The effects of infotainment on public reaction to North Korea using hybrid text mining: Content analysis, machine learning-based sentiment analysis, and co-word analysis

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Abstract

This study proposes alternative measures of infotainment's effects on audience perception and reception of news on social media, focusing on infotainment coverage of North Korea. We determine the elements of framing strategies and narrative styles in facilitating public attention, positive and negative responses, and engagement in news content. We used the *YouTube* application programming interface to collect data from *VideoMug*, Korea's most popular *YouTube* channel, run by the *Seoul Broadcasting System*. We examined 23,774 replies commenting on North Korea-related video clips from July 1, 2018, to May 17, 2019. The findings show that entertainment and human interest frames were effective in drawing public attention to news coverage about North Korea. Using humor and colloquial language facilitated public attention (both positive and negative) and public engagement. Over half (59.55%) of the comments generated positive emotions; less than one-third generated negative emotions (31.41%); and a few generated neutral ones (9.03%). The infotainment approach helped make South Koreans' attitudes toward North Korea and inter-Korean relations more positive. A small number of users who served as top authorities were extremely partisan and conducted intense debates about infotainment practices. This study's hybrid analytical framework using computerized text mining techniques offers both theoretical and methodological insights into the function of infotainment in the context of social media.

Keywords

1. Introduction

Social media have transformed how news media produce information and how users interpret issues. As an alternative news outlet, *YouTube* is a media game-changer that is altering information production and consumption practices. Visual representation and storytelling techniques are key information-production components of *YouTube* news-making. Digital news is increasingly adopting dynamic infotainment elements in which issues are framed using exciting digital images and interesting narratives. Unlike hard news reporting, infotainment is a program type that focuses on narrative appeal and entertainment (**Berrocal-Gonzalo**; **Redondo-García**; **Torres-Chico**, 2015). Broadcasting companies have begun to adopt infotainment, especially via online video platforms such as *YouTube*, to compete for scarce attention among online users.

Much has been fiercely debated about the effects of infotainment on citizenship and democracy. The skeptical viewpoint known as "theories of media malaise" contends that infotainment distracts the public with entertainment, scandal, and trivia (**Otto**; **Glogger**; **Boukes**, 2017). Thus, infotainment distorts comprehension, discourages active citizenship, and reduces trust in political leaders, with negative consequences for democracy (**Norris**, 2000; **Robinson**, 1976; **Hendriks-Vettehen**; **Nuijten**; **Beentjes**, 2005). Few scholars have argued for the potentially positive effects of infotainment on citizenship and democracy. Research shows that the features of infotainment such as soft news and personalization can increase public attention, interest, understanding, and knowledge of politics, especially among those who are less politically interested or less educated (**Baum**, 2003; **Norris**, 2000).

Addressing this debate about the role of infotainment requires more empirical research. Although broadcasting companies are increasingly adopting infotainment (**Jebril**; **Albaek**; **De-Vreese**, 2013), few studies in the social media context have been conducted. Moreover, most studies have examined the effects of infotainment in terms of traditional journalistic practices. Addressing this gap is urgent because the role of infotainment can be augmented when news is disseminated via social media. In addition, the literature's methodological approach has been limited, as most studies have been conducted using surveys or content analysis. This study aims to complement traditional approaches to examining how infotainment affects public responses to news by proposing alternative measures of infotainment's effects on audience perceptions and reception of news on social media. In addition to using human-coded content analysis, this study also proposes a hybrid text mining approach combining machine learning-based sentiment analysis and co-word analysis to detect public responses and emotions as well as interactions between users concerning infotainment-driven news on social media.

Specifically, this study investigates a case of infotainment coverage of North Korea. South Korean perceptions of North Korea are not positive in much of the world. Since direct contact with North Korea is not possible, the pervasive negative frames that appear in South Korean media coverage of North Korea's society, power elite, and people may have perpetuated negative perceptions of the country. In recent years, the inter-Korean relationship has become far more peaceful. On June 30, 2019, North Korean leader Kim Jong-un, South Korean President Moon Jae-In, and US President Donald Trump held historic meetings at Panmunjom in the Demilitarized Zone. Media outlets from around the world covered the meeting to discuss the US–North Korea negotiations. This unexpected event created public excitement and an expectation that the meeting would foster the peace process on the Korean Peninsula. The role of South Korean media companies in reporting these big steps was significant. In particular, news delivered on social media video platforms such as *YouTube* began to adopt infotainment methods, by covering North Korea-related news in a more dynamic, dramatic, interesting, and informal way (**Park**, 2021; **Park**; **Lim**, 2020). Thus, examining a case study regarding the effects of infotainment in coverage of North Korea provides us an opportunity to reveal how infotainment's impact on the public reception of news stories can change dominant negative perceptions about a country and related social issues. Specifically, we identify the elements of framing strategies and narrative styles that facilitate public attention (as measured by the number of video views), affective tone (as measured by positive and negative connotations), and engagement with news content (as measured by the number of comments). A hybrid analytical framework using computerized text mining techniques contributes to both theoretical and methodological insights into the function of infotainment in the context of social media.

