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Hashtags for Gatekeeping of Information on Social Media

Devendra Potnis
University of Tennessee, Knoxville, dpotnis@utk.edu

Iman Tahamtan
University of Tennessee, Knoxville, tahamtan@vols.utk.edu

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Devendra Potnis*

School of Information Sciences

1345 Circle Park Drive, Suite 444

College of Communication and Information

University of Tennessee, Knoxville, TN, USA

Email: dpotnis@utk.edu

Iman Tahamtan

School of Information Sciences

College of Communication and Information

University of Tennessee, Knoxville, TN, USA

Email: tahamtan@vols.utk.edu

*Corresponding author

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Abstract

Since the inception of gatekeeping research in the 1940s, most studies on gatekeeping have been human-centric, treating and studying individuals as gatekeepers, who perform their gatekeeping role using a combination of the following mechanisms: forming communities, and/or broadcasting, discovering-searching, collecting, organizing, or protecting information. However, the nature of communication channels and how information is produced by and shared with users has fundamentally changed in the last 80 years. One significant change is the growing use of technology-enabled metadata like hashtags when sharing information on social media. Rarely any study investigates whether hashtags can perform gatekeeping of information and what it means for information gatekeeping. This paper fills in the gap by conducting a content analysis of 77 interdisciplinary studies on hashtags and gatekeeping to confirm how they can implement six gatekeeping mechanisms. This study shows that hashtags expand our understanding of the role of technology solutions in gatekeeping and advance research on hierarchical gatekeeping. The benefits of hashtags for gatekeeping suggest that they act as "information anchors" for online communities, thereby highlighting the utility of information gatekeepers for society.

Introduction

Need for Revisiting Gatekeeping Research

Gatekeeping was initially proposed in the 1940s to explain how information enters and flows through a communication channel (Lewin, 1947). In the last 80 years, changes in the technology landscape have dramatically influenced the nature of communication channels, and the way information is produced and shared on these channels, with some of these changes challenging the benefits of communicating information. For instance, every day millions of users across the globe seamlessly upload and share quintillions of information in the form of videos, text, audio, and images, on social media. This high volume of variant information shared with a high velocity on social media leads to "information overload" (Tang, Mehra, Du, & Zhao, 2019), making it challenging for users to benefit from relevant information.

Information gatekeeping manifested by identifying or making recommendations about relevant information for users (Lu, 2007) can help users better process and benefit from the high volume of variant information, thereby mitigating the side effects of information overload on social media. Information gatekeeping broadly refers to the process of individuals filtering information (Shoemaker, 1991) and controlling its flow (Barzilai-Nahon, 2009; Donohue, Tichenor, & Olien, 1972). If information gatekeeping is implemented by humans, then it can be influenced by the biases and personal preferences of human gatekeepers, which consequently limits users' freedom of selecting and accessing the information relevant to them (Jürgens, Jungherr, & Schoen, 2011).

Social media users need a type of gatekeeping that does not restrict their ability to upload and share information, but at the same time, give them the freedom and customized support needed to access, process, and benefit from the information. Considering the seamless flow of information on social media, it is challenging for a human being to ubiquitously manifest gatekeeping since it would require them to continuously keep up with and control the flow of information for creating value for users. Thus, social media users need gatekeeping that is (a) *customizable* (i.e., the user can define and modify the type of information that can be controlled through gatekeeping), (b) *technology-enabled* (i.e., social media platforms should automatically and consistently support the user-defined criteria of gatekeeping), and (c) *seamless* (i.e., gatekeeping that is operational 24/7).

Research Question

Hashtags, i.e., metadata (i.e., data about data) or text labels preceded by the pound sign (#), are *customizable*, *technology-enabled*, and *operational 24/7* on social media platforms like Twitter, Facebook, Instagram, LinkedIn, Pinterest, TikTok, Tumblr, and YouTube. Hashtags originate from tags but differ from them in terms of the functionality provided by the social media platforms (Ray & Bala, 2020). For instance, the pound sign in Twitter hashtags triggers invisible procedures to bring users together by grouping and coordinating different conversations (Bruns & Burgess, 2015) and help them search and join online conversations (Bernard, 2019). Hashtags have the potential to help users benefit from the information on social media. Hence, this study investigates the following research question (RQ): *Can hashtags perform gatekeeping of information on social media?*

Evolving Landscape of Gatekeeping Research

Conventional Gatekeeping in the Pre-Internet Era

Conventional gatekeeping research is rooted in and influenced by the communication literature. For instance, the term gatekeeping in social channels was first coined by Kurt Lewin (1947), where he explained how food's journey from farms to dining tables is influenced by the decisions made by gatekeepers like the farmers, the store managers, and the shoppers like housewives. This concept was initially applied to settings such as journalism and mass communication (Barzilai-Nahon, 2008) where food was replaced with information and the way gatekeepers operate (i.e., mechanisms) kept on evolving. For instance, gatekeepers gather information from sources such as websites of health organizations and news agencies, embed information into messages, and disseminate it widely through a variety of channels (Klobas & McGill, 1995; Shoemaker & Vos, 2009). The information can be influenced and manipulated by others along the way. For instance, news editors can either select or ignore the news created by journalists (Shoemaker & Vos, 2009).

