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An Exploratory Factor Analysis on the Collaborative Information Behaviors of an Online Community Responding to the MV Sewol Tragedy

세월호 비극에 대한 온라인 커뮤니티의 협력적 정보행동에 관한 탐색적 요인 분석 연구

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ABSTRACT : This research attempts to identify how members of an online community collaboratively engaged with particular social information behaviors and accomplished a defined collective action. While responding to the Sewol Ferry tragedy, MissyUSA members quickly communicated and mobilized a collective action, a full-page ad campaign in *The New York Times*. As a follow up study, this secondary analysis quantitatively analyzes the primary data from a previous study to explore potential relationships or underlying factors among the various identified information behaviors. In this study, nineteen of the previously identified information behaviors were analyzed using exploratory factor analysis, yielding a total of eight factors. The two major factors of shared representation/collective identification and mobilizing resources verified the findings of the previous study and are in line with the findings typical of political science. The three factors of collaborative decision-making, reaction to tension, and brainstorming were factors that maximized communication and mobilization online, without any face-to-face communication or physical organization. Three emergent factors of outburst of dissent, boycott, and planning explained how members used negative emotions of anger, referential information for boycott, and incubated next collective actions. Through exploratory factor analysis, this study verifies and expands on the findings of the previous study by identifying several emergent factors that relate to the collaborative information behaviors of an online community engaged in a collective action.

KEYWORDS : Collaborative Information Behavior, Online Community, Collective Action, Exploratory Factor Analysis, Information Grounds

요 약 : 이 연구는 특정 온라인 커뮤니티 회원들이 어떤 사회적 정보행동을 통해 성공적인 집단행동을 이루어 가는지 탐구하고자 하였다. 세월호 비극에 대한 대답으로서, MissyUSA 회원들은 커뮤니티를 통해 빠르게 정보를 공유하고 자원을 동원함으로써, NYT 광고 캠페인을 성공으로 이끌었다. 이전 연구의 후속연구인 이 연구는 이차분석을 통해 이전 연구에서 밝혀진 다양한 정보행동 사이의 관계를 파악하고자 하였다. 탐색적 요인분석을 통해 19개의 정보행동들은 8가지 요인으로 범주화되었다. 집단적 정체성 확인과 자원동원과 같은 2가지 요인은 전통적인 정치학에서 강조하는 요인이자 이전 연구에서 밝혀진 결과와 상통함을 보여준다. 협력적 의사결정, 긴장의 처리, 브레인스토밍 등 3가지 요인은 온라인 상에서 집단행동에 나서는 이용자들에게 물리적 조직이나 대면 의사소통 없이도 의사소통과 자원동원을 극대화하는데 중요한 요인으로 나타났다. 분노의 표출, 보이콧, 계획 등 새롭게 보고된 3가지 요인은 커뮤니티 회원들이 분노의 감정을 어떻게 사용하고 참고적 정보를 활용하여 보이콧 행동에 나서는지, 후속 집단행동을 어떻게 계획하고 준비하는지를 보여주었다. 본 연구는 탐색적 요인 분석 기법을 통해 이전 연구 결과를 입증하고 협력적 정보행동과 관련한 새로운 요인들을 발견함으로써 이전 연구 결과를 확장하였다는 점에 의의가 있다.

주제어 : 협력적 정보 행동, 온라인 커뮤니티, 집단 행동, 탐색적 요인 분석, 정보장

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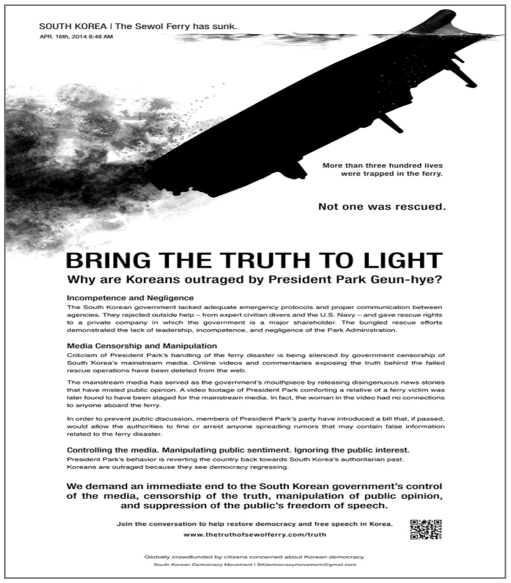
Ⅰ. Introduction

The MV Sewol capsized and sank en route to Jeju Island on April 16th, 2014. Only 172 out of 476 people onboard survived, including the captain and all the crew. Of the 299 reported dead (plus 5 reported missing), 250 of the passengers who died were secondary school students on a field trip (Chae, 2017; Kim, 2017; Kim, 2015). The captain and crew instructed passengers to stay in their cabins and abandoned the ship during the capsizing, leaving most passengers to die (Kee et al., 2017; Kim, 2015). Many of those who survived were saved by local fishing boats because the South Korean government responded too slowly and hesitated upon late arrival (Kee et al., 2017; Kim, 2015). After the sinking, investigations found that the ferry itself was in violation of several safety regulations and that the crew was not appropriately trained in safety procedures (Kee et al., 2017; Kim, 2015).

The tremendous loss of life and failure of accountability across multiple levels left the public confused and outraged. Many South Korean citizens demanded answers and justice, launched petitions, and organized demonstrations and protests (Cho, 2014; Han, 2014; Seo, 2014). These sentiments extended through the Korean diaspora as well. Shortly following the disaster, members of MissyUSA, one of the largest online communities of Korean immigrant wives and students in the United States and Canada (Lee, 2013; Yun, 2006) organized and launched a full-page advertisement in the Mother's Day issue of *The New York Times* in 2014 to seek answers and raise awareness of the disaster, as seen in Figure 1 below.



〈Figure 1〉 The MissyUSA Advertisement in The NYT on Mother's Day 2014

Online communities including the mobile social networking system, Slam, have been studied as information grounds (Counts & Fisher, 2010; Narayan et al., 2013). Information grounds are physical or virtual social settings or venues where people spontaneously and serendipitously share information while pursuing other purposes (Counts & Fisher, 2010; Fisher, Landry, & Naumer, 2007). Community members in MissyUSA, who usually seek and share various useful information about living in the US and Canada, such as visas, driver's licenses, housing, and cooking recipes, also communicated regarding the Sewol ferry disaster and quickly started a group project of New York Times advertisement campaign (NYT ad campaign hereafter). This NYT ad campaign implemented by MissyUSA members exemplifies online collective action. Collective actions are "actions undertaken by individuals or groups for a collective purpose such as advancement of a particular ideology or idea, or the political struggle with another group" (Postmes & Brunsting, 2002, 290). Loosely connected like-minded crowds in MissyUSA rapidly communicated and mobilized a collective action with a specifically defined purpose, and later published the sequential advertisement campaign in the Washington Post on May 16, 2014 (Han, 2014; Kim, 2014).