2. Framing North Korea and inter-Korean relations

Framing theory builds upon agenda-setting theory to focus on how media present the essence of an issue or event and contextualize it within a field of meaning (**McCombs** *et al.*, 1997; **Scheufele**; **Tewksbury**, 2007). Framing analysis, one of the most common approaches in communication research, involves the interpretation of a reality conveyed in a message or media frame (**Bryant**; **Miron**, 2004; **McCombs**, 2005). The literature identifies five commonly utilized media frames:

- attribution of responsibility,
- conflict,
- economic consequences,
- human interest, and
- morality (**Semetko**; **Valkenburg**, 2000).

Media expose audiences to manifest latent frames through selection and salience; audiences interpret these frames through a cultural lens and then construct shared expectations and values, which affect their behavior (**Entman**, 2005; **Scheufele**; **Tewksbury**, 2007). Thus, media frames can be persuasive; the media presentation of an issue or event can influence public opinion and collective behavior (**Ghanem**, 1997). For example, **Shapiro** and **Bolsen** (2019) show that media frames about pollution influenced Korean perceptions of the need for policy action. **Mason** (2019) suggests that media frames affect audience perceptions, especially when the audience perceives the media source as being highly credible. **Lim** and **Seo** (2009) argue that media frames influence public opinion more strongly when the issue or event is beyond a person's direct experience, such as when media report on a foreign country.

North Korea, the "hermit kingdom," has long fascinated the world, and international media, which often cover North Korea as a rogue state that behaves illicitly, have been central to how the world views North Korea (**Gusterson**, 2008; **Park**; **Yoon**, 2019; **Seo**, 2009; **Yoon**; **Park**, 2020). **Lim** and **Seo** (2009) show that US media frames reflect shifts in US–North Korea relations and that such frames have changed US public opinion about economic sanctions and military action taken against the nation. **Curran** and **Gibson** (2019) show that US news agencies attribute blame to North Korea through good-versus-evil narratives in their coverage of the Korean peninsula. **Dalton** *et al.* (2016) posit that Australian media frames employ sensationalism to reinforce a negative, adversarial orientation toward North Korea.

Several studies have examined media coverage of North Korea's nuclear tests. For example, **Dai** and **Hyun** (2010) contend that a "threat" frame dominated US, Chinese, and South Korean media, with South Korean media specifically labeling North Korea an "enemy" despite the government's reconciliatory engagement policy; moreover, South Korean media contextualized the nuclear tests in terms of global security rather than inter-Korean relations. **Chung**, **Lessman**, and **Fan** (2014) demonstrate that US media used "war" frames; Chinese, Japanese, and Russian media used "peace" frames; and South Korean media employed "neutral" frames. **Santos** *et al.* (2013) call for additional framing research about "issue-specific frames related exclusively to a particular topic" (p. 67). This study builds upon the literature to investigate media frames about inter-Korean relations, a context that has received little research attention.

3. Effects of infotainment news coverage on public responses

Media inform the public about events and issues, foster public attention and dialogue, hold political and social leaders accountable, and entertain (**Brants** *et al.*, 2010). However, not only the amount of media coverage but also the affective tone of media coverage (i.e., using emotional words and images with positive or negative connotations) influences public responses (**Wormwood** *et al.*, 2019).

Since the 1980s, the boundary between objective journalism that uses the inverted-pyramid format and popular tabloids that use the exposition-climax-resolution narrative has blurred (**Berrocal-Gonzalo**; **Redondo-García**; **Torres-Chico**, 2015). News media have shifted from disseminating verifiable information to providing interpretations and explanations (**Campbell**, 2007). Furthermore, an increasingly popular media format involves adopting dynamic infotainment elements in which news media frame issues using interesting storytelling and digital images (**Thussu**, 2011).

Infotainment is conceptualized as a mediated informative content that prioritizes narrative appeal and entertainment over hard news reporting and analysis (**Berrocal-Gonzalo**; **Redondo-García**; **Torres-Chico**, 2015). The "spectacularization" of news in infotainment involves content and design, including narrative, informal subtitles, multimedia, and visualization. Common narrative framing techniques used in infotainment include dramatization, personalization, emotion, humor, colloquial language, hyperbolic language, and speculation (**Berrocal-Gonzalo**; **Redondo-García**; **Torres-Chico**, 2015).

