making decisions. People tend to rely on the information that is easiest for them to recall, and the media can influence accessibility by repeatedly emphasizing certain aspects of a subject (Bakshy, Messing &Adamic, 2015).

As a result, media content can exert sociocultural pressure on people to conform to the values, norms, or behaviours that it conveys (Barlett et al., 2008; Grabe et al., 2008). The media has been linked to various social attitudes, behaviours, and health-related beliefs, supporting its influential role (Barlett et al., 2008; Grabe et al., 2008). Climate change beliefs (Anderson, 2009), vaccination attitudes (Schmidt et al., 2018), and health literacy. There is also preliminary evidence that the media may influence COVID-19 knowledge and beliefs.

The roles of opinion leaders and public perception of COVID-19 news

Opinion leaders have an extensive network and mastery of news content and can influence the opinions of those who are connected to them (Winter &Neubaum, 2016). Opinion leaders play an essential role in the two-step communication flow model, in which information is transferred from the mass media to the general public in two stages: in the initial stage, messages are transferred from the media to opinion leaders and later from opinion leaders to the audience who depends on these opinion leaders for information (Winter &Neubaum, 2016). As a result, the two-step flow applies to the process of persuading and changing people's minds. Katz asserts that (1955). The personification of specific values, personal competence, and strategic social location all impact the status of opinion leadership.

Opinion leadership's status can shift over time, and different people can be opinion leaders in different domains (Winter &Neubaum, 2016). When opinion leaders are targeted, information can be disseminated more effectively in various domains. For example, detecting opinion leaders has raised awareness, particularly in COVID-19. Some examples include Fidelis Egemba, also known as Aproko Doctor, who used his Twitter platform (@aproko doctor) to disseminate medical information about COVID-19. During the COVID-19 outbreak, Fidelis Egemba had over 100 tags. He educated his 1.2 million Twitter followers about the virus and how to use non-pharmaceutical measures such `as hand washing, social distancing, hand sanitiser and protective clothing.

Morayo Afolabi- Brown, a television presenter on TVC, was another opinion leader passionate about interpreting COVID-19 messages to the public. She educated people about COVID-19 on Instagram (@ morayobrown), where she has over 170,000 followers—interpreting media messages, government vaccine policies, and virus control.MorayoAfolabi-Brown and other TVC presenters used "Your View" to properly analyse COVID-19 media messages to the public. Ali Nuhu, a Kannywood actor, used his Instagram @realalinuhu platform, which has over 2.5 million followers, to lead a social call for more Nigerians to get vaccinated to save the lives of family friends, and loved ones. Similarly, Reuben Abati, the anchor of Arise TV's Morning show, used his website www.reubenabati.com.ng to analyse COVID-19-related issues. Some of the articles he wrote are "Omicron: Living with COVID-19", "Playing with COVID-19 in Nigeria", and "The Global Race for Vaccine".
Inline, BabajideOtitoju, the anchor of the Journalists Hangout on TVC, used his Youtube channel "Issues with Babajide" and Facebook @ Babajideotitoju to discuss COVID-19 issues.

In contrast, other studies incorporated opinion leaders into traditional dynamics models. For example, Wei, Binli, & Nan (2020) recognised that one of the roles of opinion leaders is to provide a platform that will enable them to reach their audience followers and discuss COVID-19-related issues. According to Wei, Binli, & Nan, opinion leaders used their platforms to discuss treatment, vaccination, COVID-19 transmission, and the efficacy of social distancing, self-protection, case detection, quarantine, isolation, and testing. Fulian (2020) observes that media messages on the use of non-pharmaceutical COVID-19 prevention measures were interpreted differently by opinion leaders. According to Fulian (2020), these individuals informed their followers about vaccines and their use, the protection gap, and government policy interpretation. According to Fulian (2020), when China was fighting COVID-19, opinion leaders on Weibo used their influence to reconstruct related topics and release as much positive information as possible. Guide netizens, focusing on positive emotions, to continuously strengthen existing opinions under the influence of social groups with relative consensus, fostering positive anti-epidemic sentiment and a victorious battle.

