Science communication by scientists and influencers on social media

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ABSTRACT

This study analyzes the shift in the science communication landscape, which is starting to be influenced by the presence of influencers on social media. Influencers who influence to construct audience opinions allow the birth of different interpretations of scientific information among the audience, especially the lay audience. These can be seen in the discussion about wildlife care tweeted by veterinarian Nur Purba Priambada who criticized influencer Alshad Ahmad. The reaction to Purbo's tweet shows that not all audiences agree with the scientific information shared by Purbo, even though Purbo has a scientific background. On the other side, some audiences support the influencer Alshad Ahmad who keeps the wildlife on his own. This study uses the netnographic method. This study aims to examines how science communication that takes place on social media affects audience reactions to scientific information shared by scientists and influencers, in this case, Purbo and Alshad Ahmad. The study result shows that the audience does not necessarily believe the information shared by people with scientific backgrounds in a scientific discussion on social media. Although some audiences believe the scientists' scientific information, other audiences trust the influencer more. This finding can be a consideration for scientists to develop an effective communication style on social media regarding scientific information to audiences, especially lay audiences.

Keywords: Audience; influencers; scientist; science communication; social media

Komunikasi sains oleh saintis dan influencer di media sosial

ABSTRAK

Studi ini menganalisis pergeseran lanskap komunikasi sains yang mulai dipengaruhi oleh kehadiran influencer di media sosial. Influencer yang memiliki pengaruh untuk mengonstruksi opini audiens memungkinkan lahirnya penafsiran yang berbeda terkait informasi sains di kalangan audiens, khususnya audiens awam. Hal ini terlihat pada diskusi soal pemeliharaan satwa liar di cuitan Twitter dokter hewan Nur Purba Priambada yang mengkritik influencer Alshad Ahmad. Reaksi terhadap cuitan Purbo menunjukkan tidak semua audiens sepakat dengan informasi sains yang dibagikan oleh Purbo meskipun Purbo memiliki latar belakang keilmuan sains. Di sisi sebaliknya, sebagian audiens menunjukkan dukungan terhadap influencer Alshad Ahmad yang memelihara satwa liar secara pribadi. Dengan menggunakan metode netnografi, studi ini bertujuan untuk mengkaji bagaimana komunikasi sains yang berlangsung di media sosial pada reaksi audiens terhadap informasi sains yang dibagikan oleh saintis dan influencer, dalam hal ini Purbo dan Alshad Ahmad. Hasil studi menunjukkan bahwa audiens tidak serta merta percaya informasi sains yang dibagikan oleh orang-orang dengan latar belakang keilmuan sains dalam diskusi tentang sains di media sosial. Meskipun sejumlah audiens percaya dengan informasi sains yang dibagikan oleh saintis, tetapi sebagian audiens lainnya lebih percaya pada influencer. Temuan ini dapat menjadi pertimbangan bagi saintis untuk mengembangkan gaya komunikasi yang efektif di media sosial mengenai informasi sains kepada audiens, khususnya audiens awam.

Kata-kata kunci: Audiens; influencer; media sosial; komunikasi sains; saintis

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INTRODUCTION

The transition from traditional media to new media, including online media, has changed the audience landscape in science communication (Brossard, 2013). In traditional science communication, the dissemination of scientific information is an exercise for professional scientists to present complex scientific findings to be more understandable so that the general public can access the scientific information. However, online media has blurred the boundaries between facts and opinions and public and professional communication (Brossard, 2013; Luzón, 2013). The online media landscape allows lay audiences to participate in science communication content, either by producing the content itself or commenting on posts about science (Brossard, 2013). Blurring boundaries between public and professional communication and opportunities for audiences to access science communication content allows for different understandings of scientific discourse (Luzón, 2013). This case is reflected in the discussion about wildlife care in the tweet of veterinarian Nur Purba Priambada, called Purbo, who criticized influencer Alshad Ahmad. He is an influencer who keeps wildlife and makes content on social media. On the other side, Purbo criticized him on Twitter. However, the reaction to Purbo's tweet shows that not all audiences agree with the scientific information shared by Purbo, even though Purbo has a scientific background.

