Understanding environmental tweets of for-profits and nonprofits and their effects on user responses

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Abstract

Purpose – Organizations are communicating with the public about their thoughts and behaviors relevant to the environment via social networking sites. The purpose of this paper is to explore for-profit and nonprofit organizations' Twitter messages to understand their environment-related messages and their influences on the publics' responses.

Design/methodology/approach – This study conducted a content analysis adopting four message classification systems: environmental message orientation, message specificity, message framing, and environmental issue. Guided by attribution theory, this study also explored how the organization's environmental messages influence social media (Twitter) user responses, likes, retweets, and replies.

Findings – The analysis showed that for-profits' messages tend to discuss their green products and manufacturing processes with specific numeric evidence, while nonprofits are disposed to describe a severely degraded environment. In addition, the study revealed that tweets yield a high number of likes and replies when the organizations are for-profits and the messages emphasize green products.

Research limitations/implications – The findings of this study showed that the green message categorization systems are applicable to the social media context. But, this study focused on Twitter only. Future studies need to examine various social media platforms.

Practical implications – The study findings recommend communication practitioners use substantive green messages highlighting actual pro-environmental performances. Also, practitioners might need to make a linkage between the discussed environmental issue and the organization (e.g. a water issue by a wildlife-related nonprofit, an energy issue by a home appliance manufacturer, an air pollution issue by a bicycle company). In addition, regarding the message specificity, infographics can be present specific information that audiences can readily understand because it is described visually.

Originality/value – Scholars investigated environmental messages in advertising and cautioned that environmental messages that are not substantive or specific can cause audiences to perceive the messages as greenwashing. However, these previous studies focused on conventional media, and they have not been replicated in the age of social media. Thus, it is important to explore the current status of organizational environmental messages on social media.

Keywords Sustainability communications, Environmental messages, Social networking sites, Attribution theory

Paper type Research paper

Introduction

Organizations have given particular attention to discussing environmental issues with publics via various channels including annual sustainability reports, sustainability vision statements, organizing committees for sustainability, green advertising, and green campaigns (Allen, 2016). With the remarkable advance of Internet-based portable digital devices, social networking sites, generally called social media (e.g. Twitter, Facebook, Instagram), became one of the most popular media platforms (Hermida *et al.*, 2012). Individuals and organizations communicate about environmental issues with their followers via social media.

Individual social media accounts, in general, focus on a person's thoughts, feelings, and actions related to the environment, but organizational accounts discuss environmental initiatives of the group of people (e.g. firms, nonprofits, and governments) with their stakeholders. In addition, individuals are much higher than organizations in terms of the number of social media accounts, yet organizations post messages more frequently and have more followers than individuals; thus, organizational social media accounts tend to generate higher visibility than individual accounts (McCorriston *et al.*, 2015). The high visibility could mean a high communicative impact on people in society, which shows the importance of organizational environmental communication in social media. Nevertheless, academic studies have not sufficiently explained how organizations are addressing environmental issues through social media. This study fills the academic niche by observing organizational messages in Twitter, which is a major social media platform with worldwide reach. An *organizational environmental tweet* can be operationally defined as a unit of a Twitter message related to environmental issues, including verbal and visual information sent by an organizational account. An organizational environmental tweet is exposed to its followers, and the followers can interact with the tweet by pressing the Like icon, re-sending the tweet to their followers, or leaving comments on the tweet.

Some organizations mislead audiences by using vague and ambiguous messages or by omitting critical information from their environmental messages in order to establish a corporate green image without engaging in legitimate pro-environmental actions (Schmuck *et al.*, 2018). Corporations' repeated misleading or deceptive environmental messages can increase audiences' skepticism about environmental communication, and this prevalent negative perception tends to hinder organization managers' environmental communication (Allen, 2016). Scholars investigated environmental messages in advertising and cautioned that environmental messages that are not substantive or specific can cause audiences to perceive the messages as greenwashing since the 1990s (Carlson *et al.*, 1993; Davis, 1993; Bortree *et al.*, 2012; Schmuck *et al.*, 2018; Fernandes *et al.*, 2020). The studies on green messages have been developed and conducted in the traditional media environment, but few studies have focused on the social media environment. Social media are especially novel and have different features from conventional media (e.g. TV, radio, magazine, and newspaper). Unlike conventional media, social media messages use textual, verbal, and/or visual information and allow users to link with extensive information using hyperlinks and hashtags. In addition, users can interact with the message and message source through the like, share, and comment functions. These functional differences could yield unique features of social media communication. Thus, by applying the existing classification systems to a new context, academic and practical researchers can extent the applicability of the systems to social media and understand the current status of organizational environmental messages on social media.

Researchers (Lovejoy *et al.*, 2012; Saxton and Waters, 2014) have called for comprehensive study of organizational environmental messages in social media for both for-profit and nonprofit organizations with the reason that each type of organization has a distinctive approach to address environmental initiatives (Egri and Herman, 2000). By contrasting and comparing environmental communication patterns of for-profits with nonprofits, this study offers some guidelines for scholars and practitioners to better understand organizational environmental messages in social media.

Studies on organizational environmental messages have adopted the following message classification systems: (1) *message orientation*, which questions where the greenness is oriented among product, process, image, or nature (Carlson *et al.*, 1993; Bortree *et al.*, 2012; Shin and Ki, 2020); (2) *message specificity*, which focuses on how specifically the message explains the green object (Banerjee *et al.*, 1995; Schmuck *et al.*, 2018); (3) *message framing*, which is how the message frames green environmental problems and pro-environmental

behaviors (Davis, 1995; Lagomarsino *et al.*, 2020; Hu, 2012; Ganz and Grimes, 2018); and (4) *environmental issue*, meaning whether the message addresses specific environmental problems (Banerjee *et al.*, 1995). This study uses these four typologies to look into organizational environmental social media messages.

In the social media space, organizations can figure out followers' thoughts and feelings using technical functions such as like, share, and comment. Attribution theory can predict the influence of organizational environmental messages on social media responses. Attribution theory posits that people tend to infer the motivation for others' behaviors based on past and current behaviors and situations (Heider, 1958; Kelley, 1967; Weiner, 2011; Harvey *et al.*, 2014). Applied to this study context, the theory explains how a particular message type leads a social media user to attribute the organizational environmental message to intrinsic or extrinsic motivation of the environmental communication and how the perceived intrinsic or extrinsic motivation influences the number of likes, shares, and comments. This mechanism is described specifically in the Literature Review.