Empirical studies

A theory is essential to pique people's interests and provoke thought years after it was first proposed. The two-step flow of communication theory has remained relevant over the years. Several recent studies have addressed issues raised by Lazarsfeld's, Katz's, and Merton's studies from the 1940s.In their paper addressing the explicating opinion leadership, Shah and Scheufele (2006) addressed several problems that have been overcome, sparking new interest in the theory.

The two-step flow of communication theory is difficult to observe in the field, as discussed further in the section on theory criticisms. Many researchers have attempted to create credible models for testing the theory, with varying degrees of success (Shah &Scheufele, p. 68). Shah &Scheufele explained agenda setting using the two-step flow of communication theory developed by Lazarsfeld, Katz, and numerous other researchers. Shah &Scheufele separated opinion leaders from their two-step flow of communication theory to avoid difficulties in studying the actual flow of communication. Each participant's "Strength of Personality" was assessed using a scale. The Shah &Scheufele study seeks to identify individuals whose personal communication influences agenda setting. These are the archetypal opinion leaders who continue to exert influence over the flow of information. According to Shah &Scheufele,

agenda-setting is a two-step process in which specific individuals (opinion leaders) collect, disseminate, filter, and promote the flow of information from the media to the community. As Shah &Scheufele point out, the difference between these influential and opinion leaders is that opinion leaders are typically elitists rather than being distributed throughout the community, as the old theory suggested.

According to Remaketse's (2005) paper on the role of opinion leadership in spreading health messages, opinion leaders are essential sources of information and play an important role in information dissemination. The use of various information sources by respondents indicates the importance. Opinion leaders are one of the most widely used sources, second only to radio, which can be attributed to the government's daily policy of presenting health programs. Fulian (2020) published a paper quantifying the role of opinion leaders in COVID-19 information propagation on the Chinese Sinamicroblog. Based on forwarding quantities generated by opinion leaders and everyday users on the Chinese Sinamicroblog at various stages during the COVID-19 outbreak, the author proposed an opinion-leader susceptible-forwarding-immune (OL-SFI) dynamics, model. Fulian discovered many opinion leaders with a large fan base in the real world. Fulian concluded that the influence of opinion leaders is critical and necessary.

Theoretical Framework

The two-step flow theory was proposed by Paul Lazarsfeld, Bernard Berelson, & Hazel Gaudet in their 1948 book "The People's Choice", which focused on the decision-making process during a Presidential election campaign. The researchers discovered that media messages directly influenced voting intentions and that informal, personal contacts were mentioned far more frequently as sources of influence on voting behaviour than radio or newspaper exposure. The assumption theory says that information from the media moves in two stages. According to the theory, individuals are known as opinion leaders who pay close attention to the media and its messages. Opinion leaders interpret these messages and relay them to the public through the actual media content. The term "personal influence" was coined to describe the intervening process between a direct message from the media and the audience's ultimate reaction to that message.

Opinion leaders were thought to have sway over people's attitudes and behaviour. The two-step flow theory has aided in understanding how the media influences people's decisions. The theory improved the prediction of the impact of media messages on audience behaviour and helped explain why specific media campaigns failed to change audience attitudes and behaviour. The multi-step flow theory of diffusion of innovation replaced the two-step flow theory of mass communication. According to Akinfeleye (2003), opinion leaders filter the information they gather for their influential associates. Previous theories assumed that media directly reached the intended audience. According to Akinfeleye (2003), the media's relationship with its target is minimal compared to the influence of opinion leaders on the media audience. Ideas frequently flow from radio and print to opinion leaders, who then pass them on to less active segments of the population, according to Akinfeleye.

Criticism of this theory

As good as the Two-Step Flow Theory appears to be, some researchers have identified a gap that the theorists have failed to fill. For example, Winter and Neubaum (2016) questioned how

Lazarsfeld, Berelson, and Gaudet could quickly dictate changes in a voter's feelings. The result was an objective measurement that could be quickly recorded and compared. The flaws are in the way the researchers addressed the flow of influences. Because the experiment was not specifically designed to test the flow of influence, it severely lacked explanations. Secondly, the authors noted that they randomly collected data, but respondents in such sampling can only speak for themselves.