In the academic field of research, science communication develops from various cross-disciplinary disciplines, such as sociology, humanities, psychology, linguistics, communication, and political science (Metcalfe, 2019). The dominant rhetoric of academic discussions describes the relationship between scientists and the public in communication. Brossard & Lewenstein suggested that science communication models are frameworks for understanding the problem in science communication and how to measure it and address it. The problem is the public's understanding of scientific information (Brossard & Lewenstein, 2010).

Brossard and Lewenstein also argued public could engage in science discussion at different levels, such as in a simple interaction with experts to discuss scientific issues, participating in different public discussions, and being given the authority for decision making about science policy (Brossard & Lewenstein, 2010). In the digital era, scientists use online media to exchange scientific knowledge through journal articles, uploads of updates from science conferences and meetings, and information about professional position opportunities and upcoming science events (Bik & Goldstein,

2013; Collins, Shiffman, & Rock, 2016). Based on a study conducted by Brossard, scientists and their institutions use several new media, such as Youtube, Facebook, and Twitter, to publish the scientific knowledge they produce (Brossard, 2013). Some scientists believe that Facebook is suitable as a medium of science communication to the general public, and others suggest that scientists only share science communications on Facebook with colleagues, family, or friends (Collins et al., 2016). On the other hand, scientists use Twitter to communicate specifically with other scientists. Some also use this platform as a forum to share their research directly with the public and the media and keep up with scientific developments and communication activities. According to Collins et al. (2016), the most benefit scientists feel from the Twitter platform is the size and diversity of the audience that Twitter can reach and the ability to network with other scientists. Google search also helps the general public to access complete information on many scientific topics. This condition shows that the expectations of science communication adoption in new media are getting higher (Collins et al., 2016).

Meanwhile, Brossard also found that younger scientists directly communicate with lay audiences to discuss scientific findings online (Brossard, 2013). That is because social media supports the exchange of information among its users (McQuail, 2005). At the same time, social media is also beneficial for scientists to help them develop research that may be influenced by public visibility and constructive conversations in online spaces (Bik & Goldstein, 2013). However, as previously mentioned, online communication has the potential to create different discourses among the audience, including science discourse. Therefore, it is necessary to understand how scientific knowledge is disseminated, mediated, and constructed in online media, especially how scientific discourse is re-contextualized online (Luzón, 2013). Brossard reveals that the online landscape for science communication is not as grim as it may initially seem (Brossard, 2013). Audiences choose scientific information actively and tend to consume scientific information from sources considered to have more expertise. Individuals also actively process science-related misinformation by considering the credibility of the information encountered (Brossard, 2013). This condition is also driven by science bloggers who spread various rhetorical strategies to contextualize scientific knowledge to diverse audiences, helping the public make the correct interpretation decisions (Luzón, 2013). It shows that the online scape has the potential to increase public knowledge of science with easier access than in previous decades (Brossard, 2013). Audiences who pay

attention to online science content are generally educated. However, Brossard argued that internet use and television use are thought to reduce the gap in scientific knowledge between groups with different levels of education. This condition is met by helping less-educated internet users acquire more scientific knowledge (Brossard, 2013).

Regardless, it is undeniable that information conveyed through mediated media can influence individual attitudes towards science through different routes (Brossard, 2013). Individuals process scientific information depending on the level of information and value systems they believe in (Brossard, Scheufele, Kim, & Lewenstein, 2009). This situation allows well-written and balanced scientific news to create different interpretations among audiences. Thus there needs to be a careful evaluation of how scientific information is presented, especially the format and type of context in which the information is shared (Brossard, 2013). In addition, each individual can disseminate mediated information to their network and start the process of social transmission to make information go viral with just a few clicks. This behavior significantly impacts the public's perception and a general understanding of science, ultimately affecting the power relationship between science and the public in science communication. That means

some challenges need attention in scientific communication in online spaces.