In the conventional paradigm, gatekeeping "relied on highly centered networks that prevented the emergence of mechanisms for sharing information. Users who wanted to share content with other users had to deal with the high costs of production and distribution" (Bastos, Raimundo, & Travitzki, 2013, p. 261). Conventionally, gatekeepers served as guards responsible

for preserving information (Agada, 1999; Metoyer-Duran, 1993) and for filtering information by serving as a "topological bottleneck" in social networks (Bastos et al., 2013), where topology refers to the distribution of actors in a social network.

Information science researchers examined gatekeeping using cultural theories for identifying gatekeepers of communities (i.e., someone who preserves and/or protects information) and investigating their role in exchanging information with the outside world (Barzilai-Nahon, 2009). Borowiec (1975) and Metoyer-Duran (1991) applied cultural theories for studying gatekeeping in ethnic communities (e.g., Latinos, African-Americans). A gatekeeper's ability to control information depends on external factors such as channels and rules of operations (Roberts, 2005).

Information science research also approached gatekeeping by proposing and applying contemporary information-seeking models, with a focus on information needs of gated (i.e., those who are subjected to gatekeeping (Barzilai-Nahon, 2008), information services that can be offered to meet the needs of communities, and how gatekeepers help community members meet their information needs (Barzilai-Nahon, 2009). Chatman (1985) combined cultural theories with information-seeking models to understand and explain the role of gatekeeping in preserving, protecting, and sharing information with the outside world.

Conventional gatekeeping focused on the spread of messages over a network of senders and receivers where the costs of production and distribution of information were high except for highly centered networks of gatekeepers (Bastos et al., 2013). Through the ages, traditional gatekeepers, such as officials, journalists, the mass media, and government propagandists, fiercely protected their gatekeeping roles because they had the privilege of controlling the flow of information (Thornhill, 2019).

Networked Gatekeeping in the Internet Era

With the emergence of the Internet, social networking platforms, and smartphones, the focus of gatekeeping research shifted from studying journalists, leaders, teachers, and other influential groups as gatekeepers to the public, i.e., the gated, and their engagement with their social networks, partly because anybody could produce and disseminate information on social media (Brems, Temmerman, Graham, & Broersma, 2017). The information did not remain in the

hands of a specific group of individuals any more (Thornhill, 2019). As a result, conventional gatekeepers no longer have as much control over the content as they had in the past (Bennett, 2004).

This shift in the focus of gatekeeping research led to the following research inquiries: Who are the new gatekeepers on social media? Can anybody serve as a gatekeeper on social media? How do new gatekeepers operate and what does it mean for communicating information on social media?

New technological developments created new opportunities for the involvement of the public in the gatekeeping process through multidirectional information flow, where any individual who acts as the hub in social networks can regulate information flow over myriad paths (Bastos et al., 2013). Barzilai-Nahon (2008) conceptualized this metamorphosis in gatekeeping by proposing the Networked Gatekeeping Theory that defines gatekeeping in terms of the power dynamics among actors such as the gated and the gatekeepers, and the mechanisms of controlling information flow by selecting, adding, withholding, displaying, channeling, shaping, manipulating, repeating, timing, localizing, integrating, disregarding, and deleting information. Building on the conventional gatekeeping literature (Shoemaker & Vos, 2009), Nahon and Hemsley (2013) defined network gatekeepers as: "people, collectives, companies, or governments that, as a result of their location in a network, can promote or suppress the movement of information from one part of a network to another (p. 7)".

Thus, information gatekeeping in digital networks manifests in the form of the spreading of the same or different information by a multitude of users (Bastos et al., 2013). However, message replication and dissemination do not necessarily emerge because of large numbers of followers. It is the level of activity of any users that account for a great deal of message diffusion (Bastos et al., 2013). For instance, individuals can serve as gatekeepers of information on Twitter only if they consciously create information and distribute it (Jürgens et al., 2011). For instance: "...both the new gatekeepers and ordinary users tend to filter political content on Twitter based on their personal preferences … and that political communication on Twitter is at the same time highly dependent on a small number of users, critically positioned in the structure of the network, as well as biased by their own political perspectives" (Jürgens et al., 2011, p. 1). "More precisely, new gatekeepers are those users whose removal decreases information spread within the network

by a particularly large degree" (Jürgens et al., 2011, p. 3), regardless of how many followers they have.