In a previous study on the collective action taken by MissyUSA members in response to the Sewol sinking, Lee and Kang (2018) identified a large array of social information behaviors involved in organizing, planning, and executing the NYT ad campaign and provided a typology of social information behaviors. The previous study focused on qualitatively describing a spectrum of social information behaviors related to the phenomena of online collective action. Due to limitations in the original study's research scope, a quantitative data analysis of using types of information behaviors and their frequencies was not conducted. Therefore, this follow-up study seeks to conduct secondary analysis by using the primary data to quantitatively explore and identify potential relationships and factors that may be associated with collaborative information behaviors for collective actions. Secondary analysis involves the re-use of pre-existing data to investigate new or additional research questions and to verify the findings of previous research (Cheng & Phillips, 2014; Clarke & Cossette, 2000; Heaton, 2008). This research attempts to take a quantitative approach using exploratory factor analysis to verify and further interpret the previous research findings. The findings of this study may be useful in understanding, developing a model, and/or building a theory of social information behaviors in online communities engaging in collective actions or responding to crises.

The perceived importance of the role that digital communication technologies play in response to both natural and human-made crises and to performing collective actions has increased (Hagen et al., 2018; Ranjit et al., 2020; Shklovski et al., 2008; Starbird, 2011). However, researchers and practitioners

also caution against the negative aspects of digital communication technologies, such as overuse and the propagation and polarization of mis- and dis-information (Conrado et al., 2016; Montesi, 2021). The previous study (Lee & Kang, 2018) found that collaborative information seeking, sense-making, and the co-creation and management of reliable information enabled individuals in an online community to quickly gather, share information, reduce uncertainties, mobilize resources, and realize a collective action. This study uses exploratory factor analysis to verify the core findings of the previous study and to further explore how the identified information behaviors relate to or interact with one another in the development of collective identity, collaborative information seeking and sharing, and the virtual mobilization of resources. The expanded findings may also have implications and applications for the development of information systems, social networking services, social media, and other digital communication technologies to facilitate online movements and collective actions.

In addition, from the perspective of mixed method research (Creswell & Plano Clark, 2011; Denzin, 1978; Jick, 1979), combining multiple data sources and methods within a study, or across subsequent studies, can enable researchers to triangulate and validate the research findings. While this study is conducted separately from the previous research, the findings from both quantitative and qualitative data analyses may offset the limitations of each method and expand the breadth and depth of our understanding of the social, collaborative information behaviors involved with online collective actions. Using exploratory factor analysis, this study involves the secondary analysis of qualitative data to answer the following research question:

RQ1: What, if any, factors are associated with the collaborative information behaviors of MissyUSA members engaged in the New York Times ad campaign for the Sewol Ferry tragedy?

Ⅱ. Literature Review

1. Collective Actions, ICTs, and Online Communities

According to Postmes and Brunsting (2002, 290), collective actions are “actions undertaken by individuals or groups for a collective purpose, such as the advancement of a particular ideology or idea, or the political struggle with another group.” Collective actions can range from letter writing and petitioning to protests, demonstrations, and sabotage. With the advent of the internet in the 1990s,

similar types of collective actions can be seen online, ranging from online petitioning, organizing online and offline protests, denial of service (DDoS) attacks, or hijacking websites or social media accounts (Hara & Huang, 2011; Postmes & Brunsting, 2002).

Cardoso et al. (2019) found that ICTs can facilitate collective action, though some aspects of ICTs and their design may support or hinder the agency of those participating. They note that while ICTs can help mitigate costs, aid in communication and coordination, and establish legitimacy, collective actions would not ultimately be possible without resources and motivated members. Cardoso et al. (2019) note that ICTs may hinder group focus, direction, and unification in some cases.

Through an extensive literature review, Hara and Huang (2011) found the internet and other ICTs can support social movements by organizing information and resources, framing or promoting the movement to encourage participation, fostering a collective identity, organizing action, as well as simply providing spaces for movements to subsist and sustain. Online communities also provide venues for sharing information without reliance on mass media (Almeida & Lichback, 2003; Pang & Goh, 2016).

Social media and other ICTs have contributed to a variety of recent social movements and collective actions. Lee and Chan (2016) found that many of those participating in the Umbrella Movement in Hong Kong engaged in online expression, debates, explanatory activities, and mobile communication either while leading participation, engaging in frontline activism, or providing support for the protest. Earl et al. (2013) examined the use of Twitter during the 2009 G20 meetings in Pittsburgh and found that Twitter was used heavily during protests to share information, especially about the location and actions of police activities. Earl et al. (2013) also found that the use of Twitter helped balance information about protest policing activities by including information and perspectives from protesters; previously, such information and narrative would be controlled and reported by the police, and thus favor their perspectives. They argue that this rebalancing in information coverage and discourse may lead to an additional change in protest policing behavior and policy. Thorson et al. (2013) found that protesters in the Occupy movement also used YouTube and Twitter to share information and videos related to protest and police activities as well as news footage, music videos, and images to encourage solidarity and comradery using hashtags.

Theocharis et al. (2014) compared the use of Twitter during protests in Spain, Greece, and the United States and found that while Twitter was often used for political discussion and information sharing, there were few tweets related to organizing live protests or making calls for action. However, they note that other related organizations or groups may be organizing such actions and that activity on social media may be used to help raise awareness and sustain the

momentum of the movement and actions being organized and taken elsewhere (Theocharis et al., 2014; Thorson et al., 2013). Anduiza et al. (2014) found that the large participation in the 15M demonstration in Spain in 2011 was accomplished by leveraging personal contacts and social media, which also encouraged more participation from younger, educated, and more politically apathetic persons who are less likely to participate in protests. As such, ICTs and online communities may support political activity and collective actions in direct or indirect ways.

2. Collaborative Information Behavior in Online Communities during Crisis

Online communities are important sources of information, and their users engage in a wide variety of information behaviors. Burnett's (2000) typology of information exchange in virtual communities includes a variety of behaviors ranging from non-interactive (such as lurking) to interactive behaviors that could be collaborative or positive (e.g., gossip, emotional support, humor, information sharing or seeking) or negative (e.g., flaming, trolling, spamming). While not all of the behaviors are information-specific, information is not the sole purpose for joining and interacting with online communities. For example, Chung and Buhalis (2008) found that beyond information acquisition, social-psychological and hedonic factors also encourage engagement in online travel communities. Hara and Hew (2007) found that nurses often share knowledge and ask for advice related to institutional practices and personal opinions in online communities. Hollister (2019; 2020) found that online role-players engage in a variety of digital literacy skills and social information behaviors to facilitate character design and interactive storytelling.