This study aims to understand the current trends of organizational environmental messages in social media and their influences on social media responses. To achieve the research goal, this study executes a content analysis on Twitter messages produced by for-profit and nonprofit organizations using four message typologies (environmental message orientation, message specificity, message framing, and environmental issues) and the subsequent responses (likes, shares, and comments) to the messages. The findings show contemporary organizational environmental message patterns on Twitter and provide guidance to for-profit and nonprofit communication practitioners for how to craft more effective message types to engage social media followers in their environmental communication.

Literature review
Organizational environmental message frameworks
Communication researchers have investigated a variety of message types in organizational environmental communication. These types can be generally segmented into four groups: (1) message orientation (product, process, image, and environmental fact); (2) message specificity (vague or specific), (3) message framing (gain/loss, current/future generations, taking less/doing more, and individual/environmental benefits), and (4) environmental issues.

Message orientation. Green message orientation was introduced by (Carlson *et al.*, 1993) with a definition that message orientation is the object that an environmental message mainly addresses. Message orientation has four sub-groups: (1) *product*, which is a message emphasizing that a product is environmentally friendly (e.g. "this product is biodegradable"); (2) *process*, in which the message asserts that a manufacturing process or work environment is environmentally friendly (e.g. "we produced 50% less greenhouse gases to make this product compared to last year"); (3) *image*, which indicates that the message focuses on the organization's philosophies and future sustainability plans (e.g. "all employees aim to contribute to environmental protection"); and (4) *environmental facts*, including messages about the degraded status of the environment (e.g. "wild animal species are suffering from environmental pollution"; Carlson *et al.*, 1996). Carlson *et al.* (1996) expounded that product and process are substantive claims describing concrete pro-environmental benefits, and image and environmental facts are associative claims that intend to make a connection between the organization and a green image or the environment itself without using visible pro-environmental outcomes. Carlson *et al.* also noted that associative claims could evoke deceptive green communication. Empirical studies have shown that US advertising more often uses substantive environmental claims than associative environmental claims

(Carlson *et al.*, 1993, 1996; Cummins *et al.*, 2014). However, a relatively recent study (Segev *et al.*, 2016) showed associative messages (53%) are slightly more often used than substantive statements in ads (47%). The inconsistent results call for additional studies for agreement on this study area.

Message specificity. Message specificity can be defined as the degree in which the description about a product, action, person, and idea is detailed providing supportive information. Specific messages address consumer benefits in detail with useful information while vague messages explain the benefits with "abstract, general, or ambiguous wordings (Ganz and Grimes, 2018)." For example, a specific claim would state, "This product is made of 100% recycled materials including cardboard, newspaper, and paper," while a vague massage would say, "This product is environmentally friendly." Scholars have examined the specificity of organizational environmental messages (Alniacik and Yilmaz, 2012; Davis, 1993; Iyer *et al.*, 1994). Scholars argue that message specificity is important because vague and ambiguous green messages could make stakeholders perceive that the message is deceptive and manipulative even if it is not (Allen, 2016; Ganz and Grimes, 2018). However, vague messages have been more common in past green advertising (Banerjee *et al.*, 1995; Carlson *et al.*, 1993). This current study will see whether vague green messages are still predominant in the current media.

Message framing. The environmental message frames in which scholars have been interested were *problem*, *target*, and *activity* that were introduced by Davis (1995). Problem framing is also known as *gain* and *loss* framing. Gain frame emphasizes the benefits resulting from a certain pro-environmental behavior, while loss frame highlights the negative effect of a particular anti-environmental behavior. Segev *et al.* (2016) showed gain frame, compared to loss frame, increases attitude toward the ad, attitude toward the brand, and purchase intention. Target framing is related to the target group who receives a negative or positive consequence as a result of action or inaction (Davis, 1995). These consequences could be presented within a short- or long-term context, so the consequence receivers could be the *current generation* or *future generation* (Davis, 1995). The long-/short-term framing may influence an individual's long-term orientation. The long-term orientation positively affects attitude toward the environment in general (Nguyen *et al.*, 2017). Activity framing explains the approaches to abide by the recommended pro-environmental behavior (Davis, 1995). There are two approaches: *taking less* or restraining anti-environmental behaviors (e.g. turning lights off) and *doing more* or suggesting pro-environmental behaviors (e.g. recycling). Compared to take less frame, doing more frame is likely to increase environmental concerns, message attitude, and intention to follow the message's recommended behavior (Bhatnagar and McKay-Nesbitt, 2016). Scholars have studied on the effects of message frames on consumer responses, but content analytic research to understand the current use of the message frames has been ignored.

In addition to the three framings suggested by Davis, scholars argued that environmental messages explicate whether the benefits resulting from a recommended behavior are for individuals or the environment (Hu, 2012; Jäger and Weber, 2020; Cummins *et al.*, 2014). *Individual benefit* refers to the benefit that an individual will receive because of recommended behaviors (e.g. a hybrid car leads to saving money on fuel) and *environmental benefit* refers to environmental improvement thanks to the recommended behavior (e.g. a hybrid car can help reduce pollutant gases in the atmosphere). Generally, the individual benefit frame is more useful to increase consumer responses than the environmental benefit frame (Hu, 2012).

Content analytic studies have shed new light on the first three framing types (Bortree *et al.*, 2012, 2013). Bortree and colleagues analyzed environmental advertisements published in *National Geographic* over the past 30 years (1979–2008) and determined that gain, current generation, and doing-more frames were used more frequently than their counterpart frames. However, not all empirical studies argue message frame is effective for persuasion.

Kumble and Diddi (2017) showed that gain/loss and individual/environmental benefit frames cannot make any difference to consumer responses.

Environmental issue. Scholars have also analyzed types of environmental issues discussed in organizational communication (Banerjee *et al.*, 1995; Bortree *et al.*, 2012, 2013; Iyer *et al.*, 1994; Peterson, 1991). Categorizations varied study-by-study and the results were also different. However, examining current major environmental issues is necessary to understand green messages of the contemporary organizations.

Organizational environmental messages on social media

While social media is a relatively new and popular communication platform, a few attempts have been made to understand the nature of organizational environmental messages in this platform. Lyon and Montgomery (2013) suggested a proposition that "Firms will tend to use social media to communicate about their greenest products" (p. 755), but this was not empirically tested in their study. Manetti and Bellucci (2016) revealed that only a small number of organizations address the contents of social, environmental, or sustainability reporting (SESR) through social media and stakeholders' engagement with the messages was low. Hopps (2013) analyzed Facebook and Twitter sustainability messages posted by universities and indicated that teaching-driven messages were the most common (27%) and followed by curiosity-driven (19%), competition-driven (15%), promotional/profit-driven (15%), politically-driven (12%), and excitement-driven (11%) messages [1]. However, these studies are not sufficient to understand for-profit and nonprofit organizations' sustainability social media messages. To fill this research gap, this study analyzed organizational environmental messages applying the aforementioned green message categories with the following research question:

RQ1. On social media, how do organizations develop their environmental messages in terms of message orientation, message specificity, message framing, and environmental issue?