Seamlessly generating relevant content for a specific audience is a key to emerge as a network gatekeeper on social media. Hemsley (2019) demonstrated that the messages shared by middle-level gatekeepers (i.e., those with 1,800 and 26,000 followers) are more likely to go viral (measured by retweet counts) compared to high-level gatekeepers (i.e., well-connected users), specifically when "there is a convergence of sharing interests among high- and middle-level gatekeepers along with typical users" (Hemsley, 2019, p. 300). Hemsley (2019, p. 284) noted that "unlike the traditional view, where gatekeepers are professional editors, network gatekeepers exist on a continuum. Depending on how successful they are in building and maintaining an audience, some gatekeepers have more control over information flows than others." The continuum consists of high-level gatekeepers who are well-connected, middle-level network gatekeepers, and typical users (Hemsley, 2019).

Mechanisms as a Means for Implementing Gatekeeping

In the last 80 years, gatekeeping research has identified several ways in which gatekeeping operates. Table 1 summarizes some of the popular mechanisms of gatekeeping. Any entity (e.g., technology, individual) that implements one or more of these mechanisms would be considered as engaging in gatekeeping.

TABLE 1. Gatekeeping mechanisms.

#	Gatekeeping Mechanisms	Description
1	Forming communities	Building and maintaining an audience interested in a specific type of content on social media (Hemsley, 2019); Using specific information for making decisions and forming support-groups in organizations (Cronin, 1982; Klobas & McGill, 1995)
2	Broadcasting information	Embedding information into a message or messages, and disseminating it widely among others through a variety of channels (Klobas & McGill, 1995; Shoemaker & Vos,

		2009); In the pre-Internet era, users relied on print media for sharing information with masses (Bastos et al., 2013); Every actor in the public sphere can select, construct, and contribute news for better civic engagement on social media (Bennett, 2004); Endorsements and word-of-mouth publicity (Chengalur-Smith, Potnis, & Mishra, 2016); Journalists can use social media for the production and dissemination of information for forming and shaping public opinion (Brems et al., 2017)
3	Discovering and searching for information	In response to patron queries, reference service librarians search information for patrons (Oyelude & Bamigbola, 2012); Policies of electronic resource providers (e.g., Digital Rights Management on e-book platforms) limit the user's ability to search information (Potnis, Deosthali, & Pino, 2017); Library websites facilitate the process of discovering information in electronic resources (Potnis, Deosthali, Zhu, & McCusker, 2018)
4	Collecting information	Locating appropriate information resources such as health organization and news agencies websites and gathering information from these sources (Klobas & McGill, 1995; Shoemaker & Vos, 2009)
5	Organizing information	Librarians catalog and classify information resources and artifacts in information organizations (Oyelude & Bamigbola, 2012); Features of electronic resources like e-books influence the user's ability to manage information (Potnis et al., 2017)
6	Protecting information	Community leaders can filter "outside" information from entering their communities or social networks (Bastos et al., 2013); Individuals, groups, organizations, and government agencies in social networks can "promote or suppress the

<table>
<tr><td></td><td></td><td>movement of information from one part of a network to another" (Nahon & Hemsley, 2013, p. 7; Thornhill, 2019); Community leaders guard internal details such as customs, community expectations, and social hierarchies, from the outside world, thereby preserving community practices (Agada, 1999; Chatman, 1985; Metoyer-Duran, 1993); Protecting community's information to preserve cultural values (Borowiec, 1975; Kurtz, 1968; Metoyer-Duran, 1993); Not exchanging information with the outside world (Roberts, 2005; Shannon & Shannon, 1973); Deleting or suppressing irrelevant, wrong, or false information (Chengalur-Smith et al., 2016); News editors can filter information shared by journalists by selecting or ignoring certain types or aspects of information (Shoemaker & Vos, 2009)</td></tr>
</table>

Methodology

A comprehensive review of the literature was conducted to check if and how hashtags can serve as gatekeepers of information on social media. The literature search included original English language scholarly documents. The focus was mainly on the documents published since 2007 when hashtags were proposed for the first time by Chris Messina to organize information on Twitter (Small, 2011). In August 2019, researchers started searching for a combination of keywords such as Gatekeeping, Gatekeepers, Gatekeeping Theory, "Online Communities AND Gatekeeping", "Social Media AND Gatekeeping", Tagging, Social Tagging, and Hashtag, in (a) 15 communication and information science journals (e.g., Annual Review of Information Science Technology; Computer-Mediated Communication; Information, Communication & Society; Information Processing and Management; Journal of the Association for Information Science and Technology; New Media and Society; Online Information Review) that publish research on social media and gatekeeping, and (b) scientific databases such as Scopus, Web of Science, ACM, ArXiv, IEEE, and Google Scholar. Researchers used the Citation Pearl Searching technique, also known

as pearl growing, snowballing, citation mining, or citation chaining (Icahn, 2020), where one or more useful citations (i.e., pearls) are used to find further relevant citations (Citation Pearl Searching, 2013). Small (2011) article on hashtags published by a communication journal and Barzilai-Nahon (2009) article on network gatekeeping in an information science journal served as two pearls that helped us search for more relevant articles. The studies that discussed different ways in which hashtags help users interact with information were considered relevant for analysis.