Besides the audience side, online science communication also faces challenges from the content creators' side. As previously mentioned, lay audiences also have the opportunity to produce scientific content, for example, bloggers. The phenomenon of science blogs has become a new practice that has attracted the attention of academics because of its interactive features that allow for a more direct and spontaneous exchange of information between writers and readers (Mahrt & Puschmann, 2014). Luzón (2013) argued that bloggers play a different role when communicating science. Bloggers can act as academics seeking to share scientific knowledge to portray themselves as expert reviewers. It could be done by critically analyzing scientific research publications and sharing and explaining science development issues to a public audience. The topic and language of blog posts can influence how audiences to comment, and, more likely, those will also affect the audiences who read them (Mahrt & Puschmann, 2014). The way bloggers communicate scientific knowledge has a persuasive resource of its own, as they relate abstractions of scientific knowledge to their own life experiences (Myers, 2003). When they comment on the research, they publish it on their blogs. These bloggers act as passive mediators

who simply share information and become actors in promoting public understanding of science and constructing public opinion on scientific issues (Luzón, 2013).

In the current era of social media, the role of science bloggers can be seen in the influencers' behavior. Influencers are treated like social media celebrities by their audiences. Karimah and Fadillah (2021) mentioned that influencers are a part of opinion leaders who can influence the views and preferences of the audience. Influencers need to earn trust from their audiences by having special skills to convince their followers of their background credibility through their branding on social media (Karimah & Fadillah, 2021; Sands, Campbell, Plangger, & Ferraro, 2022). Previous studies have found a variety of factors that affect influencers' popularity and credibility and the effectiveness of their endorsements, such as expertise and trustworthiness (Xiong, Cho, Law, & Lam, 2021); Perceived authenticity of influencer content (Pöyry, Pelkonen, Naumanen, & Laaksonen, 2019); the ability to build parasocial relationships with the audiences (Jin, Ryu, & Muqaddam, 2021; Reinikainen, Munnukka, Maity, & Luoma-aho, 2020). Pöyry et al. (2019) argued that authenticity is a negotiation for social media celebrities working within the online space industry conjuncture. This authenticity relates to presentation and self-concept that can be understood through attributes such as sincerity, authenticity, truthfulness, and originality. This behavior ultimately impacts their relationship with the audience. In this case, the audience will behave according to the values expressed by social media celebrities. Influencers build connections with their audiences through various means, such as greeting and having live conversations with their audience (Tolson, 2010), self-disclosure (Ferchaud, Grzeslo, Orme, & LaGroue, 2018), and sharing content regularly (Enke & Borchers, 2019), especially by showing photos of themselves. Posts that present the influencer's self-portraits increase the connection between the audience and the influencer because they contain a social presence (Jin et al., 2021). Those activities are known as parasocial interactions (PSI) by Horton & Wohl, which refers to the illusory interaction between the audience and the media persona.

Consequently, parasocial relationships are built (Horton & Wohl, 1956). The PSI concept was developed during the traditional media era, which did not allow reciprocity. However, new media allow for reciprocal interactions, which are thought to enhance further the parasocial experience (Reinikainen et al., 2020). For example, research by Frederick et al. found that the activity of athletes responding to audience interactions on social media enhances

the parasocial experience for that audience (Frederick, Lim, Clavio, & Walsh, 2012).

The influence of influencers can also be seen in science communication, one of which is Alshad Ahmad. He started sharing content about wildlife on Youtube in 2019. As of June 5, 2022, Alshad Ahmad's Youtube channel has 5.5 million subscribers and 298 videos. Apart from YouTube, Alshad Ahmad also shares his content via Instagram. His personal Instagram account has 3.2 million followers with 259 uploads. Wildlife that he keeps include deer, ostriches, peacocks, raccoons, tigers, and wolves. He claimed to have obtained official permission to breed wildlife in his captivity (Nursaniyah, 2022).

Alshad Ahmad's activities in caring for wild animals often attract the attention of netizens. The last time he was criticized was in April 2022, after he posted a comment about the deaths of three Sumatran tigers in East Aceh and linked it to his three tigers, Eshan, Jinora, and Selen. In his post, he wrote:

> Nature is indeed the best place to house animals like this, but right now, our forest is not doing well, guys. Still want to say to release Eshan, Jinora, and Selen back to nature?