Environmental social media messages of for-profit and nonprofit organizations

Although both for-profit and nonprofit organizations use social media to communicate environmental issues with publics, the environmental messages of these two organizations in social media may be different. In general, for-profit organizations pursue economic benefits, while nonprofit organizations aim to achieve pro-social benefits. Green advertising messages communicated by for-profit organizations are often vague and use product and image orientation, while those from nonprofit organizations are specific and focused on publics' pro-environmental behaviors (Banerjee *et al.*, 1995; Iyer *et al.*, 1994). Among nonprofit organizations, advocacy organizations—which promote and address environmental issues—generally focus on publics' green lifestyle, while organizations that support industries and businesses emphasize organizational aspects (Bortree *et al.*, 2012). However, previous studies on organizational environmental message differences across non/for-profit organizations were conducted more than 20 years ago. Therefore, this study explores the current differences and similarities of organizational environmental messages between for-profit and nonprofit organizations using the following research question as a guide:

RQ2. What are the differences and similarities in organizational environmental social media messages between for-profit and nonprofit organizations?

Social media responses

Social media make two-way symmetric communication more possible and feasible than other online communication, such as blogs and websites (Lyon and Montgomery, 2013). The two-way symmetric communication model means that organizations and publics both participate

in communication simultaneously and are involved in organizational decision-making, which positively affects relationship building (Morsing and Schultz, 2006). Some social media sites have several common functional features (e.g. posting, liking, sharing, commenting, following) that enable two-way communication and allow communication practitioners to use social media as a channel for building positive relationships with stakeholders (Valentini, 2015).

On social media, people tend to express their opinions to an organization by responding to the organization's uploaded posts using like, share, and comment functions. These responses can be influenced by attributes of the message (e.g. message orientation, message specificity, message framing, and specific environmental issue). For example, Saxton and Waters (2014) analyzed these three responses based on nonprofit organizations' Twitter message types (information, community-building, call-to-action, fundraising, and event/promotion) and found that information, community-building, and call-to-action messages gained the most retweets, likes, and replies, respectively. In terms of the comments, scholars examined not only the number of comments but also the valance of comments because the positive/negative moods of stakeholders are important information for organization managers (Bollen et al., 2011; Bonsón and Ratkai, 2013; Takagi et al., 2011). The influences of organizational environmental messages on social media responses can be explained by attribution theory.

Attribution theory

Attribution theory explains the cognitive process by which people attribute others' behavior to a cause (McDermott, 2009). There are two attribution processes: internal attributions and external attributions. When an observer infers that another's behavior is intrinsically motivated (e.g. personality, attitude, upbringing), internal attribution occurs. When the observer considers the cause of another's behavior to be a situational factor, external attribution occurs. Message orientation may affect the attribution process.

In the attribution process, an audience may determine the reasons the organization is sending an environmental message by comparing past and current behaviors (Kelley, 1967, 1972). When past and current behaviors are both environmentally friendly (specific and substantive claims: a specific green message oriented in a green product or a green process), the recipient may attribute the current behavior (a green message) to an intrinsic motive such as strong organizational environmentalism [2]. This process is referred to as an internal attribution process (Shin and Ki, 2020). However, when only the current behavior is related to the environment, without sufficient and specific evidence of past green behaviors, the recipient may attribute the current behavior to external reasons such as sustainability trends. This reasoning can be considered as an external attribution process (Shin and Ki, 2020). Leonidou and Skarmeas (2017) showed that a firm's history of pro-environmental initiatives (e.g. green products, environmental practices) lead stakeholders to perceive that the green initiatives attributed to an intrinsic motive.

The internal attribution process may generate positive influences on the recipient's perceptions about the received message and the organization because perceived intrinsic motivation may satisfy the desired ideal image of organizations. That is, people are more likely to have favorable attitudes and strong trust toward ethical and socially responsible organizations (Castaldo et al., 2009; Mohr et al., 2001). On the other hand, the external attribution process may lead to negative outcomes because they will have less trust toward organizations they think are not ethical and socially responsible. Shin and Ki (2020) revealed that the internal attribution positively and the external attribution negatively influence attitude toward the organization's green message. Furthermore, Leonidou and Skarmeas (2017) indicated that the internal attribution negatively affects green skepticism, which turns in to decrease negative word-of-mouth.

Studies have studied the direct influences of message substantiation and specificity on audience responses. They argued the substantive messages increase attitudes toward the advertisement, brand, and product, and purchase intention (Kim and Han, 2015; Hu, 2012) and specific claims are likely to increase communication effectiveness (Alniacik and Yilmaz, 2012; Ganz and Grimes, 2018). Guided by attribution theory and the empirical studies, this current study explores how organizational environmental messages influence social media responses with the following research question:

> *RQ3.* How do message orientation and specificity on social media influence social media responses (likes, shares, and comments)?

Methods

To answer the three research questions, this study uses content analysis. This research method is appropriate to understand organizational environmental messages on social media because the purpose of content analysis is "to identify and count the occurrence of specified characteristics or dimensions of texts, and, through this, to be able to say something about the messages, images, and representations of such texts and their wider social significance" (Hansen and Machin, 2013, p. 89). In addition, content analysis is suitable to analyze messages in new digital media and associated computer-mediated media (Hansen and Machin, 2013). In particular, to investigate the presence of classified messages in terms of a certain issue or idea (e.g. environmental protection), the content analytic method is legitimate (Riffe *et al.*, 2019).

Message sampling

Time period of sample content. The sample universe is purposefully limited to a specific time period (2 years; November 2014–October 2016). During these two years, there were several national and super-national events related to sustainable development. On March 19, 2015, the Obama administration announced an executive order related to federal government plans for sustainability in the next decade. During Sept. 25–27, 2015, the 193 member states of the United Nations achieved consensus on a new sustainable development agenda for the next 15 years. On January 1, 2016, the United Nations officially proclaimed 17 Sustainable Development Goals (SGDs). This agreement among world leaders and governmental planning may have influenced the communication agenda at national, organizational, and even individual levels (Finnemore, 1993). Thus, the current research assumes that organizational interest in sustainability increased more during these two years and was reflected in organizational communication.