By February 2020, researchers had collected primary and secondary research studies published in the form of journal articles, conference papers, dissertations, books (e.g., Theory of the Hashtag, Going Viral), technical reports, and theses that represent following academic disciplines (and outlets): communication (e.g., Communication Design Quarterly; Media, Culture and Society; Social Media+Society), computer science (e.g., dissertations on text mining and social media; papers presented at the ACM and IEEE conferences on artificial intelligence, data mining, hypermedia, matrices, social networks, and web), criminal justice (e.g., International Journal for Crime, Justice and Social Democracy), education (e.g., TechTrends), human-computer interaction (e.g., Computers in Human Behavior; Conference on Human Factors in Computing Systems), information science (e.g., International Journal of Information Management), journalism (e.g., Digital Journalism; Data Science + Journalism), linguistics (e.g., a thesis on sociolinguistics), medical education and research (e.g., American Journal of Infection Control; Journal of Medical Internet Research; Substance Abuse; Qualitative Health Research; Western Journal of Emergency Medicine), policy (e.g., Health Policy; Policy and Internet), politics (e.g., The Journal of Politics), and sociology (e.g., Community Development; Quality and Quantity). Most of these studies were published from 2010 to 2020.

Researchers used the gatekeeping mechanisms identified by the past research to investigate how hashtags gatekeep information on social media. They used Table 1 as the guidebook for the conceptual content analysis of 77 studies collected from August 2019 to February 2020. The conceptual content analysis consists of determining the presence of certain concepts within a corpus of data (Neuendorf, 2002; Potnis, 2010). Researchers used the concepts of gatekeeping presented in Table 1 for systematically and objectively identifying their occurrences in the 77 studies. For instance, past research describes the manifestation of the "broadcasting information" mechanism in the form of (1) embedding information into a message and disseminating the

message (Klobas & McGill, 1995; Shoemaker & Vos, 2009), (2) sharing and distributing messages over mass media (Bastos et al., 2013), (3) contributing to existing information in the public sphere (Bennett, 2004), and/or (4) producing and disseminating information for influencing public opinion (Brems et al., 2017). Researchers considered the reference to any of these four forms in the context of using hashtags as an indication of hashtags supporting the act of information broadcasting over social media.

The inter-rater agreement between the researchers was over 90%, which shows that the researchers with a collective experience of qualitative research for over 20 years, agreed over 90% of the times when identifying multiple instances of hashtags as enablers of information gatekeeping on social media. For less than 10% of the time, when researchers disagreed about the role of hashtags in implementing one of six gatekeeping mechanisms, they discussed their interpretations and resolved their differences to reach a consensus (Taber & Deosthali, 2014). Thus, the process of constantly comparing text in the 77 studies, which are at the intersection of hashtags, users, and information, with an interdisciplinary theoretical understanding of gatekeeping mechanisms presented in the Description column of Table 1 helped researchers identify the (a) six ways in which hashtags manifest gatekeeping on social media, and (b) corresponding benefits generated by hashtags for various online communities.

Study findings presented in the next section are based on a sample of qualitative and quantitative articles that represented (1) findings, concepts, and viewpoints of researchers from diverse academic disciplines (e.g., communication, journalism, political science, information science, management, computer science), (2) publication venues varying in terms of the impact factor and acceptance rate, (3) publication types (e.g., journal articles, conference papers, theses and dissertations, workshops, books), (4) years of publication, and (5) social media platforms (e.g., LinkedIn, Twitter). Due to the "representative" nature of the sample of articles analyzed in this study, researchers make an extrapolatory claim (Neuendorf, 2017) that hashtags can help humans for implementing gatekeeping mechanisms on different social media platforms, which indicates the external validity of the findings.

Hashtags for Gatekeeping of Information

This section answers the research question (i.e., RQ), with each sub-section describing the way hashtags exhibit a gatekeeping mechanism and corresponding benefits for users.

Forming Communities

Social media users can define and assign hashtags to texts, photographs, videos, and any other kinds of digital objects, thereby creating a collaborative or social tagging system. As a result, individuals with shared interests can come together by clustering around common tags and resources (Dichev, Xu, Dicheva, & Zhang, 2008; Sen, 2009), leading to forming online communities.

Online communities are virtual environments that create opportunities for (knowledge) collaboration among people not already known to each other (Faraj, Jarvenpaa, & Majchrzak, 2011). The hashtag-enabled social tagging can also enhance interpersonal communications and awareness toward an important topic or event. Interpersonal communications on online communities occur among people who are directly (e.g., networks of influencers and followers on Twitter) or indirectly connected (Haustein, 2019). On an online community, members can share a variety of digital objects along with hashtags. Hashtags in social media posts can strengthen communities (Zappavigna, 2011). Hashtags can lead to a continuous activity, periodic activity, and activity concentrated around an isolated time domain, among members of social networks (Lehmann, Gonçalves, Ramasco, & Cattuto, 2012).