However, many netizens attacked Purbo's tweet and defended Alshad Ahmad. One of those who criticized Alshad Ahmad was veterinarian Purbo, who expressed his criticism through uploads on his personal Twitter account @piyopikavet. Purbo, through his tweet, explained that Alshad Ahmad's activities are not conservation and are classified as a form of cruelty to wildlife. It is reflected in Purbo's tweet, which was uploaded on April 25, 2022. He wrote:

> You offended seeking tiger dead by snared but praise and impressed with an influencer caring wild animals. I don't understand. You are problematic.

In the reply section, many netizens criticized Purbo's comments with the argument that Alshad Ahmad already has a conservation permit and believes that the influencer's activities are a form of effort to save wildlife. The veterinarian often replies to netizens' critical tweets by providing explanations from his knowledge. Some netizens also added information about wildlife from a scientific point of view. However, some netizens continue to show their stance in favor of Alshad Ahmad and his activities to keep wildlife.

That condition shows that social media audiences trust influencers more than people with scientific backgrounds. This situation is a challenge for the world of science, how to spread education about science that is accurate and acceptable to the general public in online spaces. The science communication theory tries to see the relationship between scientists and the public in the communication process to know the

public's understanding of scientific information (Brossard & Lewenstein, 2010; Metcalfe, 2019). However, the social media landscape provides space for other communicators to construct audience opinions about scientific information, in this case, an influencer. Previous studies showed that social media effectively disseminate scientific information (Jia, Wang, Miao, & Zhu, 2017; Radin & Light, 2022). Other studies also examined the use of influencers in science communication (Kaul, Schrögel, & Humm, 2020; Rohden, 2021), but no studies examine the differences in audience reactions to science discourse conducted by scientists and influencers.

For this reason, this study wants to examine how science communication on social media affects audience reactions to scientific information shared by scientists and influencers. This study aims to see how audiences discuss scientific knowledge spread by scientists and influencers on social media and whether they trust the scientist or influencer more. This study focuses on the tweet of veterinarian Nur Purba Priambada through his Twitter account @piyopikavet, which criticized the activities of influencer Alshad Ahmad who raises liar animals. Purbo's tweet received various reactions from the Twitter audience, ranging from pro to contra arguments against his statement.

RESEARCH METHOD

This study used a qualitative approach to analyze the meaning of individuals and groups of social problems (Creswell, 2014). This approach uses an inductive inquiry style and focuses on interpreting situations. It is in line with the research objective to see how the audience discusses scientific knowledge disseminated by scientists and influencers on social media.

Data collection was carried out using netnographic methods, a qualitative research method used to understand the culture of social media users as recorded in traces, practices, networks, and social media systems (Kozinets, 2020). In this case, this study analyzed the culture of Twitter's audiences about scientific knowledge related to wildlife care.

The netnographic method uses four stages in its research: investigation, interaction, immersion, and integration. First, this study investigated to obtain the data site that will be used in the research. The data used in this study is the tweets of Twitter users who comment on Nur Purba Priambada's tweet (@piyopikavet) about the activities of wildlife care by Alshad Ahmad. Purbo is a veterinarian who started his career in 2010. Purbo criticized wildlife care activities by Alshad Ahmad last April 25, 2022. His tweet attracted Twitter users' reactions. When data

was collected on June 1, 2022, Purbo's tweets had 838 replies, 12.9K retweets, and 45.1K likes. Purbo's tweet was chosen as the object of research because the replies to Purbo's tweet accommodated the Twitter audience's reaction to the issue of wildlife care carried out by Alshad Ahmad. It means Purbo's tweets could answer research questions that want to see how the audience discusses scientific knowledge disseminated by scientists and influencers on social media. The study wanted to see if the digital space became a suitable place to be the scope of scientific discussion.