Communication source. A total of 100 organizations (50 for-profit and 50 nonprofit) were chosen for the study sample. The 50 for-profit organizations were randomly extracted from the Fortune 500 list (Fortune, 2016). The Fortune 500 has been regarded as a reputable list for communication researchers (Fraustino and Connolly-Ahern, 2015; Hashmi *et al.*, 2015). Specifically, this study randomly chose 50 from the 500 units using the "RAND ()" formula in Excel. For the nonprofit organization sample, this study randomly selected 50 units from the Top 100 Largest Nonprofits list published by the *Non Profit Times* (Hrywna, 2015) as other studies have done previously (Lovejoy *et al.*, 2012; Saxton and Waters, 2014).

Communication channel. Twitter was selected as a communication channel for four reasons. First, Twitter has been one of the most popular social media platforms for the last decade and still has a large number of users (i.e. 330 million monthly active users as of May 30, 2020). Organizations communicate with a massive number of stakeholders through Twitter. Second, organizations use this social media site more actively than other sites, with 76% using Twitter (Stelzner, 2016). Third, Twitter users are tend to use the platform to receive news. Barthel *et al.* (2015) found that 55% of Twitter users use it to receive business news.

Fourth, Twitter could be an effective channel for organizations to send their messages to followers. All tweets of a user appear in the timelines of all his/her followers. These features made Twitter valid as a sample media channel to investigate the research claims.

Unit of analysis. The unit of analysis is a message sent or posted by an organization. This message is called a tweet in Twitter. All textual content, visual content, and responses to the content (comments, shares, and likes) under a tweet are included in the unit of analysis. If textual information is represented in a picture, the information was analyzed. However, any linked information, information in an embedded video, and shared (retweeted) messages by the organization were excluded from analysis.

Using the Advanced Search of Twitter (https://twitter.com/search-advanced), a researcher gathered all environmental messages posted by the sample organizations on social media. The search keywords were the following: air, atmosphere, biosphere, clean, conserve, climate change, CSR, Earth, eco, energy, environment, global warming, green, nature, planet, pollute, protect, recycle, sustain, save, water, and wildlife. The process for sorting the messages had two phases. First, all messages including one or more keywords were gathered. Second, the researcher manually selected the final sample by reading all the messages chosen in the first round. This study did not analyze all gathered messages; instead, this study took the 15 most recent messages produced by an organization. This is because some organizations may republish multiple or even repetitive green messages on social media, but some may not. This unbalanced message distribution could affect results. The researcher created a Twitter account for this research. He clicked the hart icons (favorites) of green tweets in a particular organization. After that, the researcher saved all favorite tweets of the organization as a PDF. Coders used the PDF files for their coding.

Coding. As recommended by Lacy *et al.* (2015), this study executed coder training, coding, and reliability testing. Two coders classified the gathered messages. Before starting to code the messages, the coders were trained to understand the coding scheme. To become familiar with the messages and coding scheme, they practiced coding some messages that are not included in the final sample. Coders coded Twitter messages using a digital codebook into a coding sheet which is an Excel file. After the training session, intercoder reliability was calculated. Coders coded 104 identical messages, or 17% of all analyzed messages. Three tests—Scott's pi (Scott, 1955), Cohen's kappa (Cohen, 1960), and Krippendorff's alpha (Krippendorff, 2013)—evaluated intercoder reliability. The overall reliability coefficient was 0.96 (98.3% agreement) and this result was the same across the three coefficient tests [3]. Most of the coefficients were in the acceptable level range (generally, 0.80 is the minimum acceptable level of intercoder reliability; Lacy *et al.*, 2015).

Classification systems

Environmental message orientation. Message orientation indicates what aspect of environmental issues the message claim is oriented to. This study used the four types of green message orientations suggested by Carlson *et al.* (1993): product orientation, process orientation, image orientation, and environmental fact. Table 1 shows each message category's operational definitions and examples. This measurement checked the presence of each message type: 0 = absence; 1 = presence.

Message specificity. The message specificity variable is associated with how specifically a green message describes a green issue. This study adopts classifications and definitions from three studies (Carlson *et al.*, 1993; Davis, 1993; Segev *et al.*, 2016). The operational definitions of vague and specific messages were adapted from Carlson *et al.* (1993) and Davis (1993), respectively (see Table 1). Coders coded whether vague and/or specific green messages existed in each green message (0 = absence; 1 = presence).

Message orientation
(1) Product orientation: The claim focuses on the environmentally friendly attributes of a product. Example: "The product is 100% biodegradable"
(2) Process orientation: The claim deals with an organization's internal technology, production technique and/or disposal method that yield environmental benefits. Example: "We have reduced toxic gases during the manufacturing process"
(3) Image orientation: The claim associates an organization with an environmental cause or activity for which there is broad-based public support. The claim is symbolic, future-oriented, or recommends green behaviors for internal/external stakeholders. Example: "We are committed to preserving our forests"
(4) Environmental fact: The claim involves an independent statement that is ostensibly factual in nature from an organization about the environment at large, or its condition. Example: "Countless wild animals around world are suffering from climate change"

Message specificity

(1) Vague: The claim is vague or ambiguous; it contains a phase or statement that is too broad to have a clear meaning. Example: "The product is environmentally friendly"
(2) Specific: The claim provides detailed and useful information. Example: "The process reduces emission by 21%" as opposed to "reduces emission"

Message framing
Problem framing
(1) Gain: The message emphasizes the benefits from pro-environmental behaviors. Example: "Energy conservation helps us to save money"
(2) Loss: The message emphasizes loss avoidable by doing pro-environmental behaviors. Example: "If we do not stop. using fossil fuels, climate changes will worsen"
Target framing
(1) Current generation: The message indicates that the current generation is in danger because of the degraded environment or is beneficial because of the clean environment. Example: "Many people around the world are now suffering from natural disasters caused by climate change"
(2) Future generation: The message indicates that the future generation will be in danger because of the degraded environment or will be beneficial because of the clean environment. Example: "If we keep using petroleum as fuel, crude oil supplies will be depleted in 50 years"
Action framing
(1) Taking less: The message suggests that stakeholders not engage in anti-environmental behaviors. Example: "After washing your hands, just two paper towels are enough"
(2) Doing more: The message suggests that stakeholders engage in pro-environmental behaviors. Example: "Recycling makes the Earth green"
Benefit framing
(1) Environment: The message states that the environment can be improved by doing pro-environmental behaviors. Example: "Rivers are dying. Why do not you use biodegradable detergent?"
(2) Individual: The message states that stakeholders can personally benefit by doing pro-environmental behaviors. Example: "Turn off the lights and save money"

Table 1.
Coding scheme of
green message
orientation

Message framing. Four variables were used to classify environmental message frames: *problem*, *target*, *activity*, and *benefit*. The first three were adopted from Davis (1995) and the last one was adopted from (Hu, 2012). The first message frame, problem framing, represents the benefit resulting from pro-environmental behavior or the loss caused by anti-environmental behaviors. The second message frame, target faming, focuses on whether the target of the negative environmental impacts is the *current generation* or *future generation*. Activity framing suggests appropriate actions that recommend engaging in fewer anti-environmental behaviors (*taking less*) or more pro-environmental behaviors (*doing more*). Benefit framing accounts for whether the pro-environmental behavior is for an *individual* or the *environment*. For these eight categories, presence was measured (0 = absence; 1 = presence).