Thirdly, Oso, Soola, & Pate (2012) argued that Lazarsfeld and his colleagues could not measure the specific influence flow in their study in 1940. They discovered several opinion leaders dispersed across socio-economic groups; As Oso, Soola, & Pate (2012) pointed out, opinion leaders do not replace media but rather guide media discussions.

Application of the theory to this study

The Covid-19 pandemic arrived unannounced, leaving many countries, particularly Nigeria, perplexed because there were no adequate measures to halt the virus's spread. The media, on the other hand, was disseminating information on COVID-19 that was accompanied by medical jargon due to the sudden surge. Because people were unprepared for this pandemic, they needed people who could explain the virus, how it spreads, how it can be stopped, and so on. The desire for information during the virus's outbreak paved the way for opinion leaders to take it upon themselves to explain every aspect of COVID-19 and the medical jargon that comes with it. These opinion leaders are typically news analysts, social commentators, social media influencers, and others who form COVID-19 discussions to inform and educate a small population. These opinion leaders are better educated and wealthier than the average Nigerian. However, their interest in the world around them and belief that they can make a difference make them influential. These opinion leaders pay attention to media content and interpret it accurately for the public.

Methodology

A social network is an online discussion site where users with similar interests can communicate via posted messages. Furthermore, social networks are open spaces with open access, rapid circulation, and an interactive mechanism for information dissemination (Choi, 2015). The most notable social network communities in Nigeria allow access to publish themes of news, technology, health, and academic content and a large number of visitors. This study screened 11 social networks from a list of top websites in Nigeria as one of the most popular channels of information sharing based on the criteria mentioned above. Appendix II contains the operational definitions for these terms. The study's timeframe was set from December 30, 2019, to March 31, 2020, considering information sources for public response to COVID-19 risks. Based on previous references cited in screening for the variable measurement, 42 keywords were used. Appendix III contains a list of keywords.

In addition, automated content analysis with U-Miner was used to identify users' most common issues and interactions. U-Miner is a customized platform that implements a coding taxonomy for measuring variables like hits, comments, engagements, and hot value. As a result, U-Miner embedded natural language processing was used to investigate online content in its natural context. This process included pilot coding, coding scheme modification, double coding, and manual proofreading (Chang et al., 2019; Kumar &Garg, 2019). The procedure ensured the efficacy and validity of extracting opinions from text using syntactically correct

and explicit language. Notably, coders manually labelled and randomly checked approximately 500 sampled posts before implementing the filtering process with the U-Miner classifier. The level of classification accuracy reached 82 per cent, which is acceptable (Cuiet al., 2015).

The data was then descriptively analyzed using SPSS Version 24.0 and a regression model was used to determine the relationship between a single dependent (criterion) variable and multiple independent (predictor) variables. Although different algorithmic formulas produce corresponding changes for the hot value in concrete scenarios such as microblogs (Song &Meng, 2015), news websites (Liang & Lai, 2002), and online forums (Cao & Tang, 2014), the analysis produces a predicted value for the criterion variable based on a linear combination of predictors. By weighting engagements, computational communication research has emphasized the hot value of related topics (Preece& Maloney-Krichmar, 2003). The assignment of weights significantly impacts the final quantification results in this method. By attracting and facilitating more interactions, the measurement of valid posts that contain other variables such as influences, hits, comments, and engagements leads to a closed-loop structure of information flow factors in social networks (Huffaker, 2010).

Result

The interaction of opinion leader's networks in 11 social network forums yielded 62,119 online posts on the COVID-19 outbreak. Six prominent themes were further classified using deductive analysis: diseases, infection prevention and treatment, policy, politicians and non-political figures, news agencies and research institutes, and incidence and event. COVID-19 and related topics were mentioned the most (71.9%), followed by infection prevention and treatment (42.7%) and policy (42.7%). (33.7 per cent). The network of posted content features and user behaviour statistics were observed to determine the interplay of opinion leaders in social network forums. Facebook, Instagram, Twitter, and YouTube are the seven platforms. The most popular platforms for COVID-19-related discussion were Linkedin, Pinterest, and Telegram. Table 1 displays the descriptive analysis of COVID-19 news attributes as means, standard deviations (SDs), and maximum and minimum ranges.