People also turn to information and communication technologies (ICTs) and online communities during or in response to crises, such as civil unrest, national tragedies, natural disasters, or personal health issues. Skinner (2011) describes the Arab Spring and Occupy protests through a social informatics perspective, arguing that social media is often used by protesters to gather, share, and disseminate information related to their respective causes. Shklovski et al. (2008) describe how dispersed communities in rural California created and used ICTs, such as online discussion board websites, to share information and build community resources about and during wildfires. Ranjit et al. (2020) found that while most used phone calls, many Nepalis living outside the country used social media, messaging platforms, and websites to learn about the 2015 earthquake, to see if their family and friends were okay, the extent of the damage, and what could be done. Starbird (2011) describes how volunteers used Twitter to process information and organize resources on a crowdsourced

map to help those impacted by the earthquake in Haiti in 2010 find and use resources. Starbird's (2011) findings could also be understood as a collective action. Gooden and Winefield (2007) describe how cancer survivors use online discussion boards for information and emotional support.

While online communities and ICTs may be leveraged for their positive aspects, there may be negative aspects and impacts of seeking and interacting with information during or after a crisis. In a literature review of research on human information behavior during the COVID-19 pandemic, Montesi (2021) identified a wide variety of issues that may have negative impacts on users, such as the overuse of ICT during the lockdown, propagation of negative emotions via social media exposure, the prevalence of mis- and dis-information, systems-centric design limitations of ICTs, and difficulty of accessing and providing access to marginalized communities and other vulnerable groups, and more. Ranjit et al. (2020) noted that exposure to personal accounts of the Nepali earthquake on social media was associated with posttraumatic stress symptoms (PTSS). Montesi (2021) argues that more information behavior research is needed on these groups and others, especially in the new context of information overload, the emotional aspects of information behavior, and the post-truth era.

Ⅲ. Methods

This follow-up study attempts to identify underlying or latent factors or concepts from 19 information behaviors derived from the content analysis conducted in a previous study by Lee and Kang (2018) which explored various information behaviors associated with the collection action taken by MissyUSA members following the Sewol Tragedy. According to Heaton (2008, 39), this is a supplementary secondary analysis of qualitative data for the purpose of conducting "a more in-depth analysis of an emergent issue or aspect of the data, that was not addressed or was only partially addressed in the primary study." By statistically analyzing quantitative aspects of the primary data, the types of information behaviors and their frequencies, this study attempts to identify how various information behaviors at the micro-level gather together and form factors or concepts at the meso or macro level, and how this quantitative analysis can provide insights to verify and interpret findings of previous study. The original methods for data collection and content analysis from the original study are summarized briefly below. For a more detailed description, please see Lee and Kang (2018).

A total of 260 complete public threads, including posts and replies, were collected from MissyUSA across two phases over a 15-day period from April 16th to April 30th, 2014. Phase 1 (P1) collected 106 threads across 13 days (2014/04/16 to 2014/04/28) and phase 2 (P2) collected 154 threads across 2 days (2014/04/29 to 2014/04/30). Relevant threads were identified by searching the forums for related keywords, such as New York Times, NYT, ad, and campaign. Qualitative content analysis of the threads was conducted using Burnett's (2000) typology of information exchange as the basis of the codebook, though emergent codes were added based on themes encountered during the analysis. To ensure the trustworthiness of the analysis, two coders analyzed all of the threads and reached a consensus on the codebook through discussion and revision.

Refinement and consolidation of the 20 codes from the previous study (Lee & Kang, 2018) occurred during preliminary exploratory factor analysis (Lee & Kang, 2020), resulting in 19 information behavior codes. The original study (Lee & Kang, 2018) applied and expanded on Burnett's (2000) typology of information exchange. The original study identified 5 of Burnett's existing codes and 15 emergent codes, resulting in 20 information behavior codes total. When conducting preliminary exploratory factor analysis (Lee & Kang, 2020), 7 of the original codes were consolidated into 3, and 3 other new codes (PR, PL, and RE) emerged from the data, yielding 19 total codes. Descriptions and examples of these codes are discussed in Section 5. The 19 codes from the preliminary exploratory factor analysis (Lee & Kang, 2020) serve as the variables for the secondary analysis in this follow-up study.

Specifically, this secondary analysis employs exploratory factor analysis (EFA) using principal component analysis (PCA) which is used to identify potential latent or underlying factors or patterns among the observed variables in a dataset (Beavers et al., 2013; Child, 2006; Costello & Osborne, 2005; Henson & Roberts, 2006; Hotelling, 1933; Pearson, 1901; Suhr, 2006; Yong & Pearce, 2013). Researchers use EFA not only for developing or refining a new instrument's scales but also for exploring relations among variables to build theory (Reio & Shuck, 2015). In this study, EFA is used to identify potential patterns or relationships between the 19 information behavior codes identified in previous work by the author and collaborators and to verify the findings of previous study. Watson et al. (2005) use EFA to evaluate items in an index derived from qualitative focus groups. Ahern (2002) uses qualitative findings from a phenomenological study to develop a questionnaire and then applied EFA to compare and validate the themes found in the phenomenological study and questionnaire results. Khazaee-Pool et al. (2016) use EFA to evaluate questionnaire items derived from qualitative data and then use confirmatory factor

analysis (CFA) to create a factor model of women's breast cancer prevention behaviors.

SPSS version 28.0 (IBM Corp., 2021) was used to conduct the factor analysis. For the purposes of data analysis, the 260 threads were categorized into posts and replies, yielding 520 units of analysis or a sample size of 520. As Comrey (1973) suggested a sample size of 300 or more as being good for factor analysis, the sample size of 520 in this research is reasonable for factor analysis. To determine if the dataset was appropriate for factor analysis, a correlation matrix was generated and checked, and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were completed. As seen in the output from SPSS 28.0 in table 1, the KMO measure is .575, and Bartlett's test yielded an approximate chi-square value of 839.969, with a $p < .001$ (n=520, df =171). As there are several statistically significant correlations identified, the KMO is above .50, and Bartlett's test is statistically significant, the dataset is suitable for factor analysis (Yong & Pearce, 2013).