Infotainment research encompasses studies about soft news programming, traditional news media, and media systems (**Marinov**, 2020). For example, **Berrocal-Gonzalo**, **Redondo-García** and **Torres-Chico**, (2015) examine Spanish media and posit that infotainment with emotional content has penetrated the nucleus of economic and financial reporting and that infotainment aspects correlate positively with the events and issues that news agencies deem most important. Through an analysis of news media reporting on the 2019 Nigerian presidential election, **Amenaghawon** and **Salawu** (2020) show that audiences prefer sensational, emotional media frames to traditional news frames. **Mujica** and **Bachmann** (2016) argue that infotainment elements affect recall positively and do not significantly affect comprehension.

Given that the core motivations of *YouTube* use are information seeking and entertainment (**Haridakis**; **Hanson**, 2009), the platform can augment the positive effects of infotainment. Mass communication and social interaction take place on *YouTube* simultaneously (**Haridakis**; **Hanson**, 2009). "Audiencing" occurs in a social context on social media to a unique degree as users consume and make sense of news information. Viewing, liking, sharing, and subscribing are all indicators of public attention and reaction to news stories and issues delivered via social media; commenting and replying to other

commenters are indicators of social media engagement (**Ittefaq**, 2019; **Park**; **Hoffner**, 2020; **Schivinski**; **Christodoulides**; **Dabrowski**, 2016). Therefore, assessing the impact of infotainment on *YouTube* requires an investigation of public comment and response metrics. Based on the discussion above, this study addresses the four research questions below:

RQ1a: In *YouTube* coverage of North Korea using an infotainment approach, what news frames are used?

RQ1b: In *YouTube* coverage of North Korea using an infotainment approach, how do media frames influence public attention to, positive and negative responses to, and engagement with the news?

RQ2a: In *YouTube* coverage of North Korea using an infotainment approach, what narrative styles are used?

RQ2b: In *YouTube* coverage of North Korea using an infotainment approach, how do narrative styles influence public attention to, positive and negative responses to, and engagement with the news?

RQ3: What are public sentiments about *YouTube* coverage of North Korea using an infotainment approach?

RQ4: What comment networks emerge in response to infotainment-driven news about North Korea on *YouTube*?

4. Methods

4.1. Data collection

We collected data from *VideoMug*, a vertically integrated digital media channel run by the *Seoul Broadcasting System* (*SBS*), a major television and radio network in South Korea. It is South Korea's most popular video channel on *YouTube*. *VideoMug*'s *YouTube* account had 411,981 subscribers in January 2019 and had racked up 800,729,422 views by November 2019. The study examined 23,773 replies commenting on 93 North Korea-related video clips posted from July 1, 2018, to May 17, 2019, a period of easing tensions on the Korean Peninsula. We scraped comments posted on news containing the terms "Kim Jong Un," "North Korea," "unification," "US–North Korea Summit," "South–North Koreas Summit," "Ri Sulju," "Mountain Baekdu," and "Pyongyang" in video titles and summaries in Korean. These search queries reflect major issues about the North Korean leaders and inter-Korean relations. Both text and network data were collected using *YouTube* data tools with the *YouTube* application programming interface (**Rieder**, 2015) and *Webometric Analyst 2.0* (**Thelwall**; **Sud**; **Vis**, 2012). Comments were typically short, one or two sentences. The characteristics of comments and user distribution in commenting activities are summarized in Table 1.

Table 1. The characteristics of news and commenters

Indicator	Values
Number of comments	23,773
Number of words in comments	146,836
Number of unique words in comments	48,054
Unique commenters	14,675
Average comments per commenter	1.619
Average comments per news	255.623

4.2. Content analysis of news frames and narrative styles used in news coverage on North Korea

Public attention was measured by the number of views each video received. Then a coding scheme was developed based on existing work on news framing (**Berrocal-Gonzalo**; **Redondo-García**; **Torres-Chico**, 2015) and on an inductive review of the news content. As summarized in Table 2, each category in the coding scheme was classified as being "present" or "absent" by one coder.

Table 2. News frames

Frames	Description
Conflict	Covers disagreement between parties/individuals/groups.
Human interest	Features how issue/problem influences individuals and groups.
Attribution of responsibility	Suggests the responsibility of government for the issue/problem.
Morality	Includes any moral message.
Economic	Covers the current or future financial losses or gains.
Entertainment	Mentions cultural issues such as celebrity, sports, food.