Environmental issue. For the environmental issue variable, this study adopted the classification system used by Banerjee *et al.* (1995) and added a category (energy) from

Bortree *et al.* (2012). The classification system consists of: (1) *air* (e.g. greenhouse gas, greenhouse effect, climate change, ozone pollution, fine dust, carbon emission, etc.); (2) *water* (e.g. food processing waste, chemical waste as industrial byproducts, petroleum hydrocarbons, insecticide, etc.); (3) *land* (e.g. deterioration of land surfaces, waste landfill, recycling, etc.); (4) *wildlife* (e.g. animal disease, depopulation, habitat destruction, etc.); (5) *plant* (e.g. forest fire, plant disease, illegal logging, deforestation, etc.); (6) *energy* (e.g. natural resource depletion, energy saving, etc.); and (7) *general* (e.g. protection of environment, nature conservation, etc.). Each issue was coded as 0 (absence) or 1 (presence).

Social media responses. Researchers measured three variables of public responses to organizational sustainability messages: the number of likes, the number of retweets, and the number of replies. All these variables are ratio variables. The number of likes indicates the number of those who expressed their favorable attitude toward the message. The number of retweets means how many Twitter users shared the message. The number of replies is the number of comments Twitter users left in response to the message. The numbers of likes, shares, and replies appear below the message on the webpage and can be seen by everyone.

In addition, coders analyzed the valences of each reply. The valences were categorized as negative, neutral, and positive. Valence of each reply for a tweet was coded to -1 (negative), 0 (neutral), and 1 (positive). All valences of all replies for each tweet were aggregated and the calculated value was used to evaluate the effect of message types on reply valences.

Results

The number of organizations sending environmental Twitter messages among the organizations having a Twitter account was not statistically different between for-profit and nonprofit organizations. Forty-eight (96%) for-profits and 50 (100%) nonprofits had a Twitter account and among them, 37 (77%) for-profits and 40 (80%) nonprofits sent one or more environmental Twitter messages over the period under study. A total of 77 organizations are listed in the Appendix. Of the 77 organizations, a total of 611 environmental messages were analyzed. There were 339 (65.3%) messages from for-profits and 272 (44.5%) from nonprofits.

Green message content

Green message orientation. The first research question addressed the frequency of the four green message orientations in organizational tweets. Image orientation ($n = 389, 63.3\%$) was the most prevalent, followed by process orientation ($n = 121, 19.6\%$), product orientation ($n = 57, 9.3\%$), and environmental facts ($n = 48, 7.8\%$). Thus, associative messages including image orientation and environmental facts ($n = 437, 71.5\%$) were more common than substantive messages including product and process orientations ($n = 174, 28.5\%$).

Interestingly, substantive messages were more frequently used by for-profit organizations than nonprofit organizations ($n = 127, 37.5\%$ for-profits vs. $n = 47, 17.3\%$ nonprofits; $X^2 = 30.18, p < 0.001$); by contrast, associative messages were more frequently used by nonprofits than for-profits ($n = 212, 62.5\%$ for-profits vs. $n = 225, 82.7\%$ nonprofits; $X^2 = 30.18, p < 0.001$). For each individual orientation, the results of chi-square analysis significantly supported that product orientation ($X^2 = 10.14, p < 0.01$) and process orientation ($X^2 = 16.47, p < 0.001$) are more frequently used by for-profit organizations, while image orientation ($X^2 = 2.53, p = 0.066$) and environmental facts ($X^2 = 42.83, p < 0.001$) are more frequently used by nonprofit organizations. Table 2 presents the differences of frequency across these two organization types in terms of each orientation.

	Total	Green messages of for-profits ($N = 339$) n (%)	Green messages of nonprofits ($N = 272$) n (%)	X^2
Message orientation				
Product	57 (9.3)	*43 (12.6)*	14 (5.1)	10.136[**]
Process	121 (19.6)	*87 (25.6)*	34 (12.4)	16.466[***]
Image	390 (63.3)	207 (60.5)	183 (66.8)	2.527
Environmental fact	48 (7.8)	5 (1.5)	*43 (15.7)*	42.834[***]
Total	616 (100.0)	342 (100.0)	274 (100.0)	
Message specificity				
Vague	489 (80.0)	258 (76.1)	*231 (84.9)*	7.347[**]
Specific	122 (20.0)	*81 (23.9)*	41 (15.1)	7.347[**]
Total		339 (100.0)	272 (100.0)	
Framing				
Gain	17 (15.0)	*15 (18.1)*	2 (6.7)	7.595[**]
Loss	1 (0.9)	1 (1.2)	0 (0.0)	0.804
Current generation	25 (22.1)	*19 (22.9)*	6 (20.0)	4.443[*]
Future generation	0 (0.0)	0 (0.0)	0 (0.0)	0
Taking less	6 (5.3)	4 (4.8)	2 (6.7)	0.307
Doing more	33 (29.2)	20 (24.1)	13 (43.3)	0.371
Environmental benefit	22 (19.5)	15 (18.1)	7 (23.3)	1.490
Individual benefit	9 (8.0)	*9 (10.8)*	0 (0.0)	7.329[**]
Total	113 (100.0)	83 (100.0)	30 (100.0)	
Environmental issues				
Air	88 (13.6)	33 (9.3)	*55 (18.9)*	13.460[***]
Water	59 (9.1)	19 (5.4)	*40 (13.7)*	14.329[***]
Land	81 (12.5)	49 (13.8)	32 (11.0)	0.949
Wildlife	45 (7.0)	5 (1.4)	*40 (13.7)*	38.722[***]
Plant	29 (4.5)	9 (2.5)	*20 (6.9)*	7.368[**]
Energy	124 (19.2)	*88 (24.8)*	36 (12.4)	15.103[***]
General	220 (34.1)	*152 (42.8)*	68 (23.4)	25.775[***]
Total	646 (100.0)	355 (100.0)	291 (100.0)	
Additional features in content				
Pictures	391 (26.8)	*230 (27.7)*	161 (25.6)	4.907[*]
Videos	22 (1.5)	*21 (2.5)*	1 (0.2)	14.763[***]
Hyperlinks	388 (26.6)	*239 (28.8)*	149 (23.7)	16.095[***]
Tags	155 (10.6)	82 (9.9)	73 (11.6)	0.560
Hashtags	407 (27.9)	231 (27.8)	176 (28.0)	0.801
Total	1,459 (100.0)	830 (100.0)	629 (100.0)	