〈Table 1〉 KMO and Bartlett's Test Results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.575
Bartlett's Test of Sphericity	Approx. Chi-Square	839.969
	df	171
	Sig.	〈.001

Ⅳ. Results

EFA identified eight factors encompassing all 19 variables to account for 58.002% of the cumulative observed variance. Reio and Shuck (2015) report that the extracted factors should explain at least 40% of the total variance in the original variables, while Stevens (1996) recommended at least 75%. In this study, eight factors account for 58.002% of the total variance. Table 2 depicts the identified factors and their associated codes. Table 3 displays the results of the EFA with the rotated component matrix, the eigenvalues following rotation, percentage of variance accounted, and the cumulative variance accounted. Components were extracted using principle component analysis and the rotation used Varimax with Kaiser normalization, with the rotations converging over 10 iterations. The first factor (F1) has a final Eigenvalue after rotation of 2.120 and includes QU, CM, ES, UP, and RM, accounting 11.159% of the variance. The second factor (F2) has an Eigenvalue of 1.455 and includes PR and HF, accounting for 7.659% of the variance. The third factor (F3) has an Eigenvalue of

1.388 and includes SC and PL, accounting for 7.305% of the variance. The fourth factor (F4) has an Eigenvalue of 1.324 and includes MR, CA, and IM, accounting for 6.968% of the variance. The fifth factor (F5) has an Eigenvalue of 1.291 and includes RE and BC, accounting for 6.796% of the variance. The sixth factor (F6) has an Eigenvalue of 1.177 and includes GDM and IS, accounting for 6.195% of the variance. The seventh factor (F7) has an Eigenvalue of 1.136 and includes TS and HT, accounting for 5.977% of the variance. The eighth factor (F8) has an Eigenvalue of 1.129 and includes BR, accounting for 5.943% of the variance.

〈Table 2〉 Summary of 8 Factors

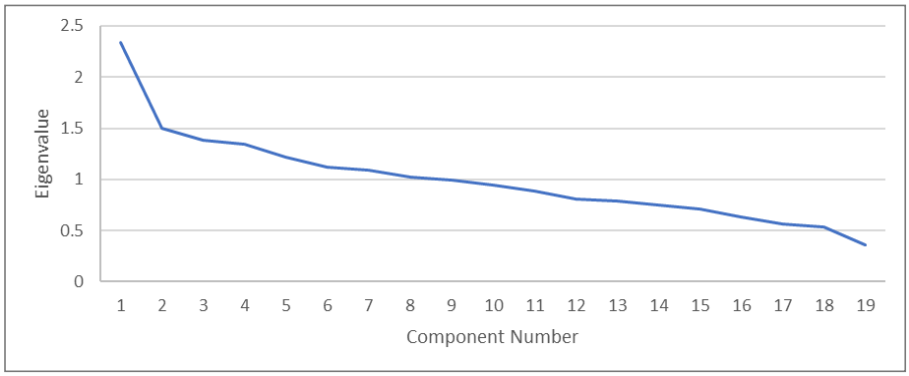
Factor No.	Associated Codes/Variables
1.	QU: Queries or Specific Requests for Information CM: Commentary ES: Emotional Support UP: Updating RM: Reach Out to International News Media
2.	PR: Propaganda HF: Flaming
3.	SC: Side Campaigns PL: Planning
4.	MR: Mobilizing Resources CA: Call to Actions IM: Information Management
5.	RE: Reference BC: Boycott
6.	GDM: Group Decision-Making IS: Information Sharing
7.	TS: Troubleshooting HT: Trolling
8.	BR: Brainstorming

〈Table 3〉 Result of Exploratory Factor Analysis

	Rotated Component Matrix							
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
QU	**.750**	.035	-.069	.059	.095	.234	-.018	-.071
CM	**.719**	.190	.133	-.069	.265	.026	.048	.005
ES	**.671**	.148	.046	-.034	-.087	-.134	-.114	.040
UP	**.478**	-.113	.004	-.229	-.316	-.283	.077	-.068
RM	**.430**	-.147	-.066	.319	.138	.277	.405	.099
PR	.033	**.798**	.003	.034	.018	-.023	.173	.060
HF	.167	**.745**	-.041	.006	.019	-.013	-.055	-.034

	Rotated Component Matrix							
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
SC	.019	-.014	**.809**	.119	-.040	-.053	.000	-.055
PL	.038	-.026	**.797**	-.062	.006	.031	.002	-.007
MR	-.117	.017	.048	**.708**	-.113	.152	.038	-.127
CA	.027	-.085	-.087	**.549**	-.079	-.216	.063	.455
IM	-.062	-.202	-.124	**-.449**	-.246	-.032	.266	-.112
RE	.032	.150	-.026	.055	**.696**	-.088	.081	-.132
BC	.070	-.125	-.015	-.097	**.695**	.019	-.015	.082
GDM	.037	-.070	-.042	.115	-.035	**.806**	.072	-.122
IS	-.008	-.128	-.103	.311	.154	**-.457**	.244	-.411
TS	.251	-.025	-.119	.102	-.087	.034	**-.726**	-.159
HT	.238	.244	-.109	.064	-.055	.037	**.490**	-.158
BR	-.031	.018	-.056	.023	.015	-.041	.047	**.779**
Eigenvalue	2.120	1.455	1.388	1.324	1.291	1.177	1.136	1.129
Of variance (%)	11.159	7.659	7.305	6.968	6.796	6.195	5.977	5.943
Cumulative (%)	11.159	18.819	26.124	33.092	39.888	46.082	52.059	58.002
KMO=.575, Barlett's test x^2=839.969 (p<.001)								

Following Kaiser's (1960) criterion, only factors with Eigenvalues over 1 were included. As seen in the scree plot depicted in Figure 2, while the line seems to gradually taper off after the sixth component (factor), the seventh and eighth components or factors are still above the 1.0 Kaiser criterion and are included because running factor analysis with fewer or greater number of specified factors did not explain more of the variance. It is also recommended that researchers retain the number of factors of the breakpoint in the scree plot where the curve starts flattening out (Costello & Osborne, 2005). Therefore, the researcher in this study decided to retain eight factors; the specified variables in each factor are shown in Table 3 using bold font.



〈Figure 2〉 Scree Plot

Ⅴ. Discussion of Eight Factors

The factors or components identified through EFA are often used to develop a model or framework that explains the observed phenomena or the patterns or relationships between the variables (Beavers et al., 2013; Child, 2006; Costello & Osborne, 2005; Henson & Roberts, 2006; Yong & Pearce, 2013). Yong and Pearce (2013, 81) note that while factors or components may be identified, naming the factors is difficult because the "names may not accurately reflect the variables within the factor." However, based on the codebook and findings from the previous study, and an exploration of the literature, there are some concepts that may relate to the factors identified in this study. The researcher attempted to label each factor to capture "the conceptual meaning of each variable defining a particular latent dimension" as Mvududu and Sink (2013, 90) suggested.

1. Factor 1: Shared Representation/Collective Identification

As per the findings above, factor 1 consists of QU, CM, ES, UP, and RM. The operationalized definitions with examples from Lee and Kang (2018; 2020) codebook can be seen in Table 4.