Furthermore, the research carried out data sorting (scouting) manually because no software can collect tweet replies from @piyopikavet, as shown in the attached screenshot. Data was collected by copy-paste the replies to the tweet above on June 1, 2022. From 838 replies, only 155 tweets were collected. The difference in the number of tweets may be due to personal accounts, deleted tweets, or other possibilities beyond the study's control. Then, this study selected the data (selecting) following the provisions put forward by Kozinets, relevance, activity, interactivity, richness, and diversity (Kozinets, 2020). For relevance, this study only took tweets that discussed the activities of wildlife care, in this case, tigers, by Alshad Ahmad. Tweets that did not address the topic were excluded from the study. Then, this study chose tweets with a minimum interaction of 1 reply/retweet/like to fulfill the interactivity aspect. This criterion is expected to show that tweets taken as research objects attract other social media users' attention. For the richness aspect, this study sets several criteria. Tweets in the form of original messages, not retweets

Source: Twitter, 2022

Figure 1 Tweet @piyopikavet about Wildlife Care Activities by Alshad Ahmad

from other users; tweets were at least four words long, and tweets that only indicated agreement or disagreement without explaining the arguments about wildlife care activities were excluded from the study. Thus, the researchers can further interpret the tweets used in this study. Finally, the study included tweets showing both pro and contra attitudes towards wildlife care activities to show the diversity of the data. By that, this study is expected to be able to cover views from both sides. This study did not consider the activity aspect in the data selection process. This study wants to see how Twitter users reacted to wildlife care activities by Alshad Ahmad. Therefore, all accounts with an opinion on this issue have the same right to be the object of research even though the account has a low activity frequency.

Data was saved (saving) in Ms. Excel and then coded (coding) based on specific themes using NVivo. Based on Kozinets, coding netnographic data means themes distribute the data to discover meaning (Kozinets, 2020). In this study, the data is distributed by three major themes: pro with influencers, with scientists, and neutral. Data that are pro-influencers are grouped under the theme "Defending the influencer," and data that is pro-scientist is grouped under the theme "Supporting the vet." Neutral data is included in the theme group "Asking for science education." According to

those considerations, this study got a total of 92 tweets. Further explanation will be discussed below.

RESULTS AND DISCUSSION

Based on coding results by NVivo, three major themes were found in the Twitter users' reactions to @piyopikavet or Purbo's tweets. The first theme is defending the influencer. A total of 45 tweets in the replies to Purbo's tweets defended the influencer, in this case, Alshad Ahmad. The form of defense of the influencer by the Twitter audiences consists of several types of behavior, such as criticizing veterinarians, comparing with other wildlife keepers, criticizing defenders of veterinarians, and believing that wildlife is better kept by individuals than released back into the wild. The next theme is supporting the vet. Some of the audiences were on Purbo's side. Several support forms for the veterinarian were found, such as criticizing the influencer, belittling influencer supporters, supporting the veterinarian's criticism of the influencer, criticizing wildlife cruelty activities, and educating about wildlife. Another theme found in this research is asking for science education. Several users replied to Purbo's tweet by asking about the rules and ethics that need to be applied regarding wildlife. In summary, the findings can be seen in the

Table 1 Results

	Theme		
	Defending the influencer	**Supporting the vet**	**Asking for science education**
Sub-theme	Criticizing the vet	Criticizing the influencer	Asking questions about wildlife protection
	Believe that wild animals are better kept	Underestimating influencer supporters	
	Criticizing the vet defenders	Supporting the vet criticism	
	Comparing with other wildlife keepers	Criticizing wildlife cruelty activities	
		Educating other audiences	

Source: Study Results, 2022

table 1.

The coding results showed that there are 18 replies to tweets from Twitter audiences criticizing the veterinarian, or in this case, Purbo. In this sub-theme, five tweets mentioned Purbo, who acts as the problematic party, four say Purbo does not understand anything, and four satirize Purbo. Most tweets showed that the audiences trust Alshad Ahmad more because they believe the influencer has an official license to keep wild animals privately. The audience used the license as a fundament to validate Alshad Ahmad's activities and used it as a benchmark in looking at wildlife care issues. With this belief, the audience rejected Purbo's argument and judged that Purbo was the one that did not understand wildlife issues.