Note(s): 48 for-profit organizations; 50 nonprofit organizations. The italic values means the corresponding type of organization (for-profit or nonprofit) gained significantly more values than the counterpart type of organization. [***]$p < 0.001$; [**]$p < 0.01$; [*]$p < 0.05$

Green message specificity. There were 489 (80%) vague messages and 122 (20%) specific messages. A Chi-square test revealed that vague messages were more common in nonprofits' tweets than in for-profits' tweets ($X^2 = 7.35$, $p < 0.01$), and specific messages were more common in for-profits' tweets ($X^2 = 7.35$, $p < 0.01$).

Green message framing. This study measured the presence of the four types of green message framing: gain/loss, current/future generations, taking less/doing more, and individual/environmental benefits. Only 42 (6.9%) out of all 611 messages adopted one or

more message framings. Doing more framing ($n = 33$, 29.2%) was the most frequently found among all coded framings, followed by current generation framing ($n = 25$, 22.1%), environmental benefits framing ($n = 22$, 19.5%), and gain framing ($n = 17$, 15.0%). For-profits more often used gain framing ($n = 15$, 2.4% for for-profits vs. $n = 2$, 0.7% for nonprofits; $X^2 = 7.60$, $p < 0.01$) and current generation framing ($n = 19$, 5.6% for for-profit vs. $n = 6$, 2.2% for nonprofits; $X^2 = 3.44$, $p < 0.05$) than nonprofits. However, use of the other framings was not significantly different between for-profits and non-profits.

Environmental issues. Overall, general environmental issues ($n = 220$, 34.1%) were the most frequently used in organizational tweets, followed by energy ($n = 124$, 19.2%), air ($n = 88$, 13.6%), land ($n = 81$, 12.5%), water ($n = 59$, 9.1%), wildlife ($n = 45$, 7.0%), and plant ($n = 29$, 4.5%). Statistical analysis indicated that the presence of environmental issues is different between for-profit and nonprofit organizations. For-profit organizations more frequently focused on energy ($X^2 = 15.103$, $p < 0.001$) and general issues ($X^2 = 25.775$, $p < 0.001$) than nonprofit organizations, while nonprofit organizations more frequently looked into air ($X^2 = 13.46$, $p < 0.001$), water ($X^2 = 14.33$, $p < 0.001$), wildlife ($X^2 = 38.72$, $p < 0.001$), and plant issues ($X^2 = 7.37$, $p < 0.01$) than for-profit organizations.

Additional features in green messages. To understand the messages' features, this study examined the presence of pictures, videos, other online posts, hyperlinks, tags, and hashtags in each tweet. There were significant differences of picture significant differences of picture ($n = 230$, 67.8% for-profits vs. $n = 161$, 59.2% nonprofits; $X^2 = 4.91$, $p < 0.05$), video ($n = 21$, 6.2% for-profits vs. $n = 1$, 0.4% nonprofits; $X^2 = 14.8$, $p < 0.001$), other online post ($n = 27$, 8.0% for-profits vs. $n = 69$, 25.4% nonprofits; $X^2 = 34.5$, $p < 0.001$), and hyperlinks ($n = 239$, 70.5% for-profits vs. $n = 149$, 54.8% nonprofits; $X^2 = 16.1$, $p < 0.001$) between for-profits and nonprofits.

Message effects on twitter responses

The third research question was about the influences of message orientation and specificity on Twitter responses (likes, retweets, and replies). Before analyzing the message influences on responses, this study examined the number of responses by for-profit and nonprofit organizations. ANOVAs with organization types and Twitter responses indicated that there were mean differences of likes, $F(1, 609) = 7.198$, and retweets, $F(1, 609) = 14.543$, $p < 0.001$, between for-profit and nonprofit organizations. The means of likes ($M = 15.51$, SD $= 39.68$ for-profit; $M = 27.18$, SD $= 66.73$ nonprofit) and retweets ($M = 9.20$, SD $= 17.98$ for-profit; $M = 26.56$, SD $= 81.38$ nonprofit) of nonprofit organizations' green messages was higher than those of for-profits' messages. However, there was not a mean difference in the number of replies between organization types.

To respond to the third research question, a series of ANOVAs with message orientation and message specificity and Twitter responses was conducted. There were mean differences of replies by message orientation, $F(1, 602) = 4.71$, $p < 0.01$. Environmental fact orientation had the highest number of replies ($M = 0.87$, SD $= 2.542$ for product; $M = 0.47$, SD $= 979$ for process; $M = 0.55$, SD $= 2.376$ for image; $M = 31.23$, SD $= 10.824$ for environmental fact). A post-hoc test (Bonferroni) specified that the mean differences between process and environmental fact orientations and between image and environmental fact orientations are significant, $p < 0.01$. All other impacts of messages on responses were not significant.

The influences of green messages on social media responses were different by organization types (see Table 3). Interestingly, when the source was a for-profit organization, there was a significant mean difference of likes, $F(1, 332) = 5.76$, $p < 0.01$, retweets, $F(1, 332) = 6.88$, $p < 0.001$, and replies, $F(1, 332) = 5.00$, $p < 0.01$. Table 4 shows detailed descriptive results for the impact of for-profit organizations' environmental message orientations on the numbers of likes, retweets, and replies. However, when the source was a

nonprofit organization, there was not a mean difference of Twitter responses across green message orientations and specificity.

This study analyzed not only the number of replies but also the valences of each reply. However, statistical results indicated that there were no significant differences of valences by organization types (for-profits vs. nonprofits) and message types (green message orientation and specificity).

Discussion

This study conducted a content analysis to examine for-profit and nonprofit organizations' Twitter messages related to the environment. For-profit organizations more frequently emphasized their green products and manufacturing processes, while nonprofits more often informed audiences about the seriously degraded environment. In addition, for-profits' messages were more specific than nonprofits' messages. For environmental issues, nonprofits' messages dealt with detailed environmental issues (e.g. air, water, wildlife, plants), while for-profits often discussed energy issues. Moreover, when the source was a for-profit organization, the description of degraded environment generated the most likes, retweets, and replies.