Some people consider the interest of the community they belong to while tagging items online, and some do not. Users may unconsciously contribute to the community by assigning tags that are aligned with the community's collective attention and interest, or tagging could be done in a manner that differs from the community's collective goal (Tonkin et al., 2008). Twitter users utilize hashtags to find the online communities that they feel they belong to and to demonstrate mutual interests through content curation tagged with those hashtags. Hashtags are critical for creating online communities and social networks on Twitter. Eventually, members of online communities can develop trust and loyalty by sharing information, replying to people's comments,

and any other activity that creates value for the community (Ntalianis, Kavoura, Tomaras, & Drigas, 2015).

A set of hashtags used by members of online communities eventually help to build a collective identity, a sense of belonging among the members, and possibly interest in these communities among others on social media. Using tags builds communities of practice. Communities of practice require a shared set of *interests* that fosters a sense of collectivism and communal commitment (Xu, Chiu, Chen, & Mukherjee, 2015). Hashtags can be used to discuss topics of shared interest. Hashtags help self-motivated people with similar goals, shared understanding of their activities, same concerns, or the same interest to find each other on time (Wang, Liu, & Gao, 2016). Hashtags can be leveraged to form communities where a group of people, who are similar to each other, interact with each other more frequently than with those outside the group (Pei, Chakraborty, & Sycara, 2015). Hashtags also allow people to construct an information network through which "contributors can be informed of shared vision and goals" of the community (Wang, et al., 2016, p. 862).

Hashtags can also lead to small sub-communities of interests that are separated from each other (Santos-Neto, Ripeanu, & Iamnitchi, 2007) because hashtags can emerge and split into sub-hashtags and disappear over a short or long period (Li et al., 2010). Tagging leads to small, medium, or large networks of users through which information is passed on from influencers to followers and beyond (Bastos et al., 2013).

Broadcasting Information

As per the theory of the Two-Step Flow of Information, gatekeepers interpret, contextualize, and make the messages relevant to the less active users (Xu et al., 2015). Social media users can make their messages relevant for those who are unable to connect the dots in terms of the seemingly disparate topics and digital objects on the Internet, by proposing and associating hashtags with messages. Thus, hashtags can be used by users to emerge as influencers and leverage their positions on social networks to link and broadcast information on different topics with audiences with distinct interests (Bastos et al., 2013). Hashtags can help influencers spread their ideas further than their usual spread (Bakshy, Hofman, Mason, & Watts, 2011).

Hashtags find their distinctness after they become popular (e.g., #MeToo), which helps associated content seek attention. Strategic hashtags can be the means through which users make their posts seen by others. Users employ strategic hashtags to reach broader networks, specifically to those social circles and participants that are outside the group. Hashtags play a critical role in promoting messages of social and political movements since hashtags can mobilize the public for collective attention (Wang et al., 2016). On Twitter, trending topics marked with hashtags can indicate the salient of what is happening then in the society. For instance, the reuse of viral hashtags is common for directing political (e.g., #iranelections in 2009) and social movements (e.g., #MeToo). On June 12, 2009, 60 tweets were posted under the hashtag #iranelection to show an oppositional voice against the results of the Iran 2009 presidential election. This hashtag remained the top trending hashtag in the world for almost fourteen days after the election. The hashtag was used as the main communications means to give voice to the Iranian protesters on Tehran streets during the protest, which lasted for almost 8 months (Bernard, 2019).

Individuals can also use hashtags to label information resources and share them with the online community. For instance, group administrators on Facebook tag content using hashtags to enhance engagement among group members. Hashtags also connect group members to the resources shared by the group administrators and other members.

Discovering and Searching Information

Information dissemination through hashtags makes the shared content more visible and discoverable and leads to a wealth of user-generated knowledge, but most of it is unstructured and disorganized (Brabham, 2012). Users can employ hashtags as anchors to find a range of digital objects that they need. The user can leverage the retrieval capability of hashtags to discover online content. Labeling content with hashtags is a popular way of organizing content that facilitates content navigation, filtering, and searching among online communities (Cao et al., 2015). Hashtags can help users find online digital objects such as texts, photographs, and videos (Dichev et al., 2008) by filtering out unrelated and unwanted resources, users, and tags. Users use hashtags with different motivations, such as making things findable online, locating items such as photos, books, and web pages, and capturing and communicating key features of the tagged items (Sen, 2009).

Hashtags can lead to information encountering or serendipitous discovery of useful information. Encountering useful information assists information users to move from their current information needs to past or future information needs (Erdelez, 1999). Using and clicking hashtags for information navigation can sometimes lead to discovering other information and following active information seeking. Information systems can be used that improve information encountering and help non-encounters make better use of serendipitous discovery of useful information (Erdelez, 1999). One major feature that can embed in such systems is hashtags to empower and facilitate the processing of encountered information. Hashtags can be used to "improve the capturing, formatting, forwarding and organizing of the encountered information" (Erdelez, 1999, p. 28).