〈Table 4〉 Variables Associated with Factor 1

QU	Queries or Specific Request for Information • An act of asking questions or submitting queries made by other community members: queries presented to the community both in the posts and its replies. For example, "How is the focus of International News Media changing?", "Is this some sort of a rumor or trolling? Or is it true? Anyone has more information about this?"
CM	Commentary • An act or commenting toward original posts and/or replies on multiple levels. For example, members express agreement and support by commenting "22222, you had a great point here, I agree that we need to let International News Media know about this tragedy" in the first-level reply and "33333" in the second-level reply and others provide their ideas and feedback by commenting.
ES	Emotional Support • An act of expressing emotions for precisely defined groups of users and/or specific issues. This includes positive (e.g., consolation, gratitude, happiness, solidarity, encouragement, etc.), negative (e.g., anger, frustration, etc.), and neutral emotions. Examples include "Most of those children are only child, how their parents could live without them? ㅠㅠㅠㅠㅠ", "I am so pissed off about how Park brought this panicked girl from the hospital, only to broadcast nice footage of her meeting the victims…"
UP	Updating • An act of updating/broadcasting the current status of fundraising to the community. Examples include "All of my family members participated in the campaign, more than 370 participants already have funded this campaign!", "I just participated in it too! We have collected $21,705 now!"
RM	Reach Out to International News Media • An act of reaching out to international news media to seek or inform more reliable information about the Sewol ferry such as "Let's inform foreign media about the news of the Sewol ferry", "Let's deliver the unfair news of the Sewol ferry to International Human Rights Organizations."

Note. Names of variables, their definitions, and examples in the table were adapted and revised from previous research (Lee & Kang, 2018; 2020). Some key examples were newly added in the table for this study.

Qu and Hansen (2008) describe shared representation as the repeated reorganization of group members' various ideas, beliefs, and knowledge through collaborative sense-making. In the early stages following the Sewol disaster, group members on MissyUSA were coming together to make sense of what happened by seeking information (QU), updates (UP), and emotional support (ES) as well as making comments about what to do (CM), especially calls for bringing awareness of the tragedy to the international stage by delivering stories and/or interviews that Korean mainstream news media did not air (RM). As more comments positively evaluate and support the content, more users can continue and strengthen the community's participation (Joyce & Kraut, 2006). As MissyUSA community members asked questions, shared information, and exchanged their feelings and emotions to collaboratively cope with the crisis, a shared representation was developed and contributed to what would lead to taking collective action. This process of identification with the social movement's norms, interests, and goals becomes self-defining, resulting in an 'inner moral obligation' to become actively involved (Alberici & Milesi, 2016; Kelly & Breinlinger, 1996).

Even though the MissyUSA community itself was not built for a social movement or political discussion more broadly, members quickly shared information and emotional support during the crisis and adopted a parental group identity, especially as a mother, given that many of the victims were young people and, of course, many of the group members are parents. This parental identity and the responsibilities of caring for and protecting the young also encourage active participation in the group. As Thomas and McGarty (2009) argued, members shared their opinions and emotions within a group, which form a strong basis for developing new collective identities linked to collection action. This process can be seen as a collective identification process, where group members develop a sense of collective identity and solidarity by exchanging information and emotions. Collective identity consists of an "agreed upon definition of membership, boundaries, and activities for the group" while individual identity consists of "wholly personal traits that are … internalized and imported to social movement participation as idiosyncratic biographies" (Larana, Johnston, & Gustielf, 1994, 15). In addition, the norms of collective action, the understanding of groups, and the purpose of movement are self-defined in this process, eventually creating internal obligations, that encourage more active participation in working toward the group's collective action, which in the case of the MissyUSA was launching the NYT ad campaign. By continuously updating the number of participants and the sum of the crowdsourcing fund for phase 2, members passionately shared their joy and gratitude and encouraged members' participation in voluntary fundraising. This factor shows that online communication including political information seeking, sharing,

exchanging of emotions, and discussion enables members of powerless groups to form a collective identity and coordinate collective resistance to power for targeted collective action. As such, these findings imply that information professionals should consider features such as tagging, emotive reactions, emojis or emoticons, and profile customizations to allow individuals to create a collective identity and signal their interests, values, or goals when designing, developing, maintaining, or managing online communities, social media/SNS, or other ICTs.

2. Factor 2: Outburst of Dissent

The second factor consists of PR and HF. Excerpts from the previous studies' codebook (Lee & Kang, 2018; 2020) can be found in Table 5. A traditional explanation of social movements is based on the notion of individuals' grievances arising from discontent with a status quo, which considered collective action as an irrational choice (Jenkins, 1983; Olson, 1965). Stürmer and Simon (2009) found that group members' feelings of group-based anger about collective injustice played a key role to determine group members' motivation for participating in social movements. Anger at the collective level is an important motivation for voluntary participation in collective actions such as demonstrations. In this case, MissyUSA members expressed outrage toward those spreading propaganda supporting the Park administration or were unsupportive of the ad campaign. Alberici and Milesi (2016, 44) reported that online discussion facilitates place- and time-independent interaction so that "members of less powerful groups can easily exchange uncensored and dissenting opinions." When postings included propaganda messages against the MissyUSA community and the NYT ad campaign were repeatedly posted, some members reacted with anger, sometimes with flaming comments. This process shows that members taking out group-level anger at the beginning of the crisis triggers members' motivation for engaging in collective action online. This group-based anger is reported as an important drive to collective action (Leach, Iyer, & Pedersen, 2006). Anger can be a powerful component of political change if channeled in appropriate nonviolent ways (Peters, 2012). While the previous study (Lee & Kang, 2018) emphasized sharing positive emotions among community members, newly added code of PR gathered together with existing HF and represented an outburst of negative emotions at group level. As such, these findings imply that information professionals should consider features such as up or down voting, emotive reactions, as well as reporting or flagging tools to allow online community members to express their emotions as well as identify, tag, or report propaganda and other forms of mis- or dis-information.

〈Table 5〉 Variables Associated with Factor 2

PR	Propaganda • An act of providing ideas or statements, which may be false or present only one side of an argument, typically about or against President Park's administration or the NYT campaign. For example, "We are the ones who elected Park as a president, so we need to solve this problem on our own instead of asking for helps to foreign countries."
HF	Flaming • A hostile online act, ad-hominem argumentation, aiming neither for logic nor for persuasion but purely and bluntly as an insult. For example, "You filthy scum, don't even know how to spell words - impeachment!"

Note. Names of variables, their definitions, and examples in the table were adapted and revised from previous research (Lee & Kang, 2018; 2020). Some key examples were newly added in the table for this study.