On social media, how do organizations develop environmental messages?

The current findings show that green messages oriented toward organizational image without factual environmental actions are most frequently used, compared to the other message orientation types. This message orientation pattern is identical to that found in research conducted in the 1990s on traditional media (Cummins *et al.*, 2014; Carlson *et al.*, 1993, 1996). Considering the scholars' cautions that associative green messages can be perceived as greenwashing (Carlson *et al.*, 1996), the unchanged pattern is surprising. Perceived greenwashing might cause audiences to have negative attitudes toward the message (Nyilasy *et al.*, 2013).

	For-profit organization			Nonprofit organizations		
	Likes F	Retweets F	Replies F	Likes F	Retweets F	Replies F
Orientation	5.764**	6.881***	5.002**	0.646	0.906	1.842
Specificity	1.307	0.761	0.010	0.5547	0.600	3.823

Note(s): *** $p < 0.001$; ** $p < 0.01$

Table 3.
ANOVA tests: The mean differences of likes, retweets, and replies by message orientation and specificity for for-profit and nonprofit organizations

		Likes		Retweets		Replies	
	n	M	SD	M	SD	M	SD
Product	40	33.43[a]	80.837	15.18[c]	32.589	1.08[f]	2.895
Process	84	13.86	18.478	8.74[d]	11.154	0.56	1.068
Image	207	11.44[a,b]	27.866	7.41[e]	12.230	0.29[f]	1.188
Env. Fact	5	59.80[b]	124.261	38.40[c,d,e]	70.617	2.00	2.915
Combination	3	30.0	14.526	17.33	9.292	1.33	1.528
Total	339	15.51	39.683	9.20	17.978	0.48	1.526

Note(s): [a, b, c, d, e,] and [f] = multi-comparisons (Bonferroni post-hoc test) having significant mean differences between the orientations. The post-hoc test did not include the combination orientation messages ($n = 3$)

Table 4.
Descriptive tests of Twitter responses to environmental messages of for-profit organizations across message orientations

What are the differences and similarities in environmental social media messages between for-profits and nonprofits?

This study also found that for-profit organizations more frequently adopt product/process orientations than nonprofits, while nonprofits more often use environmental facts than for-profits. These findings are in line with previous studies (Banerjee *et al.*, 1995; Iyer *et al.*, 1994). It is reasonable that for-profit organizations more often claim their products or processes are eco-friendly than nonprofit organizations because a for-profit organization's ultimate goal is to reap financial benefits by manufacturing products and selling them to consumers.

For green message specificity, more than 80% of the analyzed green messages were vague. As discussed earlier, vague messages can be perceived as greenwashing (Carlson *et al.*, 1993; Ganz and Grimes, 2018; Allen, 2016). Thus, to craft more effective green messages, practitioners should avoid vague messages. The statistical results indicate that for-profit organizations' messages are more specific in contradiction to past findings (Banerjee *et al.*, 1995; Iyer *et al.*, 1994) which demonstrated that nonprofit green messages were more specific than for-profit green messages.

The current findings also show that nonprofits more frequently mention specific environmental issues in their messages than for-profits. This might be because of the influence of environmental organizations. Some environmental nonprofit organizations are highly related to a particular environmental issue and discuss only that issue (e.g. National Fish and Wildlife Foundation—wildlife; Conservation Fund—plants). On the other hand, for-profit organizations more often talk about energy issues than nonprofits, perhaps because saving energy or developing and using reusable energy (e.g. solar and wind power) brings environmental as well as economic benefits to the organization. However, many nonprofits' green messages link environmental issues to social issues (e.g. climate change is related to natural disasters (e.g. flood, drought), which are related to financial/technical/human aid). This study did not systematically investigate the relationships between organization types and the combinations of environmental, social, and economic issues, but future research on this topic will benefit scholarship related to sustainable development.

For-profits, compared to nonprofits, frequently used gain, the current generation, and personal benefit-focused frames for message framings. The communicative practices of for-profits are on the right track because scholars argue that gain and personal benefit frames effectively increase attitude toward the message and sender (Segev *et al.*, 2016; Hu, 2012). However, nonprofits tended to post their messages without a frame. It is recommended for nonprofit communication practitioners to use message framing because framing effectively persuades audiences. At times, nonprofits' persuasive communication is highly required to change stakeholders' behaviors instantly (e.g. memberships, donations).

How do message orientation and specificity influence social media responses?

Message orientation generated significant differences in social media responses only for for-profits' messages, perhaps implying that highlighting a certain orientation in environmental communication is an appropriate tactic for for-profit organizations. Specifically, for-profits should actively use environmental facts and product orientation to generate likes, shares, and comments. Based on the findings, social media responses to nonprofit green messages are not different by message orientation and specificity. Thus, nonprofit organizations need to use another green message strategy to increase their social media responses. However, confound variables may exist in the real world that may influence the relationships between a message and the responses to it on social media. Thus, in future research, the effects of green message orientation and specificity need to be tested in a laboratory environment.

Attribution theory predicted that substantive green messages more positively affect social media responses than associative green messages, and the current findings supported

this theory. Results were consistent with attribution theory (Kelley, 1967, 1972) as well as the previous corporate social responsibility (CSR) literature adopting the theory (Becker-Olsen *et al.*, 2006; Nyilasy *et al.*, 2013; Walker, 2010). This study did not measure the attribution/ attributional processes directly but instead inferred the processes through the findings. This finding is consistent with the literature (Leonidou and Skarmeas, 2017; Shin and Ki, 2020). Future researchers might need to test the relationships between green message orientation and attribution processes and between the attributions and attitude and intention in the various contexts.

Contributions and implications

The findings of this study showed that the green message categorization systems are applicable to the social media context. In detail, this study revealed that message orientation and specificity categories can be used not only in the conventional media (Carlson *et al.*, 1993, 1996), but also in the social media context. Although this study focused only on Twitter, future studies can test these categories in various online media (e.g. other social media platforms, organizations' official websites, blogs, e-commerce websites). In addition, this study discovered that message frames have not been used frequently on Twitter. The infrequency may be explained by Twitter's limited available character count. Future researchers should apply the green message framing categories to other social media platforms that allow lengthier messages (e.g. Facebook, Instagram). Not only academic scholars but also practitioners can use this message categorization system to understand competitors' social media messages. Although this researcher gathered tweets conventionally, practitioners may be able to collect big data using computational data mining skills though a social media platform's API.