Users can also find information resources, including website links, which are labeled with hashtags (Furnas et al., 2006). Hashtags can also be used to search for individuals who have created and/or used hashtags associated with them (Hellsten & Leydesdorff, 2020). Hashtags increase the searchability of posts on Facebook, LinkedIn, and Instagram, among others; although, in some cases, irrelevant tags are used to increase the searchability of posts (Chopin, 2008).

Hashtags can be useful in retrieving structured information as well. For instance, on LinkedIn, a talent search can be conducted using hashtags, if those hashtags appear in the profile information of LinkedIn users as well as their posts. This helps LinkedIn users to be discoverable by academic institutes, organizations, corporates, recruiters, and other LinkedIn users. Knowledge discovery techniques using hashtags can reduce extensive manual labor tasks and improve search results (Brabham, 2012). However, the degree of content discovery through tags may be different on different platforms. For instance, tweets labeled with hashtags become visible not only to those on Twitter but also to everyone who has access to the Internet, because tweets would be searchable through search engines like Google and other websites (Small, 2011).

Collecting Information

In the context of hashtags, collecting information is different from searching information, since information search involves typing and/or clicking a hashtag for accessing related information, whereas collecting information refers to using hashtags as parameters to extract data via any software such as Nvivo and NodeXL and programming languages like R and Python.

Using the software, researchers can use hashtags as keywords for scraping, locating, and collecting unstructured information on social media. Hashtags can also be used to identify the user sentiments embedded in the information collected from social media.

Bass (1969) argues that newsgathering qualifies as gatekeeping since stories that are not gathered and reported will never be processed and hence shared with the masses. Hashtags can be instrumental in locating and gathering specific types of information promptly. For instance, hashtags can be used to gather news in the form of raw facts on specific topics in millions of posts on Facebook and Instagram, videos on YouTube, pins on Pinterest, and tweets on Twitter. To improve the quality of disaster response and recovery, Ray and Bala (2020) proposed a technique that helps organizations differentiates between information about an actual and a false event. They proposed and tested this technique based on the relevant and cohesive social media feeds, which were collected using hashtags like "#ChennaiFloods2015," "@ChennaiFloods15," and "#2015SouthIndianFloods" as input parameters for their Python codes.

Social media users can also use hashtags to collect updates about events or topics. Sometimes multiple hashtags are defined or adopted for a single event or topic. Some of these hashtags may describe the subtopics of the event (Gao, Sang, Ren, & Xu, 2017). Sometimes during public health crises such as the coronavirus in 2020, people use hashtags (e.g., #coronavirusupdates or #coronaupdates) to find the most recent information that could include the actions taken by governments, statistics, recommendations, stories, and other information resources.

Organizing Information

Due to the lack of restriction on users for uploading information on social media, a large corpus of unstructured information gets quickly accumulated on social media in a short time (Brabham, 2012). Most of this unstructured information is not organized., making it almost impossible for human gatekeepers to quickly organize this seamless flow of information.

Hashtags can create the same levels of benefits as controlled vocabularies for organizing information on social media (Tonkin, 2008). Some researchers claim that hashtags were originally devised for organizing information on social media (Small, 2011). For instance, the diversity of information reduces over time (Santos-Neto et al., 2007) as users with the same interest come

together to form smaller sub-communities, contributing to the better organization of information in sub-communities.

Hashtags are appropriate for organizing information on diverse social media platforms. For instance, Instagram users can add relevant and meaningful hashtags in the captions or comments of posts to re-find their posts faster in the future. Associating Instagram posts with hashtags let users organize all the content (e.g., text, videos) in those posts, where they can view the content on a single page organized using hashtags. The hashtags associated with videos on YouTube also help users organize videos effectively (Huang, Thornton, Efthimiadis, 2010). Hashtags on Twitter connect users with other tweets about the same topic and help them organize personal tweets (e.g., the instructor declaring #ClassOfFall2020 as a new hashtag for all the class communication) (Shapp, 2014). Thus, information overload over social media can be mitigated by creating hashtags that help users organize information (Papadakis, Kyprianos, Karalis, & Douligeris, 2017).

Protecting Information

Hashtags can be used to mark inaccurate information to encourage users to verify the information before trusting and relying on it. For instance, users can label inaccurate content as fake news with hashtags like #FakeNews. After verifying the facts, users can also label them as #CorrectInformation, thereby encouraging its spread on social media. This set of actions can protect accurate information on social media.

Trending and viral hashtags may also be more indicative of misinformation and false facts than others. For example, Kouzy et al. (2020) found that "#2019_nCov" might be more associated with misinformation and unverifiable information than hashtags like "#nCov19" and "#COVID-19". In other words, the tweets that contain #COVID-19 or #nCov19, are more likely to contain reliable information.