Source: **Berrocal-Gonzalo**; **Redondo-García**; **Torres-Chico** (2015)

We calculated intercoder reliability of new framing based on a coding of 20% of a randomly selected sample by a second independent coder using Cohen's kappa, which yielded 0.73. We also analyzed the narrative styles used in infotainment news coverage. Based on the literature's determination of the major narrative styles used in infotainment (**Berrocal-Gonzalo**; **Redondo-García**; **Torres-Chico**, 2015), each category in the coding scheme was classified as present or absent by one coder, and 20% of the randomly selected sample was also coded by a second coder. Table 3 presents the coding scheme of the narrative styles. The intercoder reliability scores ranged from 0.68 to 1.00 for each coding category. Then, media engagement was measured by the number of comments on each video.

Table 3. Narrative style in infotainment

Narrative styles	Description
Dramatization	Uses dramatic and emotive resources, dramatic structures that boost suspense to the end instead of presenting information in descending order of importance as per the classic inverted pyramid structure.
Actantialization	Personalizes institutions by transferring their attributions to individuals representing or associated with them or attributing human qualities to such entities or other legal structures.
Emotion	Focuses on emotional elements or the personal sentiments of the main subjects in news stories.
Humor	Uses irony and satire.
Speculation	Presents baseless news stories or reports that cover events that may or may not occur in the future.
Colloquial language	Uses informal terminology and expressions such as set phrases and figures of speech not normally deemed acceptable according to the principles of traditional journalism.
Privatization	Presents moral or political scandal and focuses on the private life of politicians instead of presenting them as spokespersons for certain policies or ideologies.

Source: **Berrocal-Gonzalo; Redondo-García; Torres-Chico** (2015)

4.3. Supervised machine learning-based sentiment analysis

A sentiment analysis to measure affective tone was conducted on the 23,773 public comments using the supervised machine learning technique with *Python*-enabled *Naïve Bayes* classifier via the Korean web-based big data toolkit available at *textom.co.kr*. *Naïve Bayes* classifier is a common supervised and probabilistic technique for sentiment analysis, which assigns objects to discrete categories (**Dhande**; **Patnaik**, 2014). The advantages of using this method are "efficient computation" especially on the web and easy interpretation over alternatives (**Singh**; **Husain**, 2014; p. 4).

We applied a bag-of-words approach for sentiment analysis, the dominant method in which a predefined category was used to count the frequencies of sentiment terms (**Danowski**; **Yan**; **Riopelle**, 2021). In supervised learning, a portion of dataset is labeled by human coders and trained to produce output that coded the entire dataset (**Gautam**; **Yadav**, 2014). A comment level classification was used for this study that helps to determine whether each comment conveys positive, negative, or neutral sentiments. The presence of emotion in 10% of the sample was human-coded as "positive," "negative," or "neutral." Then, the entire comments were categorized into positive, negative, or neutral types in terms of their learning with the training data.

4.4. Co-word analysis

To explicate contextual information and meanings in emotional expressions of comments, co-word analysis was employed. We explored the connections between the frequently used keywords that occurred in the comments more than 18 times. Stop words such as proper, common nouns, numbers were excluded. Emoticons, adjectives, adverbs, and verbs that are meaningful in detecting users' opinions and perceptions were included. Then, n-gram analysis was employed to explore word pairs that occurred frequently in the comments. Co-word analysis is a meaning-centered network approach that determines the relationships between textual components in a corpus (**Yoon**; **Park**, 2020). It is useful for identifying trending topics and the relations between sub-issues in large amounts of text (**Park**, 2019). We used a *Hadoop*-based semantic network analysis tool available at *Textom.co.kr*.

4.5. Social network analysis

We constructed a comment network to explore the conversational flow and replies-to activities among the users who engaged in the news items on North Korea. A nondirectional and weighted network was modeled from the one-mode sociomatrix of the users who commented on the North Korea-related news. The tie indicates reply-to relationships between the users and the tie strength indicates the frequency of comments between the users. Isolates were excluded in computation of network measures and visualization. *UCInet* was used for calculating network indicators and the network was visualized with *Gephi* by applying the Yifan Hu algorithm. The results of network measures were summarized (see Table 4).

Table 4. Multiple network measures

Indicator	Values
Nodes	4,691
Edges	5,065
Average degree	1.08
Modularity	0.854
Connectedness	0.001
Fragmentation	0.999
Average distance	2.957
Arc reciprocity	0.001
Outdegree centralization	0.0198
Indegree centralization	0.0064
Density	0.0002

5. Results

5.1. Effects of frames in infotainment news coverage of North Korea on public attention, responses, and engagement

RQ1a asks how infotainment is used in South Korean social media when covering North Korea. The results of the content analysis show that "attribution of responsibility" was the most popular news frame used by *VideoMug*

(n = 48, 51.6%) in covering North Korea. The second most popular frame was "human interest" (n = 23, 24.7%), followed by "entertainment" (n = 22, 23.7%). Interestingly, the "conflict," "morality," and "economy" frames were not used at all.