The green message categorization systems in this study are appropriate to understand current or past green messages. However, these theoretical frames themselves cannot predict audiences' responses to the message and its source. To overcome this limitation, scholars have conducted experiments to see the effect of messages on audiences' attitude, belief, and behavior. Interestingly, the findings of this study show that the effects of green message on audiences can be measured through a content analysis. The functional feature of social media that it displays accumulated responses makes this method feasible. A future environmental communication study may focus on various relationships between main messages and social media responses through a content analysis (e.g. attributes of a YouTube video and thumb-ups/downs and comments).

For-profits' environmental tweets can be characterized with products and process orientations, while nonprofits are with environmental fact orientation. Considering that a person can be a consumer and an environmentalist at the same time, practitioners need to use various types of green message orientations to make the person deeply engage with the organization regardless of the type of organization. So, it is necessary for for-profits to discuss environmental pollution and for nonprofits to recommend using a particular type of product (e.g. bio-degradable stew, LED bulbs).

The study findings should recommend communication practitioners to use substantive green messages highlighting actual pro-environmental performances in their green messages such as green products, technology that decreases negative impacts on the environment, environmental certification, environmental community services, and sponsorship of environmental events. Realistically, however, it is not easy for small and start-up firms to create pro-environmental goods and services in a short time. Thus, this study suggests that organizations' executives lead a pro-environmental campaign for internal stakeholders (e.g. paperless office, using a personal mug instead of disposable cups, turning off unnecessary lights) and discussing the actual green initiatives with external stakeholders on social media.

Although this study did not examine them in detail, many infographics were found in for-profit messages for the message specificity. Infographics can present the specific information that audiences can readily understand because it is described visually. Infographics have been used in mass communication (e.g. newsletter, newspaper, magazine, and reports) since the 1980s, but they have become more prevalent in the digital age because they can be easily created using software and shared through social media (Siricharoen, 2013).

Regarding the specific environmental issues, practitioners might need to consider the relationship between the discussed environmental issue and the organization. When an audience perceives the discussed environmental issue is closely related to the organization, the audience is likely to have a favorable attitude toward the message and organization and strong purchase intention (Shin and Ki, 2019). For example, an audience may press the Like button, retweet the post, or leave a comment when a wildlife-related nonprofit talks about the water issue, when a home appliance manufacturer discusses the energy issue, and when a bicycle company converses about air pollution.

This study additionally tested the differences in online content features between for-profits and nonprofits. The analysis showed that for-profits significantly more often use pictures, videos, and hyperlinks in their tweets than nonprofits. The visual aids can attract audience attention and lead the audiences to engage in the tweet. Practitioners, especially in nonprofit organizations, keep in mind visually attractive cues, including pictures, videos, and hyperlinks, to encourage followers to interact with the tweet.

Limitations and future research directions

As with any research project, this study has limitations. First, the study analyzed how organizations frame environmental issues on Twitter. However, only a small portion of messages adopted framing. A possible reason for this is that the analyzed social media platform in this study was Twitter. During the time period the sample was taken from, a post on Twitter was limited to 140 characters, which might not be long enough to frame a message. Some other social media platforms do not have a character limitation (e.g. Facebook, Instagram), so more framing cases may be found on these social media platforms. To see the use of green message framing and its effect on social media responses, future researchers need to examine various social media platforms. Second, this study only focused on US organizations. Carlson *et al.* (1996) showed that green message orientations can be different across countries. Future researchers should examine the similarities and differences of organizational environmental tweets between various countries. Third, Twitter responses could be influenced by the number of followers of each organization. This study did not control for the number of followers, but future researchers should do so.

Notes

1. Teaching-driven messages refer to the messages discussing research, lectures, and forums regarding sustainability; curiosity-driven messages represent casual liking, curiosity, and/or enjoyment of sustainable activities; competition-driven messages are in relation to sustainability contests, expos, awards, and certifications; promotional/profit-driven messages talk about the benefits of a green company or organization; political-driven messages discuss government engagement with sustainability initiatives; and excitement-driven messages urge stakeholders to engage in sustainable activities immediately (Hopps, 2013).

2. Banerjee (2002) defined corporate environmentalism as the recognition of the importance of environmental issues facing the firm and the integration of those issues into the firm's strategic plans.

3. Results for each individual variable were as follows: picture (1.00), video (1.00), embedded outside post (1.00), hyperlinks (1.00), tag (1.00), hashtag, (1.00), reply (1.00), retweet (1.00), like (1.00), loss

framing (1.00), future generation framing (1.00), take less framing (1.00), environmental benefit framing (1.00), water issue (1.00), land issue (1.00), wildlife issue (1.00), plant (1.00), energy issue (1.00), general issue (0.98), air issue (0.96), environmental fact (0.94), image orientation (0.92), product orientation (0.91), process orientation (0.91), negative reply (0.90), specific (0.89), positive reply (0.87), vague (0.86), neutral reply (0.82), gain framing (0.80), current generation framing (0.80), individual benefit framing (0.80), and doing more framing (0.74, 98.1% agreement).

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Appendix
Analyzed for-profits and nonprofits that sent at least one environmental tweet during the given period

(1) For-profits ($n = 37$): AIG, Alaska Airlines, Alliance Data, Aramark Corp., Arrow electronics, Atria Group, BNY Mellon, Boeing Company, Boston Scientific, Capital One, Caterpillar Inc., CBRE, Celanese, Cognizant, ConocoPhillips, Evision, Goldman Sachs, Hertz, Johnson and Johnson, Kiewit, MGM, Mondelez International, Navient, NCR corp., Netflix, Newell Brands, Newmont, Mining, Realogy, Sempra Energy, Spirit Aerosystems, Texas Instruments, Thermo Fisher, TJX Cos Inc, US Steel, Union Pacific, Western Digital, Williams

(2) Nonprofits ($n = 40$): ALSAC, American Heart Association, American Kidney Fund, American Museum of Natural History, Americares, Boys Town, Catholic Medical Mission Board, Catholic Relief, ChildFund International, Compassion International, Direct Relief, Feed the Children, Girl Scout, JDC, March of Dimes, Medecins Sans Frontieres (MSF) International, Mental Health America, Mercy Corps, Metropolitan Museum of Art, National Fish and Wildlife Foundation, National Jewish health, NPR, Operation Blessing, Planned Parenthood, Project HOPE, Salvation Army USA, Samaritan's Purse, Shriners Hospitals for Children, Teach For America, The Carter Center, the Conservation Fund, The Kennedy Center, UJA-Federation of NY, UNCF, United Way, WGBH Education, Wildlife Conservation Society, World Vision, Wounded Warrior Project, YWCA USA

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