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Social Media, Sustainability and Organizations

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Abstract

Communication is a social process affecting human behavior, including both in-person and virtual interaction made possible by advances in technology. Social media communication allows users world-wide to connect with each other, engaging with shared content ranging from personal messages to news to entertainment. Anyone with a device and Internet access may engage with social media, and individuals, businesses, and public organizations are active users. Social media communication is utilized in the important domain of sustainability: Meeting present needs without compromising the ability of future generations to meet their needs. Sustainability activities are broad and include environmental, economic, and social initiatives at multiple levels. This article discusses key elements of social media, its use in organizations, its application within sustainability communication, and future challenges.

Communication is a social process affecting human behavior (Godemann and Michelsen, 2011). Individuals have always communicated with others: first through direct, face-to-face connections, then indirectly through images or the written word, and today through multiple channels and formats made possible by rapid advances in technology. Social media communication allows users world-wide to connect with each other, engaging with shared content ranging from personal messages to news to entertainment. With this shift to digital platforms, anyone with a device and Internet access may engage with social media. This global connectivity, in turn, allows for the creation of virtual networks and communities.

Social media communication covers a broad array of topics, and it is used by individuals, businesses, and public organizations. One steadily-growing domain addressed via social media is sustainability: meeting present needs without compromising the ability of future generations to meet their needs. Sustainability activities are broad and include environmental, economic, and social initiatives at multiple levels. This article discusses key elements of social media, its use in organizations, and its application to sustainability communication.

Background of Social Media

Social media is a broad term that refers to people interacting in online, multidirectional communication. It differs from traditional one-way communication by providing an interactive experience among participants, rather than a transmission outlet broadcasting information with no direct reaction or response (Kaplan and Haenlein, 2010; Joesse and Brydges, 2018; Saxton et al., 2019). Individuals, organizations, businesses, governments, and communities use social media, and the global availability of the Internet has supported this interactive communication. The world's population was about 7.6 billion in 2019, and over half the planet's inhabitants reported using the Internet regularly. Statista data indicate that on average, Internet users across the globe spent 135 min daily on social networks in 2019.

The rise of social media as a powerful communication tool has been rapid, reflecting the explosive increase in information available through major shifts in technology (Godemann and Michelsen, 2011). Kaplan and Haenlein (2010) highlighted the impact of Web 2.0, a term that describes how software developers and end-users have utilized the Internet as a platform to share and modify content in a participatory fashion; see also Fieseler et al. (2010). Social media usage worldwide has contributed to new exchanges of knowledge and different forms of virtual collectives.

The Pew Research Center, a nonprofit, nonpartisan data research center (www.pewresearch.org) began tracking social media engagement in 2005. At that time, some 5% of American adults used at least one social media platform (Pew, 2018); by 2018, 95% of North Americans engaged in social media use, and world-wide social media users reached almost 2.5 billion. This global engagement clearly offers immense potential for communication outreach in multiple domains. Social media market penetration varies by region and reflects the *digital divide*: global inequalities in information access. According to Statista data, North America and Northern Europe reported the highest penetration, at 95%, with significantly fewer users (51% and lower) in Central Asia, the Caribbean, and all regions of Africa.

The broad array of social media formats allows for information transmission, content sharing, and entertainment, and most communication is available instantaneously. Widely and rapidly sharing a social media *post* (text, image, or video) is called *going viral*. From a practical standpoint, social media is easy and inexpensive. While music and video streaming services may charge a subscription fee, the costs for social networking platforms are generally free to users because they are covered by advertiser support. For example, many popular YouTube videos cannot be accessed without first viewing a short advertisement from a corporate sponsor.

User Characteristics

Anyone with access to the Internet and a device (e.g., smartphone, tablet, or computer) can utilize social media, so its reach crosses demographic attributes and geographic boundaries. Social media was first embraced by young participants, but its audience now crosses the age spectrum, although younger users remain the most actively engaged. For example, Pew data (2018) indicated that the Instagram platform achieved 64% market penetration among American young adults (ages 18–29), compared to 21% of middle-aged users (ages 50–64). Younger users may be more likely to embrace social media because of technology expertise. A person brought up after the advent of the Internet and digital technology is considered a *digital native*, while *digital immigrants* have had to learn these skills as adults.

Pew research also indicates differences in social media engagement for other demographic characteristics. People with higher education levels are more likely to report using social media regularly, although variation across user income levels is small. Women are more active users of social media applications compared to men, except for YouTube (with 75% men and 72% women active participants). Platform usage also seems to vary by race, with Facebook most popular among Hispanic users, Instagram used more often by Black users, and Pinterest, by White users (Pew, 2018).