3. Factor 3: Planning

The third factor consists of SC and PL. Codebook excepts for these can be seen in Table 6. In addition to planning the primary NYT ad campaign, various members continued to plan other, smaller secondary campaigns by financially supporting alternative or independent news media outlets and carrying out the Yellow Ribbon campaign to mourn for the victims (Lee & Kang, 2018). Members attempted to sponsor alternative independent news media such as Newstapa, Gobal News, and Media Mongu (known as influential one man media[1]) and create various posters and images containing Yellow Ribbons to console their grief and sadness for the victims and their families.

While running the NYT ad campaign, members continued planning for other collective actions, such as publishing sequential ads in other influential media, such as the *Washington Post*, and publishing a news article about the community's experience of completing the NYT ad campaign in a newspaper. The content of the ads focused on mourning the victims as a way to pay respects to and grieve for the victims as well as raise awareness of the disaster and seek justice. This means that members in MissyUSA constantly plan and incubate side campaigns and the next actions following the NYT ad campaign. After successfully completing the NYT ad campaign, members quickly started a second crowdfunding project that calls for global support of the Sewol Ferry Act[2]. The emergent code of PL gathered together with existing SC, which formed a factor

1) One man media refers to a financially independent reporter supported by citizens' donations who provides news from various perspectives different from mainstream news media and quickly shares them by using alternative platforms of blogs, social networking services of Twitter, Facebook, and YouTube. Lee (2016) reports that Media Mongu is one of the most influential independent media journalists whose work has been officially recognized by several Journalists Awards in Korea.

2) A campaign to Raise Funds for a Full-Page Ad Calling for a Global Support of the Sewol Ferry Act was also successfully completed with 1,559 backers (114% of $ 58,240) at Indiegogo platform

of Planning. As such, information professionals should consider adding features like shared calendars, event scheduling, and lists or even project management tools like Gantt charts to help community members with planning.

〈Table 6〉 Variables Associated with Factor 3

SC	Side Campaigns • An act of running secondary campaigns by supporting alternative independent news media in Korea and consoling grief and sadness for the victims and their families through Yellow Ribbon campaign. Members support such independent news media as Newstapa, Gobal News, and Media Mongu whose reports reasonably challenged the mainstream media and the South Korean government. Members created and shared various types of posters and images of Yellow Ribbon to comfort their grief and sadness for the victims and their families. Examples include sharing information about detailed information about sponsoring independent media and posters of Yellow Ribbons via communities and other social networking channels.
PL	Planning • An act of making plans for the following collective actions after the NYT campaign such as "putting another ad in the Washington Post", or "publishing a news article about the community's experience of putting the NYT ad"

Note. Names of variables, their definitions, and examples in the table were adapted and revised from previous research (Lee & Kang, 2018; 2020). Some key examples were newly added in the table for this study.

4. Factor 4: Mobilizing Resources

The fourth factor consists of MR, CA, and IM. Excerpts from the original codebook (Lee & Kang, 2018; 2020) can be seen in Table 7. To realize a collective action, significant resources need to be mobilized. Resources include money, facilities, labor, technical expertise, means of communication, supporter loyalty, interpersonal ties, solidarity, common awareness, moral commitment, and authority (Jenkins, 1981, 1983; McCarthy & Zald, 1977; Tilly, 1978). Group members' time, enthusiasm, knowledge, and skills can be used to achieve collective action. Of course, collective actions may vary across contexts. In this case, the NYT ad campaign was the primary collective action, alongside smaller planned campaigns (supporting independent media and the Yellow Ribbon campaign) and other empowering actions such as petitions and protests (CA). As posited by McCarthy and Zald's (1977) resource mobilization theory, tangible and intangible resources must be maximized and organized to accomplish the goals of a social movement. Many members of MissyUSA including graphic designers, copywriters, and lawyers

(https://www.indiegogo.com/projects/a-full-page-ad-promoting-the-sewol-ferry-act#/).

voluntarily utilized their expertise, time, enthusiasm, and work experience to draft and design the advertisement (MR).

While working on the NYT ad campaign, members constantly organize actions such as putting petitions or organizing offline protests as well (CA). To effectively manage information flow, react to campaigns and actions, and effectively mobilize resources, members needed to define rules for how they organize and manage information within the community (IM). Members came up with norms and rules about how to repost postings (RP), organize postings by using brackets and structured keywords (OG), and archive important information and sources by archiving (AR). Paul and Morris (2011) identified users 'prioritizing information behavior' during the collaborative web search. Also, the MissyUSA community itself was a strong resource and venue that enabled effective computer-mediated communication (CMC) and mobilization. Online social movement research shows that CMC via ICTs can be seen as a resource to maximize actors, collective identity, networks, and resources (Diani, 2000; Hara & Huang, 2011). As such, these findings suggest that information professionals could consider integrating crowdfunding platforms or online marketing and advertising tools to allow online communities to raise awareness, encourage participation, and mobilize resources.

〈Table 7〉 Variables Associated with Factor 4

MR	Mobilizing Resources • An act of mobilizing various types of resources and capital to complete members' shared purposes. Members voluntarily mobilize their expertise and information to achieve a collective action. For example, graphic designers, copywriters, and PR managers designed and drafted the advertisement in the community and lawyers took part in reviewing legal issues for decision-making.
CA	Call to Action • An act of empowerment by organizing group-level actions such as starting petitions or organizing protests. For example, members started petitions urging the impeachment of President Park and pressuring the U.S. president not to visit Korea, and organized offline protests such as "I went to the demonstration in front of Korean Embassy in Washington D.C. I will attend another demonstration this Thursday (12pm, 04/24), if you are interested in joining, reply to this post or email me."
IM	Information Management • Reposting (RP): To keep the original post on the very first page of the bulletin board, members manually repost the original post. For example, "While I was writing a reply to this post, the original post was being deleted. Here I am copying the post and reposting it." • Archiving (AR): Capturing screenshots or copying their postings. • Organizing (OG): The use of keywords in brackets such as "[repost], [to leading members], [announcement]" in the subject line.

Note. Names of variables, their definitions, and examples in the table were adapted and revised from previous research (Lee & Kang, 2018; 2020). Some key examples were newly added in the table for this study.

5. Factor 5: Boycott

The fifth factor consists of RE and BC. Excerpts of the codebook related to this factor can be seen in Table 8. Boycott movements initiate over ethical reasons and suit a larger agenda (Prabhat, Motwani & Rangaswamy, 2019). Many members of the MissyUSA community were disappointed that the mainstream media reported incorrect information about the Sewol ferry incident and voluntarily initiated a boycott against those media and their subscribers (BC). In this case, Missy USA members further justified their boycott through a variety of references to historical events as well as real and perceived wrongdoings of the mainstream media from the past (RE) to add legitimacy and build support for the current boycott. The emergent code of RE was grouped with BC, which showed how community members used information for their chosen action of boycott. As such, these findings suggest that information professionals should consider robust linking and referrals systems to share and refer to trusted information sources as well as allow users to curate, recommend, or approve alternative resources or services.