Hashtags like #FakeNews can be used to collect and analyze the tweets and associated content to identify what is perceived as misinformation (Ribeiro, Calais, Almeida, & Meira Jr, 2017). Hashtags are also useful in designing systems for automatically detecting misinformation (Qazvinian, Rosengren, Radev, & Mei, 2011). For example, generating a hashtag co-occurrence graph can help to identify clusters or sets of closely related hashtags. Each cluster of co-occurred hashtags represent a unique topic and can be used to parse and collect associated tweets. The

collected tweets can be used as input to misinformation and rumor detection algorithms (Jain, Sharma, & Kaushal, 2016). Thus, hashtags can be used as search parameters in many machine learning models for classifying and detecting misinformation and fake news (Gupta, Lamba, Kumaraguru, & Joshi, 2013).

Implications

Theoretical Contributions

Past research on conventional gatekeeping in the pre-Internet era and network gatekeeping in the Internet era is centered around and considers individuals as gatekeepers. These studies find technology solutions like search engines, directories, categorizations, and hyperlinks as "gateway stations designed to attract the attention of gated and convey or direct them into or through channels (Barzilai-Nahon, 2009, p. 1498)." Thus, past research limits the role of technology solutions to channels that enable humans for gatekeeping. However, attracting the attention of gated and directing them through channels is not enough to form communities, or broadcast, discover, search, collect, organize, and protect information on social media. This study demonstrates the utility of technology solutions beyond channeling for information gatekeeping on social media.

The hierarchical gatekeeping model grounded in the communication research proposes the effects of five levels of factors on the content produced by media (Shoemaker & Reese, 2014). All levels operate hierarchically and influence lower levels, where ideological factors represent the highest level and individual factors act as the lowest level in the hierarchy. The five levels of factors are as follows: (1) ideological factors (e.g., one's political and religious beliefs), (2) external factors (i.e., the economic environment in which the media operate), (3) routines (i.e., established patterns of expectations and constraints that are common to most media organizations), (4) organizational factors (e.g., media organization's bureaucracy and policies), and (5) individual factors (e.g., characteristics of communicators and their personal and professional backgrounds). Each set of factors represents a distinct level of gatekeeping (Reese & Shoemaker, 2016).

However, the existing research on hierarchical gatekeeping does not take into account the effect of hashtags on content. Current study findings prove that hashtags can gatekeep the social

media content they are part of. Human gatekeepers like influencers, politicians, and organizational leaders define hashtags as part of the content on social media, wherein the name and purpose(s) of hashtags are directly affected by individual factors. Hashtags help humans implement gatekeeping mechanisms such as collecting and protecting information and setting and controlling the agenda of social and political movements, wherein hashtags serve as an interface between humans and social media content. Hence, researchers argue that hashtags, a technology solution, represent a new level of "technology factors" influencing hierarchical gatekeeping of the content on social media (see Figure 1).
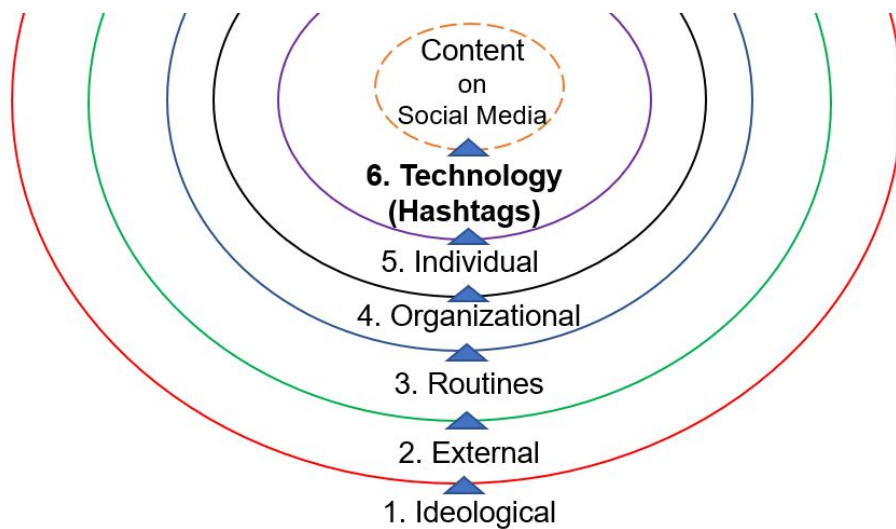

Figure 1. Hashtags Representing a New Level of "Technology Factors" Influencing Hierarchical Gatekeeping

Hashtags as "Information Anchors" for Online Communities

Anchors in society are the actors that play a significant role in the development and improvement of the quality of life and well-being of communities (Clopton & Finch, 2011). Their mission is to meet community members' needs by delivering public services (Billis, 2010). For instance, public libraries in the U.S. serve as anchors for local communities by facilitating social activities and engagement of diverse groups of patrons. Public libraries provide a platform and resources needed to fulfill the information needs of vulnerable populations (Mehra, Sikes, & Singh, 2019; Moxley & Abbas, 2016).