Types of Social Media Applications

Technology developments, coupled with social media's worldwide popularity, has generated an expanding number of applications. Many alternatives are available in content (from news releases to personal blogs), format (text-based transmissions, sound, image, and video), and audience (individuals to groups to organizations). Although social media platforms share many characteristics, they operate in different ways; e.g., the media richness of a virtual game world versus the self-disclosure level of a Facebook post (Kaplan and Haenlein, 2010, p. 62). Joining a social media platform means the user agrees to the platform's terms, giving the site permission to use posted content and allow others to share it. Because individual dialogues rely on original content, such as posting one's own ideas or pictures, they generally circumvent copyright issues. Most platforms typically offer users some control over their activity through privacy and application settings—although some degree of self-disclosure is almost inevitable (Joose and Brydges, 2018). Indeed, the only way to maintain full control over one's personal information on social media is not to share it at all.

Among the earliest social media applications were personal weblogs (*blogs*). Blogs are online publications with brief entries in a narrative style, organized in reverse chronological order, that enable interactive comments. Some blogs are targeted to a small group of like-minded individuals; others have expanded through both social and mass media. An illustration is the "Going Zero Waste" blog (www.goingzerowaste.com) that has been featured by *National Geographic*, *National Public Radio*, *CNN*, *The Guardian*, *CBS*, and *US News and World Report*. Joosse and Brydges (2018) comment that blogs broaden the sources and platforms for environmental communication, making way for new voices—and nonexperts—on the topic. In recent years, many organizations have also become active users of corporate blogs (Fieseler et al., 2010).

Global interconnectivity allowed for the development of social networking. Early social networking sites such as MySpace were developed in the late 1990s, and were followed in 2004 by the establishment of Facebook. Facebook is the most widely-used social media platform in the world. It provides an extensive social networking capacity, also serving its users as a search directory for friends and contacts. The second most popular application is YouTube, which shares videos and music and allows users to upload original content. Other platforms, including Twitter, rely primarily on text, web links, or memes. In general, a social media update is called a *post*, except for Twitter, which calls its short posts *tweets* (up to 280 characters of text). A *meme* is an image plus short text, often meant to be humorous, that is shared on the Internet; an illustration is included in Fig. 2.

Instagram is an image-sharing platform that is very popular for personal activities; it also encourages user interaction through informal questions, quizzes, and polls (e.g., 'What is your favorite way to recycle?'). The *Pinterest* social network allows participants to visually share interests through posts, primarily images (called *pins*, after a bulletin board). *LinkedIn* is a social networking and search platform focused on professional topics and job opportunities that also includes articles and career-related content. The *WhatsApp* application concentrates on text messaging and voice calls. Several platforms (e.g., Twitter, Instagram, and Facebook) use the *hashtag* concept (# followed by a word or phrase) to organize content, making it easier to access related documentation (Saxton et al., 2019). One illustration is *#sustainability* on Instagram, which had 3.2 million posts in early 2019. Table 1 provides a summary of the seven largest social media applications worldwide. In addition, other popular social media platforms and messaging tools (especially for younger users) include Snapchat, Skype, Tumblr, Reddit and Flickr.

Social Media in Organizations and Communities

Public and Government Organizations

The benefits of global reach, rapid transmission, and low cost encouraged social media communication to extend beyond individual networking to include organizations. Public entities, nonprofits, and governmental agencies (from local to intergovernmental) use social media actively to connect with a wide range of stakeholders. Social media offers high information access and different types of data as well as more interactivity (Joose and Brydges, 2018). Public communication may serve to transmit information (e.g., educating citizens about changes in regulations), and it also provides the opportunity to strengthen stakeholder engagement. For example, social media platforms are an integral part of many public emergency management plans, such as hurricane tracking.








Prior research has reported that civic engagement and political activism are linked with social media use, because it enables direct action as well as knowledge sharing. When citizens gain a voice through social media, industry and government lose their dominance over information (Joose and Brydges, 2018; Saxton et al., 2019). In addition, social media creates social networks that offer opportunities to participate in civic and political actions. Boulianne (2015) found the relationship between social media use and civic/political participation appeared to be positive and correlational.

Business Organizations

Corporate firms, both publicly and privately-owned, are heavy users of social media. Businesses use social media for a variety of purposes (Reilly and Hynan, 2014), such as sharing company information (e.g., on a Facebook page), responding to customer questions (perhaps through Twitter), and recruiting new employees (via LinkedIn). Many large companies maintain multiple accounts: a parent company presence plus social media sites for their major brands (which may be more active than the parent company account; see Reilly and Larya, 2018), and perhaps other accounts addressing particular topics (Saxton et al., 2019). To illustrate, in 2019 General Motors maintained multiple platforms for each of its automobile brands (e.g., Buick, Cadillac, Chevrolet), a Twitter account addressing diversity (@GM_Diversity), as well as separate Twitter, Facebook, and Instagram accounts for the GM parent company and its Chair and CEO Mary Barra.