Table 1: AnalysisofAttributesofCOVID-19NewsDisplayed on11Social Network forums

Variable	Mean	SD	Maximum	Minimum
Words	413.2	370.7	2799	69
Days	46.1	25.8	90	3
Influences	415.4	547.8	3049.8	0
Hits	71.1	185.1	775	0
Comments	44.1	70.9	391	0
Engagements	45.0	70.5	391	0
Hotvalue	45.6	70.2	391	0

Facebook had the highest share of posts among users (68.5 per cent), followed by Instagram (9.0 per cent) and Twitter (9.0 per cent) (6.7 per cent). The top posts from various Facebook sub-forums revealed that the most frequently used keywords included Wuhan pneumonia

(29.7 per cent), coronavirus (26.6 per cent), and epidemic (26.6 per cent) (25.0 per cent). More than half of all posts (58.4%) cited traditional news media sources, and the average length of a social network platform news post was 413.2 characters. A post's average number of influence hits and comments was 415.4, 71.1, and 44.1, respectively.

A multiple regression analysis was performed to determine whether the text level and type of social network forum predicted the total value of influences. The analysis revealed that followers' behaviour in Nigerian Internet forums positively predicted a single dependent variable (influences) (B =.12, SE =.00, t = 44.90, p.001). Furthermore, two hierarchical multiple regressions were performed to examine word length and posting time variables. Seven main forum venues and the influences of opinion leaders explain 97 per cent of the variance by the various predictor variables (R2 =.97, F(9, 79) = 259.47, p.001). The roles of opinion leaders in Hierarchical Multiple Regression are depicted in Table 2.

Table 2: Roles of Opinion Leaders in Hierarchical Multiple Regression

Roles of opinion leaders	Unstandardizedcoefficients
Interpretation	.00
Vaccine	-.01
Spread	43.42***
Measures	12.46
Exposure	-11.52
Policies	7.85
Donations	40.79***
Sensitization	31.41**
Campaign	.12***

Note:**p<.01, ***p<.001

R^2=.97, F(9,79)= 259.47

The analysis revealed that opinion leaders' roles positively impact Nigeria's social network forums. Opinion leaders and the value of COVID-19 news had a significant relationship (B = 1.00, SE =.00, t = 616.66, p.001). Two hierarchical multiple regressions were observed to examine variables such as word length, posting time, and main forum venue; followers' engagements were found to explain 100% of the variance using various predictor variables (R2 = 1.00, F(9, 79) = 48309.34, p.001). The types of social network forums used in the hierarchical multiple regressions are shown in Table 3.

Table 3: Types of social networks used

Forumcontent&type	Unstandardizedcoefficients
Facebook	.00
Instagram	.00
Twitter	-3.15***
Youtube	-.96
Linkedin	.86
Pintrest	-.54
Telegram	-3.10***
WhatsAPP	-2.38**
Tiktok	1.00***

Note:**p<.01, ***p<.001

R^2=1.00,F(9, 79)=48309.34

Table3showedthetypes of social network forums used inthehierarchicalmultipleregressions.

Discussion of findings

This study examines how opinion leaders discuss and disseminate COVID-19-related news on social network forums. As a result, understanding the public reaction to the COVID-19 pandemic is critical because public actions have been fueled by stigmatizing terms, biases, rumours, and misinformation that have harmed public health and well-being. The current study provides insight into the information flow for constructing the dissemination mechanism of communication about health risks. In this flow, followers of social networks actively sought information and comments in internet forums. Opinion leaders' roles were strongly reflected in their ability to educate/sensitize followers in specific social forums.

Fulian (2020), Wei, Binli, &Nan (2020) stated that during the coronavirus pandemic, opinion leaders provided insight into the characteristics of the virus, how it spreads, and how to best prevent and treat it to the public, who were rapidly forming new attitudes and beliefs about the virus. As a result, the researcher agrees with Fulian (2020), Wei, Binli& Nan (2020), Akinfeleye (2003), and Soola& Pat (2010) (2012). Opinion leaders cannot replace the media. It is also true that the media influences the direction of debate among opinion leaders. Just as the power and direct influence of the media cannot be overlooked, neither can the power, influence, and relevance of opinion leaders. Because of their audience base and influence on followers, these opinion leaders help interpret media messages, shaping public opinion.