RQ1b explores how framing used in South Korean social news media influenced public attention, positive and negative responses, and engagement. The results of a one-way anova show that the effect of news frames on the number of views is statistically significant (F(2, 90) = 9.86, p < .001). A Tukey post hoc test determines that the mean of views is statistically significantly higher for news with the human interest frame (M = 13844.04, SD = 178260.11, p < .05, 95% CI: 13424.39, 186883.99) than for news with the responsibility frame (M = 34689.85, SD: 58360.63). News with the entertainment frame (M = 189217.86, SD = 217604.46, p < .001, 95% CI: 66475.695, 242580.32) has a significantly higher number of views than news with the attribution of responsibility frame.

Similarly, the effect of news frames on "like" rates is statistically significant (F(2, 90) = 7.126, p < .001). A Tukey post hoc test reveals that the mean of the like rate is statistically significantly higher for news with the entertainment frame (M = 1427.86, SD = 1637.14, p < .001, 95% CI: 341.90, 1670.74) than for news with the responsibility frame (M = 421.54, SD: 710.94).

The human interest frame (M = 1025.74, SD: 1076.57) does not differ significantly from the attribution of responsibility or entertainment frame in like rates (p > .05). Interestingly, the news frames resulted in different "dislike" scores (F(2, 90) = 3.544, p < .05). A Tukey post hoc test indicates that the dislike rate mean is statistically significantly lower for news with the attribution of responsibility frame (M = 42.63, SD = 55.93, p < .05, 95% CI: 1.14, 188.39) than for news with the human interest frame (M = 137.39, SD = 286.73).

There is no statistically significant difference between the human interest and entertainment frames or between the attribution of responsibility and entertainment frames in terms of the comment volume (p > .05). These results suggest that the effect of news frames on the number of comments was not statistically significant (F(2, 90) = 2.83, p > .05).

5.2. Effects of narrative styles in infotainment news coverage of North Korea on public attention, responses, and engagement

To answer RQ2a, we examined the effects of infotainment narrative styles on public attention, positive and negative responses, and engagement. A content analysis reveals that the emotional approach is used across all 93 news stories on North Korea (n = 93, 100%). Most of the news adopt colloquial language (n = 68, 73.1%). More than half of the stories use humor (n = 47, 50.5%). The other narrative styles used are privatization (n = 24, 25.8%), dramatization (n = 22, 23.7%), actantialization (n = 20, 21.5%), and speculation (n = 1, 1.1%).

Next, we answered RQ2b by examining how the narrative styles used in infotainment-driven news about North Korea influence public attention, positive and negative responses, and engagement. Mann–Whitney tests were carried out, as the data were not normally distributed. The findings indicate that use of the dramatization style does not drive more views (mean rank: 42.41, U = 680.00, p > .05), likes (mean rank: 45.61, U = 730.00, p > .05), or dislikes (mean rank: 41.11, U = 651.00, p > .05) than does the use of non-dramatization styles (mean rank of views: 48.42, mean rank of likes: 47.43, mean rank of dislikes: 48.82). Surprisingly, the news presented without dramatization styles produces significantly more comments (mean rank: 50.06, U = 564.00, p < .05) than does the news presented with dramatization styles (mean rank: 37.14).

We also find that the news with actantialization styles lead to more views (mean rank: 63.35, U = 403.00, p < .05), likes (mean rank: 65.08, U = 368.50, p < .001), and dislikes (mean rank: 57.53, U = 519.50, p < .05) than does the news without actantialization styles (mean rank of views: 44.27, mean rank of likes: 42.05, mean rank of dislike: 44.12). However, the use of actantialization styles does not significantly increase the number of comments (mean rank: 56.98, U = 530.50, p > .05) relative to the use of non-actantialization styles (mean rank: 44.27).

Regarding the effect of humor, the results indicate that the news with humor drives more views (mean rank: 60.51, U = 446.00, p < .001), likes (mean rank: 59.59, U = 489.50, p < .001), dislikes (mean rank: 59.70, U = 484.00, p < .001), and comments (mean rank: 59.15, U = 510.00, p < .001) than does news without humor (mean rank of views: 33.20, mean rank of likes: 34.14, mean rank of dislike: 34.02, mean rank of comments: 34.59).