〈Table 8〉 Variables Associated with Factor 5

RE	Reference • An act of referring to various information sources such as cultural, historical, and political affairs when writing posts and or commenting on others' postings. Examples include "This is the good example of how mainstream news media can badly distort and falsify the facts", "Samsung only put their ads in pro-Samsung news media and this is how Samsung exercises their power."
BC	Boycott • An act of empowerment by boycotting. Members intentionally boycott to quit subscribing to purportedly biased domestic mainstream media such as the Korean Broadcasting Systems (KBS), Chosun-ilbo, Joongang-ilbo, and Donga-ilbo (a.k.a. Cho-Joong-Dong for short) and refused to purchase products made by the companies that put ads in those news media. Examples include "Let's not purchase products whose ads are put in Chosun-ilbo."

Note. Names of variables, their definitions, and examples in the table were adapted and revised from previous research (Lee & Kang, 2018; 2020). Some key examples were newly added in the table for this study.

6. Factor 6: Collaborative Decision-Making

The sixth factor consists of GDM and IS. An excerpt from the codebook for the variables associated with factor 6 can be seen in Table 9. The sixth factor was important for successfully executing the NYT ad campaign process. MissyUSA members shared large amounts of information and worked to make it accessible to the community and public, facilitating more interest and participation in the overall campaign. Group based decision-making (GDM) was successfully

carried out when members needed to make decisions. When graphic designers designed the images and texts, they shared their first draft in the community, asked for feedback, and revised the draft incorporating other members' feedback and voting results. Information sharing (IS) also helped the community to make decisions to facilitate the NYT ad campaign. Collaborative decision-making has been seen in other online communities. For example, Ebrahimzadeh et al. (2020) reported that scholars on ResearchGate[3] demonstrated behaviors of collaborative decision-making by discussing, voting, and sharing information with each other. MissyUSA members actively engaged in sharing their ideas, opinions, and feedback along with credible information, such as foreign media sources, for group decision-making. Through this group decision-making in the online community, members collaborated systematically based on organizational consensus, without forming a physical organization or having face-to-face communication. As such, these findings suggest that online communities should include features that allow cross-platform, user-friendly information sharing as well as voting, polling, or surveys to help facilitate group decision making.

〈Table 9〉 Variables Associated with Factor 6

GDM	Group Decision-Making • An act of making group decisions about the NYT ad and fundraising campaign by community members via posting and commenting. For example, "This is one of the many designs created for the NYT ad campaign. I am sharing the updated design based on the comments you left in replies. Everyone participating in creating this design owns the copy-right of this work, so feel free to use and distribute it."
IS	Information Sharing • An act of deliberately sharing information or posts such as news reports created by mainstream and/or alternative news media, sharing links or URLs to outside sources, or answering specific queries. For example, "I am posting the NBC news article that is not exposed to Korean news media - Broken fingers reveal South Korea Ferry victims' escape bids. Here is the url: http://nbcnews.to/1hr6sVX."

Note. Names of variables, their definitions, and examples in the table were adapted and revised from previous research (Lee & Kang, 2018; 2020). Some key examples were newly added in the table for this study.

7. Factor 7: Reaction to Tensions

Factor 7 consists of TS and HT. Codebook excerpts can be found in Table 10. Online communities are fluid spaces where boundaries, norms, participants, interactions, and foci continually change over time (Faraj et al., 2011). When members see tensions such as technical problems to be solved (during the crowdfunding campaign) or trolling by outsiders in the community, MissyUSA

3) An academic social networking and research-sharing site: https://www.researchgate.net/.

members actively reacted to and dealt with those tensions. Since the NYT ad campaign was a collective action digitally enabled without forming a physical organization or communication, members needed to quickly fix and troubleshoot those issues throughout the entire procedure. As users' levels of digital literacy and previous exposure to new technologies, such as the internet, social networking services, and crowdfunding systems noticeably varied, MissyUSA members helped, taught, and learned from each other to solve those technical problems. This quick troubleshooting resulted in managing the issues in the community and early completion of fundraising in less than forty-eight hours. As such, these findings imply that online community platforms could include features such as community-maintained troubleshooting, help guides or frequently asked questions (FAQ) sections to help users resolve issues as well as reaction, reporting, flagging, or blocking tools to flag negativity or harassment.

〈Table 10〉 Variables Associated with Factor 7

TS	Troubleshooting • An act of solving technical issues related to maintaining the fundraising website, reporting and fixing issues, helping others fix technical issues while participating in the fundraising campaign, etc. For example, "[Leading member] Announcement about the updated payment for the NYT ad campaign (content added). I just called PayPal out of impatience. I requested again that PayPal should unblock our campaign account since I sent all documentation needed. Now it is unblocked. The campaign account is linked to the Indiegogo campaign site. Thanks, those who supported us by paying by credit card. I would appreciate if you participate in the campaign by using PayPal."
HT	Trolling • A hostile act of one deliberately posting a message for the purpose of eliciting an intemperate response among more established community members. For example, "Impeaching president? You must have been watching too many TV shows and you really think you can do so in real life? Haha!"

Note. Names of variables, their definitions, and examples in the table were adapted and revised from previous research (Lee & Kang, 2018; 2020). Some key examples were newly added in the table for this study.

8. Factor 8: Brainstorming

The eighth factor is associated with BR. The codebook excerpt for BR can be seen in Table 11. As soon as the news broke that all passengers were rescued turned out to be false, horrified MissyUSA members (mostly Korean mothers having young children) started posting in the community to share information as well as feelings. Since there was not much information found and delivered to the public and there was much doubt and suspicion over the Korean government and mainstream news media, MissyUSA members attempted to collaboratively make sense of the available information and reduce uncertainty. As Ebrahimzadeh et al. (2020) found, the desire

for informal communications and complex information needs lead researchers to engage in collaborative information-seeking behaviors. During the first few days, even though many of the ideas and suggestions in the brainstorming stage were simple or rough, like-minded members not only built solidarity but also gathered ideas about what they could or should do (i.e., collective action) at a group level to cope with the disaster situation. The aforementioned information sharing features may also aid in brainstorming, but these findings suggest that other online collaboration and ideation tools, such as Bubble.us[4], Miro[5], Mural[6], MindMeister[7], or Google Docs[8], may help communities identify and visualize ideas and make sense of a breaking situation.