On the other hand, this sub-theme also found three tweets that raised the issue of cruelty to other animals. The audience highlighted Purbo's attitude, which only discusses keeping wildlife private, even though there are still many cruel activities against wildlife. Then, there was one tweet that criticized the grammar in Purbo's argument and one tweet that apologized for criticizing Purbo, who is a veterinarian.

Furthermore, the next sub-theme believes that wildlife is better kept by individuals, in this case, Alshad Ahmad, rather than releasing them into the wild. In this sub-theme, the average Twitter audience argued that the condition of forests and other natural conditions in Indonesia is currently unsafe and has the potential to endanger the animals that live in them, including tigers. On the other side, some audiences said that wild animals in captivity

since birth are better kept because they will be much more dangerous if released into the forest. On average, the tweets belonging to this sub-theme often emphasize that Alshad Ahmad can take care of wild animals, including tigers. They believed an influencer better keeps wildlife rather than living in nature.

The next sub-theme is criticism of influencer supporters against the veterinarian. This sub-theme consisted of four tweets that think these veterinarian supporters just want to blame the influencer without actually caring about the wildlife care activities themselves. The last finding on this theme was a comparison with other wildlife keepers. Three tweets questioned audience criticism of Alshad Ahmad. Whereas before Alshad Ahmad, several public figures kept wild animals in their respective homes. In this sub-theme, tweets taken as objects of research give the impression that they think that netizens only want to attack influencers.

The next theme was supporting the veterinarian Purbo. This theme consisted of 43 tweets. Support for Purbo was expressed through various forms of expression, one of which was belittling Alshad Ahmad's supporters. This sub-theme was the one with the most tweets, which is 17 tweets. In this sub-theme, most Twitter audiences questioned the attitude of certain people who defend Alshad Ahmad's wildlife conservation activities. Most of the arguments in this sub-theme showed a disparaging sentiment toward the influencer Alshad Ahmad supporters. Some even questioned Alshad Ahmad supporters' level of knowledge.

Furthermore, two tweets claimed to have been attacked by Alshad Ahmad's fans for criticizing the influencer's activities. The next sub-theme is criticism directed at Alshad Ahmad, found in 14 tweets. A total of three tweets strongly criticized Alshad Ahmad's actions. They argued that wildlife's habitat is in the wild. If the ecosystem is damaged, then the ecosystem is the one that needs to be fixed. Caring for wild animals privately to keep them away from the wild is not a solution when the condition of the ecosystem is being damaged. Three other tweets questioned the behavior of Alshad Ahmad, who made his pet wildlife content. Apart from being risky, they also argued that Alshad Ahmad's content does not contain an educational value. Instead, it justifies wildlife care by individuals. One of the tweets recommended that Alshad Ahmad follow Tommy Winata, who built the Tambling Wildlife Nature Conservation (TWNC) area to protect, not keep, the wildlife himself. Some audiences mocked Alshad Ahmad. Some even asked other Twitter audiences to boycott Alshad Ahmad.

The next sub-theme is educating. A total of seven tweets contained explanations about

wildlife care that could educate the Twitter audience. The education included regulations on wildlife care, recommendations for educational content about wildlife, and reasons why support for individual wildlife care activities should not be normalized. Furthermore, two tweets went into the sub-theme criticizing wildlife cruelty activities and one that supported veterinarian Purbo's criticism of influencer Alshad Ahmad.

Another big theme found in this study was asking for education. A total of five tweets did not side with Purbo or Alshad Ahmad but asked about wildlife. Wildlife care activities, how the ability of wild animals after living in captivity for a long time, who is in charge of regulating wildlife care, and questions about the possibility of a discussion between Alshad Ahmad and Purbo.