Anchors contribute to collective actions and help build group identities in society (Bridger & Alter, 2006; Clopton & Finch, 2011). In the same vein, hashtags act as information infrastructures (Zappavigna, 2011), facilitate dialogue (Bakshy et al., 2011), enhance the public understanding of global issues (Ribeiro et al., 2017), and address community challenges (Kouzy et al., 2020). Hashtags can guide schools, workplaces, and institutions on different topics during emergencies, or they can be used to filter out unreliable information (Ribeiro et al., 2017).

The anchoring role of hashtags enhances community empowerment (Berry et al., 2017). It is often challenging for vulnerable and marginalized communities to voice their opinions, come together, exchange ideas and stories, provide solutions, and spread their messages and concerns. Hashtags provide an opportunity and a virtual environment to address these challenges without affecting anybody else's freedom of uploading and sharing information. Tags that describe aspects of diversity such as diverse groups, topics, events, and identities (e.g. #BlackGirlMagic) can successfully serve as access points for finding diversity-related information (Clarke & Schoonmaker, 2019). Members of online communities use hashtags to learn about each other and to relate to communities, share their experiences or achievements with them, or obtain feedback (Teodoro & Naaman, 2013). Hashtags support collaborations and interactions that are difficult to take place in a more traditional world (Pei et al., 2015).

Information anchors are required for online communities to create large-scale information sharing opportunities for heterogeneous groups (e.g., crisis victims, healthcare professionals, government agencies) and enhance their engagement needed to solve grand challenges in society (Fuller, 2016). Online communities formed around hashtags establish and promote public health, social, political, or environmental agendas. Hashtags and the stories that form around them become part of people's social reality and inform their worldview (Hemsley, 2019). Thus, similar to the anchor role that public libraries play in local communities, hashtags through the provision of information and community support, have gained high credibility, trust, and attention among online communities (Alemanne, Mandel, & McClure, 2011; Xu et al., 2015).

Other Types of Metadata and Gatekeeping

Subject headings in library catalogs or controlled vocabulary thesauri like Medical Subject Headings and genres of the digital content on online entertainment platforms like Netflix and Amazon Prime are few more examples of technology-enabled metadata. Subject headings (e.g., motion pictures, education) describe or represent a topic or a concept and serve as index terms, tags, or umbrella terms (Library of Congress, 2020), which are defined by subject matter experts like catalogers. Similarly, genres (e.g., drama, thriller) are pre-defined by service providers on their entertainment platforms.

In contrast, anybody can define hashtags on social media platforms, irrespective of their subject matter expertise. Information service providers primarily use subject headings and genres for organizing information in their collection. Users can browse or search for subject headings and genres for reaching out to the desired information or exploring unknown information.

However, subject headings and genres do not lead to forming communities of users, and broadcasting or protecting information. Functionalities awarded to hashtags by coding at the backend of social media platforms (Ray & Bala, 2020) offer hashtags an edge over other types of metadata when gatekeeping information.

Conclusion, Limitations, and Future Research

Using interdisciplinary literature and perspectives, this paper proposes and demonstrates that technology-enabled metadata (i.e., hashtags) can perform gatekeeping of information on social media. The confirmation of hashtags as enablers of gatekeeping of information on social media (a) validates the utility and applicability of six gatekeeping mechanisms grounded in the conventional and networked gatekeeping literature, (b) suggests that hashtags manifest both conventional and networked gatekeeping, (c) demonstrates the role of technology solutions beyond channeling in gatekeeping, and (d) informs research on hierarchical gatekeeping. Study findings based on the analysis of the articles collected using two pearls in information science and communication make theoretical contributions to both disciplines.

Limitations of Hashtags

Spammers or bots can hijack popular hashtags for tweeting and retweeting irrelevant content or spreading misinformation on social media (Gupta & Kaushal, 2015). Such manipulation by bots or malicious users can lead to negative consequences (Robinson-García, Costas, Isett, Melkers, & Hicks, 2017). For example, political bots can manipulate and impact public opinions, enhance the social impact of politicians, cause artificial trends, and misdirect facts (Forelle, Howard, Monroy-Hernández, & Savage, 2015).

Future Research

In the future, we plan to investigate how user-defined hashtags differ from bot-defined hashtags in terms of the six gatekeeping mechanisms discussed in this paper. Future research can also investigate the role of hashtags in (a) forming and sustaining online communities and distinguishing boundaries among the communities, (b) setting the agenda of discussions on global topics, including public health emergencies, on online communities, and (c) framing issues associated with global topics and broadcasting them to the society. It might be worthy of strengthening the research strand of non-human centric gatekeeping by exploring how search engines, directories, algorithms, and hyperlinks possibly operate as gatekeepers on the Internet, and if and how they contribute to hierarchical gatekeeping.

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