We find no significant effect of speculation styles on views (mean rank: 86.00, U = 7.00, p > .05), likes (mean rank: 88.00, U = 5.00, p > .05), dislikes (mean rank: 82.00, U = 11.00, p > .05), or comments (mean rank: 46.51, U = 1.00, p > .05) relative to the effects of non-speculation styles (mean rank of views: 46.58, mean rank of likes: 46.55, mean rank of dislike: 46.52, mean rank of comments: 46.51).

We find statistically significant effects of the use of colloquial language in news on views (mean rank: 53.40, U = 415.00, p < .001), likes (mean rank: 52.61, U = 468.50, p < .001), dislikes (mean rank: 52.50, U = 476.00, p < .001), and comments (mean rank: 36.41, U = 578.50, p < .05) relative to news that does not use colloquial language (mean rank of views: 29.60, mean rank of likes: 31.74, mean rank of dislike: 32.04, mean rank of comments: 36.14).

Finally, the privatization style promotes more views (mean rank: 60.25, U = 510.00, p < .01), likes (mean rank: 59.94, U = 517.50, p < .01), and dislikes (mean rank: 59.58, U = 526.00, p < .01) than the non-privatization style (mean rank of views:

42.39, mean rank of likes: 42.50, mean rank of dislike: 42.62). However, the privatization style does not result in more comments (mean rank: 54.94, U = 637.50, p > .05) than the non-privatization style (mean rank: 44.24).

5.3. Public emotions about infotainment-driven news on North Korea

Next, we addressed RQ3 by investigating emotional responses to infotainment-news coverage about North Korea on *YouTube*. The findings of a sentiment analysis show that over half (59.55%) of the comments contained positive sentiments. Less than one-third of the comments included negative sentiments (31.41%), and there were quite a few neutral ones (9.03%).

To further explicate in what context the sentiments were expressed, a co-word analysis was employed. The term "North Korea" appears most often in positive, negative, and neutral comments. "North Korea" was linked with many negative comments that contain abusive language, such as "commie" and "son of a bitch," or that refer to *VideoMug* as a pro-North Korean broadcaster and left-wing channel.

However, we also found that the term "North Korea" appears in positive comments with words that reflect favorable attitudes toward inter-Korean relations, such as "unification" and "peace" as well. Several comments praise a South Korean female singer who performed in North Korea. Considering North Korea's image problem in South Korea, these are surprising. South Koreans have perceived North Korea very negatively because they primarily associated North Korea with war, nuclear weapons, and military (**Kim** *et al.*, 2015). Young adults are particularly skeptical about reunification in that they concern its cost more than benefits (**Rich**, 2019).

These results on reactions to North Korea-related news using an infotainment imply that South Koreans might have changed their attitudes to North Korea. However, the findings must be interpreted with care. The change might be attributable to a change in the way South Korean media cover North Korea. A close examination of several replies reveals that the term "editing" often appeared along with friendly comments saying that the edited videos are funny. This implies that the consumption of political news in an informal and entertaining form aroused positive emotion.

5.4. Flow of information and communication patterns in public discourse about North Korea on *YouTube*

We addressed RQ4 by mapping a comment network to explore the information flow and pattern of communication between users who engaged in public discourse in reaction to the North Korea-related news posted on *VideoMug*. Figure 1 displays a comment network diagram.

Node sizes and colors are proportional to the nodes' degrees (i.e., connections with other nodes). A tie between nodes indicates a reply to another user. The degree indicates the number of commenting activities, including sending and receiving a comment. The deeper the red, the higher the degree in the network (degree size is indicated by red, purple, and yellow in descending order).

As Table 4 shows, the network indicators suggest that the network comprises 4,691 users (who replied to or received at least one comment from others) and 5,065 relations in terms of their communication about the news.