From the findings, it could be seen that online media has blurred the line between public communication and professional communication regarding facts and opinions on scientific information, as stated by Brossard and Luzón. Audiences in the online landscape can process information and make their interpretations of scientific information which can ultimately increase public knowledge of science (Brossard, 2013; Luzón, 2013). However, the open participation space for lay audiences to comment on scientific information presents a different science discourse. It was

reflected in the different reactions of the Twitter audience to @piyopikavet's or Purbo's tweet that criticized Alshad Ahmad's activities in keeping wildlife. In this case, Purbo, from the scientific community, used his platform to communicate with lay audiences regarding scientific information to straighten out the scientific discourse that spreads in the online space (Brossard, 2013). However, not all online audiences believed the scientific information Purbo shared. From the data obtained, it could be seen that some of the audience supported Purbo's criticism, while others defended Alshad Ahmad's acts. That means the scientific background does not necessarily make the general audience agree with the arguments put forward by scientists. In contrast, information about science discourse shared by influencers is more acceptable to lay audiences. These differences in reactions indicate that there are different routes to individual attitudes in interpreting scientific information (Brossard, 2013).

Brossard et al. (2009) mention that people process scientific information based on the value systems they believe in. Therefore, when reviewing audience reactions to scientific information, it is necessary to look at their behavior in receiving scientific information that would affect the values they believe. Some of the audience showed that they had a good

basic knowledge of information science. It was reflected in several audiences' reactions who sided with Purbo. Their agreement was expressed through their support for Purbo, criticism towards Alshad Ahmad's defenders, and help to explain the ethics and regulations of keeping wildlife. That means audiences could accept Purbo's science communication with fundamental science knowledge. However, not all audiences have basic knowledge of science or could be called lay audiences. Lay audiences have a weak scientific information base. They could be easily influenced by non-credible scientific information. The science industry needs to monitor this group to ensure they receive credible and accountable scientific information.

One way that could be done to influence the audience's values is through the influencer's communication style. According to Karimah and Fadillah (2021), influencers can be opinion leaders who can influence the views and preferences of the audience. This ability is obtained in several ways, such as greeting and having live conversations with their audience (Tolson, 2010), self-disclosure (Ferchaud et al., 2018), and sharing content regularly (Enke & Borchers, 2019). The contents uploaded by Alshad Ahmad through his Instagram and Youtube channel meet those criteria. Alshad Ahmad regularly shares content about his

activities with wildlife. Alshad Ahmad also involves interacting with the audience and expressing his thoughts about his pet wildlife through captions on his content. Alshad Ahmad's ability to influence his audience is also supported by his content, which displays his self-portraits and his pet wildlife in the form of photos and videos. Some of his pet wildlife that he often publishes through his social media content are tigers named Eshan, Jinora, and Selen. According to Jin et al., content that features the influencer's self-portraits could increase connection with the audience because they contain a social presence (Jin et al., 2021). This presence has an essential role in building relationships between influencers and audiences. In addition, Alshad Ahmad's content also gives the impression of authenticity, which is reflected in his content that shows his closeness to his wild pet animals. This activity eventually has the potential to build a parasocial relationship between Alshad Ahmad and his audience, which in turn affects his popularity and the trust he gains from his audience (Jin et al., 2021; Pöyry et al., 2019; Reinikainen et al., 2020; Xiong et al., 2021).

The audience's trust in Alshad Ahmad was reflected in Purbo's tweet. Some audiences familiar with Alshad Ahmad's content show an attitude that supports Alshad Ahmad, for example, by believing that Alshad Ahmad

better keeps wild animals rather than being released back into the wild. This mindset was born from Alshad Ahmad, who often reveals that the natural ecosystems in Indonesia are not safe and dangerous for animals. It showed that Alshad Ahmad has succeeded in acting as a person with sufficient knowledge to communicate scientific information. It is in line with Luzón (2013) finding about science bloggers and Kaul et al. (2020) that influencers provide practical implementations of science communication that arise from the authenticity of the content shared. Alshad Ahmad shares and explains scientific development to the audience in a more interactive way by connecting the abstraction of scientific knowledge with his life experiences (Myers, 2003). This method is the specialty of his persuasive style to influence his audience's perspective. That means Alshad Ahmad did not only act as a passive mediator who merely shared information and became an actor in promoting scientific information for public understanding and constructing public opinion on scientific issues (Luzón, 2013).