Conclusion and Recommendations

Concerning the available literature, it is clear that this research had done a critical review on the Two-step Flow theory, the concept of opinion leadership, the influence of media, and the flow of information. This study embellished that opinion leaders affect the interpretation of media and are more influential than non-opinion leaders in a social system, especially when it comes to interpreting news like that of COVID-19. It was discovered that some of the roles of opinion leaders at the surge of the COVID-19 were to interpret government policies

regarding the pandemic, explain the non-pharmaceutical measures of stopping the spread of COVID-19 and encourage the public to get the COVID-19 vaccine. This study recommends that the influence of opinion leaders should not be neglected because they can be used to interpret media messages, thereby helping the media get the desired outcome or shape certain opinions, especially in health campaigns like COVID-19.

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S/N	Social Network forums	2022 Ranking of top websites in Nigeria	Domainname	Average independent visitors permonthin 2022	Forumde scription
1	Facebook,	69	fb.com	2.912 billion	Online social media and social networking service. It allows visitors to share and connect with people
2	Instagram	40	instagram.com	3.0 billion	An entertainment forum that allows visitors to create and share stories in all works of life.
3	Twitter	23	twitter.com	206million	A micro blog that allows a comprehensive large-scalediscussionarea,wi thavarietyof Richdiscussionboardsandto pics
4	Tiktok	21	tiktokcdn.co	745,337	Afreesocialnetworkingand micro-Blogging service
5	Pinterest	31	pinterest.com	3.014Million	This is a forum that boarders on different topics such as, cars, mobile phones,homedecoration,di gitalequipment, Realestateinvestment,etc.
6	Snapchat	25	Snapchat. com	100,838	A forum that allows instant message, visits can create and share stories as well as raise discussion on any topics
7	Youtube	81	Youtube. com	1.7billion	This forum allows for videos, music and visitors and create and share stories

8	Telegram	18	telegram.org	33,613	Fast instant messaging platform
9	Google hangout	30	"Meet" and "chat"	2.355Million	A communicationplatform for people, containingtopicsofcurrent affairs,feelings,eating, drinking,playing,studyingandworking
10	WhatApp	23	Wa.me	1.570Million	Instant message on hottopics,leisureandentertainment,academiccomputer,information exchange,etc.
11	Linkedin	28	Linkedin.com	1.39 billion	This is a business oriented forum, it is used for career development and professional networking

APENDIX 1

AppendixII

- **Measurements**
- **Forum type:** Internet forum was recoded into one dummy variable. Forexample, Facebook forum was coded as 1, and its sub-categories further coded as 1-2, 1-3,andsoon.
- **Words:**Lengthofcontentinapost
- **Days:**Dateand timewhenapostwasmadepublic.
- **Influences:** The average level of influence of opinion leaders in the industry, especially in changing the attitude or behaviour of others after taking a particularaction, including publishing, posting, commenting, and forwarding a piece ofinformation.
- **Engagements:** Frequency of involvement by weighted sum of hits andcomments.
- **Hot value:** A "hot value" is used to learn the popularity index of a post fromthe time of posting to the present in the forum. It is affected by users' behaviour in thesame community within a limited time period. A higher hot value is associated with a higher positionofthe correspondingpage in theforumlists.
- **Hits:** Number of clicks of a posted item.
- **Comments:** Number of comments left on a post.

AppendixIII

Codebook

1. Coronavirus
2. Novel coronavirus (nCoV)
3. 2019novelcoronavirus (2019-nCoV
4. Pneumonia
5. Viralpneumonia
6. Person-to-person/human-to-humantransmission
7. Incubation/latentperiod
8. Asymptomaticperiod
9. Droplettransmission
10. Confirmedcase
11. Suspectedcase
12. Mortalityrate
13. Tocontaintheoutbreak
14. Lockdown
15. Quarantine
16. Vaccine
17. Wearing of mask
18. Hand washing
19. Disinfection
20. Crowd control/restriction
21. HubeiorHubeiprovince
22. Wuhan
23. NCDC
24. Whistleblower
25. World HealthOrganization
26. China
27. Mediaornews