A circle graph is observed with an outdegree centralization value of 0.0198 and an indegree centralization value of 0.0064, suggesting that the network is spread out. This means that the power of individual commenters was even; thus, positional advantages in voicing opinions and interpreting the news were distributed in the network equally. The density value of 0.002 indicates that only 0.02% of all possible interactions occurred between users in the network. Users commented to or received a comment from around one user at an average degree of 1.08. The average distance between the users is 2.957, suggesting that only around two steps are necessary to
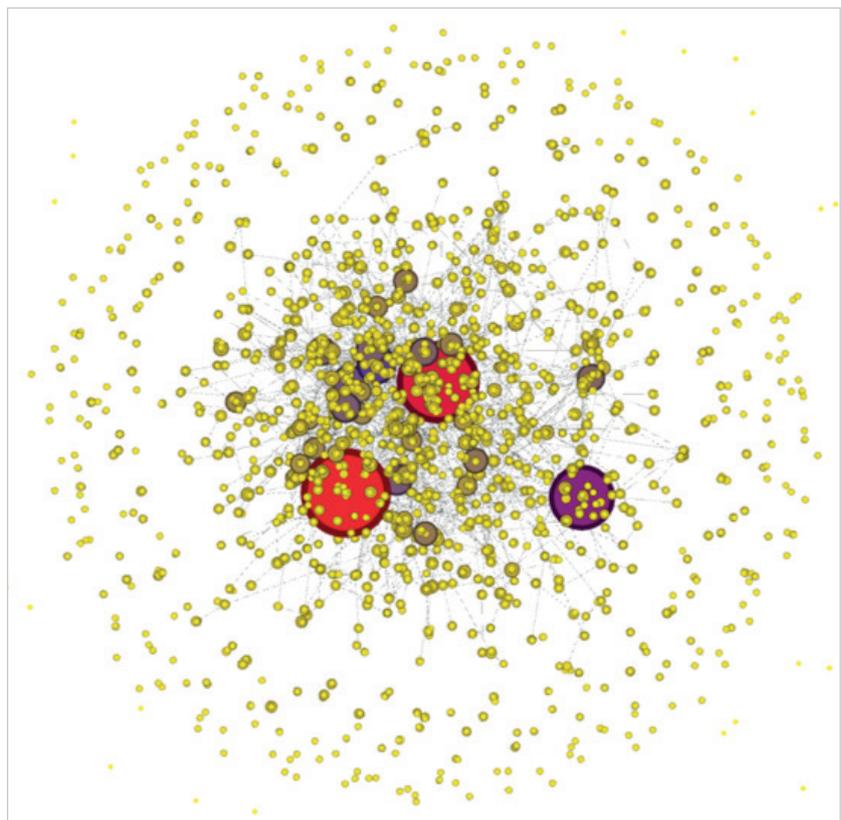

Figure 1. Comment network of North Korea-related news on *YouTube*

be connected to another randomly chosen user. A total of 430 communities are detected in the network, with a high modularity value of 0.854, showing that there are many dense connections between the users within the modules but there are few ties with users in different modules. The arc reciprocity is 0.001, meaning that, of all the connections in the network, 0.1% of the users replied to user comments. The comment network is fractious, with a fragmentation value of 0.999 and a connectedness value of 0.001. Thus, 99.9% of the users are unreachable to each other, and the rate of user interaction is very low.
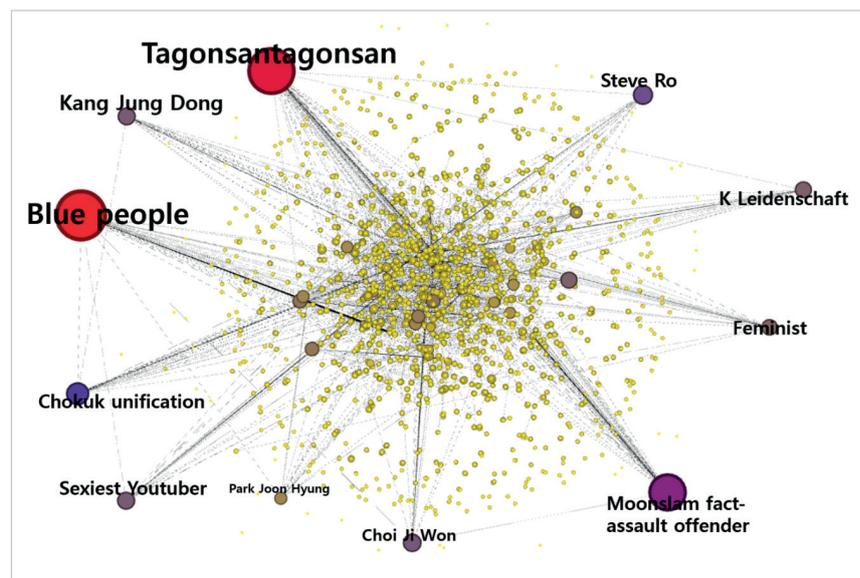

Figure 2. A major community in comment network of North Korea-related news on *YouTube*

The results also show that the comment network comprises two main layers. While a small number of users with high degrees are closely connected to each other in the center, most of the actors have few interactions. Thus, we closely investigate the communications and patterns of the three actors with the greatest connections: "TagonsanTagonsan," who is friendly to the incumbent government, as well as "Blue People" and "Moonslam Fact-assault Offender," who provoked a heated debate with other users by criticizing the president and *VideoMug*.