The other impact of this phenomenon is that Alshad Ahmad's followers refused to believe the scientific information shared by Purbo. Moreover, the findings showed that some of the audience considered Purbo with limited scientific information, and others asked Purbo to improve his literacy related to scientific

insight. This finding showed that influencers have more influence on some lay audiences regarding scientific information when compared to scientists.

Contrary to Brossard's assumption that the online landscape is not grim for science communication, this finding indicated a threat to scientific information credibility circulating among audiences in the era of social media (Brossard, 2013). The findings showed that some audiences have an adequate understanding of science, for example, the ethics and regulations of wildlife care and the risks of keeping wild animals. The audience in this group showed an attitude that supported Purbo, a scientist. However, that was not the case for the lay audience. Influencers have a solid ability to shape public opinion and dominate control over the general audience's understanding of scientific information. This condition had the potential to threaten the role of scientists in communicating scientific information to lay audiences. The problem is that the influencers do not necessarily have an adequate understanding of science. A previous study by Moukarzel et al. showed that complex challenges exist when using influencers to spread scientific agendas due to the different interpretations by the influencers (Moukarzel et al., 2021). This founding indicated that influencers might be a hamper on scientific communication.

The founding of this study also threatens the science communication theory suggested by Brossard and Lewenstein (2010), which tries to see how the relationship between scientists and the public and the public's understanding of scientific issues. The founding showed that some audiences do not trust veterinarians. Instead, they support Alshad Ahmad's activity to keep the wildlife on his own. If scientists no longer have sufficient power to spread the correct scientific information to the public, the chances of public misunderstanding regarding science will be even greater. This condition is a challenge for the science industry in the era of social media, how to regain control over science communication in the online landscape to spread accurate scientific information to the public.

CONCLUSION

The study result shows that the audience does not necessarily believe the information shared by people with scientific backgrounds in a scientific discussion on social media. Social media allows the audience to explore scientific information by themselves. This condition presents a vast space for interpretation among the audience. Conversely, social media also gives birth to influencers who actively build parasocial relationships with their followers.

This behavior gives influencers the power to construct the opinions of their followers. That means social media allows the audience to receive scientific information differently, and this gap allows the audience to trust the scientific information provided by influencers more than scientists. It is proven by the audience's reactions toward Purbo and Alshad Ahmad. Although some audiences believed the scientific information shared by Purbo as a veterinarian shared, other audiences were more supportive of Alshad Ahmad. The latter keeps wild animals private and even criticizes Purbo. It proves that social media has shifted the landscape of science communication with the presence of influencers who have control to shape public opinion about scientific information. This condition becomes a challenge for the science industry, how to effectively communicate scientific information to the audience while ensuring that scientific knowledge circulating among the audience is true and correct information.

The findings of this study can contribute to academic studies related to science communication that focuses on the dissemination of scientific information among audiences by scientists and influencers. Previous studies have examined the effectiveness of using influencers in science communication. Still, none has compared the style of science communication between scientists and influencers and how the

general audience reacts to scientific information disseminated by both parties. For this reason, this study could fill the gap in academic studies.

Furthermore, practically, the findings of this study could be a consideration for scientists regarding how to develop an effective science communication strategy in targeting the audience, especially the lay audience. Scientists need to explore effective communication styles on social media. In this case, scientists can use influencers' communication styles, such as sharing content regularly, participating in the uploaded content, and conversing with the audience. Scientists can build trust from audiences, as happened with influencers, for the audiences to receive scientific information shared by scientists, both educated and lay audiences. The other way is to optimize the influencer's platform. Influencers already have massive followers, so scientists can collaborate by educating them about correct scientific information. That way, they can spread the correct information about science. In doing so, the science industry can maintain the credibility of scientific information circulating among the public.

However, this study has some limitations. This study only took audience reactions on Twitter related to wildlife care discussions. Alshad Ahmad actively uses other social media platforms, such as YouTube and Instagram, to share content about wildlife. Moreover, each social media has characteristics that can affect how the audience communicates. On the other side, the data in this study were collected manually, so there might be errors in the data results. Therefore, further studies could examine scientific communication by scientists and influencers on a broader social media platform with more powerful tools to obtain reliable data and convey a broader perspective.

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