〈Table 11〉 Variable Associated with Factor 8

BR	Brainstorming • An act of pouring ideas and suggestions to figure out the chaotic situation right after the ferry sunk. Examples include "Is there anything we can do now? "We can't just sit and cry here, let's calm down and be smart", "We need to build a website to memorialize these innocent kids", "Let's start donating money to help victims' family!"

Note. Names of variables, their definitions, and examples in the table were adapted and revised from previous research (Lee & Kang, 2018; 2020). Some key examples were newly added in the table for this study.

9. Limitations

This study identified that certain social collaborative information behaviors can be grouped and formed factors that are traditional elements of collective action, such as collective identification (F1), outburst of dissent (F2), and mobilizing resources (F4). Moreover, this study reported more specified information behaviors of planning (F3), boycott (F5), collaborative decision-making (F6), reaction to tension (F7), and brainstorming (F8). Among the eight factors found, the newly added emergent information behavior codes, in particular, formed factors regarding dynamics driven negative emotions and planning actions that were not clearly represented in the previous study.

Despite that, the collective action taken by MissyUSA members in this study is a single case and the result of this case study provided an illustration of various social information behaviors that facilitated online collective action. Therefore, the findings in this study of particular single

4) https://bubbl.us/
5) https://miro.com/
6) https://www.mural.co/use-case/brainstorming-and-ideation
7) https://www.mindmeister.com/
8) https://www.google.com/docs/about/

case cannot be generalized for all collective actions taken by online communities. Community members' social collaborative information behaviors may vary by nature and characteristics of online communities, situations, and contexts. Also, the Sewol Tragedy happened in 2014 and there may be different and/or more specified information behaviors in recent online communities. However, as discussed above, the collaborative information behaviors and underlying factors found from this case study may be transferable or similar to those seen in other online communities making collective actions.

While the findings suggest associations among the variables or concepts, the factors cannot be used to establish causation. Yong and Pearce (2013) argue that scree plots are only reliable with a sample of 200 and warn that datasets with clumped data or many components may make scree plots more difficult to interpret. Costello and Osborne (2005) recommend running the factor analysis with pre-specified numbers of factors. In this case, the final 8 factors were selected because they explained the most variance with all eight factors with eigenvalues over 1. Difficulty in interpreting the factor analysis may also be due to the qualitative nature of the source data: the data analyzed here is the result of qualitative content analysis of text and not standardized survey data with pre-validated scales. A larger sample size may have yielded stronger correlations and more reliable factors. However, all available data for the case and context in focus were included. While there is debate in the literature about minimum viable sample sizes for factor analysis, the sample size of this study is higher than the 300 generally recommended and also meets recommendations for the subject-to-variable or case-to-item ratio of at least 5 to 1 (Beavers et al., 2013; Bouvin & Ng, 2003; Costello & Osborne, 2005; MacCallum et al., 1999; Tabachnick & Fidell, 2007; Yong & Pearce, 2013). Further research including research with a larger sample size and comparative analyses with other online community studies should be conducted to understand rich spectrums of social collaborative information behaviors for various online collective actions.

Ⅵ. Conclusions

This research attempted to demonstrate how the MissyUSA members collaboratively engaged with particular social information behaviors online to achieve collective action, the NYT ad campaign in response to the Sewol Ferry tragedy. By using 19 micro-level information behaviors from the typology found in previous research (Lee & Kang, 2018; 2020), this study attempted

to explore and identify potential relationships and factors associated with the previous findings using exploratory factor analysis. In this study, exploratory factor analysis identified a total of eight factors. In light of the previous study's findings (Lee & Kang, 2018), the factors of shared representation/collective identification (F1) is key factor related to the collaborative information behaviors seen through the NYT ad campaign. Exchanging information, emotions, and opinions, fostering a sense of solidarity, and grasping a collective identity as a mother induces active participation. With newly added emergent code of PR, outburst of dissent (F2) was represented as a major factor to trigger a collective action, as shown in traditional political science research. In this process, the members also define the norms of their collective action and understand the group's identity and the purpose of the movement. Eventually, 'collective politicized identification' is formed as an 'inner moral obligation', making it possible for the members to participate more actively involved in collective action (Alberici & Milesi, 2016; Kelly & Breinlinger, 1996).

Mobilizing resources (F4) is also another traditionally important factor for collective action identified by Lee and Kang (2018). As mentioned above, online communities can act as effective spaces to maximize both tangible and intangible core resources to take collective action (Hara & Huang, 2011). Members established novel ways/norms of mobilizing resources and organizing/archiving/managing information on their own to prioritize, organize, and curate information. More studies from the perspectives of computer-mediated communication (CMC) and collaborative information behaviors (CIB) are needed to better design and manage information systems for networked individuals' social movements. These findings suggest that aspects and themes of the social information behaviors used by MissyUSA community members to engage in collective action may align or relate to concepts and theories from political science, such as collective identity, network, and mobilization.

The factors shared representation and collective identification (F1), collaborative decision-making (F6), reaction to tensions (F7), planning (F3), boycott (F5), and brainstorming (F8) can all also be understood in terms of collaborative information behavior and knowledge creation. From the stage of members' collaboratively making sense of and coping with the crisis, brainstorming started building members' solidarity and group identity. When maximizing empowering actions and mobilizing resources, members efficiently used collaborative decision-making, planning, and troubleshooting tensions within the community. The emergent codes of RE and PL formed factors showing that a chosen action of boycott was driven by using further information of past wrongdoings and next collective actions were planned and incubated by members at the same time. Faraj

et al. (2011) broadly define knowledge collaboration as the sharing, transformation, accumulation, integration, and co-creation of knowledge. In an online community, knowledge collaboration involves individual acts of offering knowledge to others as well as adding to, recombining, modifying, and integrating knowledge that others have contributed. Qu and Hansen (2008) argue that new knowledge can be created through the collaborative sensemaking process through which shared understandings and representations are established. By maximizing collaborative decision-making and troubleshooting tensions, members successfully accomplished a collective action without forming any face-to-face-based physical organization or communication. Therefore, it is critical for information professionals, such as the system developers, community managers, and user experience designers of online communities, social networking services, etc. to provide users with functions and features, such as voting, chatting, referrals, and other tools to facilitate collaborative information searching, sharing, and curation. These features and tools may enable users and communities to engage in collaborative information behaviors for their defined purposes, whether those purposes are for work, learning, leisure, responding to tragedy, or organizing collective actions.

This study signifies that loosely connected individuals worldwide are now working together in an ever-changing digital environment and are creating new styles of collaboration. Research studying various types and manners of group sense-making and decision-making, collaborative information seeking and management, and knowledge creation and collaboration must continue to illuminate a holistic view of collaborative social information behaviors and how they enable collective actions online and offline.

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