The diagram in Figure 2 zooms on in the center of the network, showing the interaction patterns of the cohesive groups. The graph shows that small groups are formed around the three big talkers. Specifically, TagonsanTagonsan has posted many comments on a video clip about North Korean leader Kim Jong-un's possible visit to Seoul. The user argues that the South will benefit economically from unification. While (s)he actively communicates with people with similar ideas, (s)he also argues with people with different opinions. On the other hand, Moonslam Fact-assault Offender interacts with TagonsanTagonsan and other liked-minded people using swear words and an extremely negative tone. Similar to Moonslam Fact-assault Offender, Blue People comments on video footage of North Koreans' "levitation." His/her comments typically criticize people who find this video amusing or entertaining. For example, (s)he complains that ordinary people laugh and enjoy this video without seeing the reality of North Korea. Moreover, after the failure of the US–North Korea summit in Vietnam, his/her comments on a video about Trump entitled "North Koreans should also live" attack people with left-leaning tendencies.

6. Discussion and conclusion

This study provides empirical evidence on how infotainment techniques help shape public discourse about, reactions to, and engagement with news coverage on North Korea. We have investigated public emotions about and attitudes to such news, explored how news frames and narrative styles impact public attention to, responses to, and engagement with the news, and examined users' networking patterns. Along with human-coded content analysis, we used hybrid text mining approaches (machine learning-based sentiment analysis and co-word analysis) derived from *YouTube* metrics as alternative measures of public responses to news.

This study has extended previous research by identifying which infotainment elements are effective. This study has demonstrated that the entertainment and human interest frames are effective in drawing public attention to news coverage about North Korea compared to the news with the responsibility frame. These results suggest that soft news is not only dominant on social media (**Horan**, 2013), but also popular even when covering politically controversial issues.

We have also found that using humor and colloquial language attracted public attention (both positive and negative) and public engagement (**Amenaghawon**; **Salawu**, 2020). In addition, actantialization and privatization styles promoted more public attention and positive and negative responses. These results further our understanding of how exposure to infotainment news via *YouTube* affects political discussions, responses, and engagement. It is interesting to note that infotainment-driven news affected the amount of likes and dislikes. This can be interpreted that dynamic entertainment features of *YouTube* news are useful to draw emotional reactions.

Interestingly, the results of the sentiment analysis and co-word analysis show that positive sentiments dominate, with much optimism about inter-Korean relationships, cultural exchange, and hope for reunification. These findings are inconsistent with the findings of a previous study, which revealed predominantly hostile South Korean attitudes toward North Korea and a pervasive view of reunification as an economic burden due to media framing (**Jiyoon** *et al.*, 2015).

This study shows that *VideoMug*'s innovative journalistic practice of adopting infotainment framing helped make South Koreans' attitudes toward North Korea and inter-Korean relations more positive.

Our network analysis found a loosely connected, decentralized, and fractious comment network generated by infotainment-driven news about North Korea. This result implies that, while the South Korean public tends to comment on news coverage about North Korea, the commenters have very few conversations while making sense of it. A small number of users serving as top authorities are connected to each other in the comment network. They are extremely partisan (either progressive or conservative) and conduct intense debates about *VideoMug*'s infotainment practices and Korean unification. Not surprisingly, the left-wing users evaluate *VideoMug*'s new approach to news coverage on North Korea very positively and discuss the economic benefits of unification, whereas right-wing users view infotainment as a tool of left-wing news media.

This study has proposed innovative alternative analytical frameworks for exploring the function of infotainment news stories in public discourse on, responses to, and interactions about the news in a context that has been little researched, but it is not without limitations. For instance, the study examined only one news channel, *VideoMug*, and focused on issues related to North Korea; thus, the results may not be generalizable. Future studies should investigate different news outlets and different political issues to increase our understanding of the effects of infotainment news on public discussion about and responses to the news. Moreover, we assumed that the public's discussion about and responses to infotainment news resulted from their exposure to it. However, as this study did not conduct an experiment, it would be premature to impute cause–effect relationships between news framing/narrative styles and public reactions. Experimental studies should be conducted to verify the causal relations between journalistic practices and audience perceptions/attitudes. Although Naïve Bayes classification used in this study is the common and effective technique for sentiment analysis (**Dhande**; **Patnaik**, 2014), it did not provide a measure of goodness, which needs to be addressed in future studies. Finally, although the study employed co-word analysis to scrutinize the contexts in which sentiment words were used, sentiment classification using machine learning techniques and co-word analysis might not detect sarcasm, satire, or irony as accurately as human coding does. The detection of such complex sentiments and emotions using computer-assisted textual analysis methods is still at a very early stage. Future studies should utilize more sophisticated algorithms to capture the meaning of non-literal words, emoticons, slang, and figurative language used in textual data appearing on social media (**Abulaish**; **Kamal**, 2018).

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