Business organizations also engage frequently with the LinkedIn platform. This application emphasizes professional networking and career development, and many firms dedicate resources to LinkedIn as an important part of their job recruitment strategy.

Table 1 Overview of key social media applications.

Social media site	Logo	Established	Primary function	Active users in 2018	Owned by	Users, age 18–29 (%) ^a	Users, college grads (%) ^a
Facebook		2004	Social networking	2.32 billion	Public: NASDAQ	81	77
Twitter		2006	Micro blog	330 million	Public: NYSE	40	32
Instagram		2010	Photo sharing	1.0 billion	Facebook	64	42
YouTube		2005	Video sharing	1.8 billion	Google	91	85
Pinterest		2010	Visually share interests	250 million	Public: NYSE	34	40
LinkedIn		2013	Professional social networking	260 million	Microsoft	29	50
WhatsApp		2009	Text messages and phone calls	1.3 billion	Facebook	27	29

Data sources: Pew Research Center; Statista; company websites.

^aPercentage of American adults as active users (Pew, 2018).

LinkedIn also provides a useful search function that targets not only by individuals' names, but also by desired job-related attributes or demographics. This platform claimed 630 million members worldwide in 2019 (www.facebook.com/LinkedIn/).

One of the most important reasons companies use social media is to market their products and services (Reilly and Larya, 2018). As Kaplan and Haenlein (2010) comment, social media allows firms to engage in timely and direct consumer contact efficiently at low cost, and organizations frequently use multiple social media platforms to relay similar marketing content. Making sure the company's message is consistent across all media and outlets is the concept behind integrated marketing communication. Firms also gather data from consumer/company social media interaction that contribute to marketing strategies. Prior research has thus called for social media to be integrated fully within an organization's overall corporate communication strategy (Saxton et al., 2019; Herzig and Schaltegger, 2011).

Savvy organizations also look to social media *influencers* in crafting their communication plans. An influencer has a strong social media presence and established credibility, and his large audience and reputation allow him to influence other users. High-profile influencers impact others not only through direct follower engagement, but also via comments, discussions, *likes* and *shares* by their audience (e.g., *retweets* and *pins*). The sustainability realm offers multiple examples of high-impact social media influencers—including many who are high-profile because of their other roles. Film celebrity and environmentalist Leonardo DiCaprio is an illustration; in May 2019, his Twitter presence included 19 million followers. Another high-impact sustainability influencer is former Microsoft CEO Bill Gates, with 47.2 million Twitter followers in 2019. A sample tweet from his Twitter account is below:

Bill Gates@BillGates 28 March 2019

To prevent the worst effects of climate change, we need to reach near-zero emissions on all the things that drive it—agriculture, electricity, manufacturing, transportation, and buildings—by investing in innovation across all sectors while deploying low cost renewables.

In addition to message content, the freshness of corporate social media communication must be considered. Outdated information and broken links are common, and more serious problems may arise with negative content. Given the broad scope and instantaneous transmission possible with social media, organizations must be vigilant in monitoring for potential information distortion, rumors, and unofficial or unverified sources (Kaplan and Haenlein, 2010; Reilly and Hynan, 2014).

Virtual Groups and Communities

Social media has encouraged virtual groups and communities to form through its online social interaction. Like-minded users may form a public (anyone may join) or private (requires permission) group or community based on shared demographics, backgrounds, or interests: e.g., local neighbors, university alumni, or recycling advocates. Indeed, potential group members may receive an invitation to join a group, based on their network connections and platform activity. These virtual communities vary in complexity and format, and their cohesiveness generally depends on having engaged members plus an organized curator monitoring information flow and the network of connections. One popular example is a Facebook group. These groups provide information sharing and add the social networking dimension of connecting via Facebook profiles. An illustration of a public Facebook group is called 'Sustainability.' This community had over 2000 members in early 2019, and its profile notes,

About This Group: A forum for discussing important sustainability topics and sharing useful or interesting information on the subject. Looking for provocative and even controversial discussions on topics like climate change, water/food shortages, waste and pollution, biodiversity, war and many others.

Other examples of virtual communities include the blogosphere, chat rooms, and virtual worlds. The *blogosphere* generally refers to the collective online network of personal and organizational blogs (Fieseler et al., 2010). A *chat room* operates like synchronous conferencing: group members exchange text information with others in real time. Many social media users participate in *virtual worlds*, in which individuals adopt an *avatar* identity (a figure representing a person) in a fictional computer-based setting—often as part of a game (Kaplan and Haenlein, 2010). For example, *Farmville* (developed by Zynga) lets participants virtually engage in farming by planting and harvesting crops, milking cows, and collecting eggs (www.zynga.com/games/farmville).

Social Media Communication and Sustainability

Individuals and organizations use social media to communicate and interact about an array of topics, including sustainability. Sustainability is a broad construct covering a wide range of issues, ranging from individual recycling behavior to organizational pollution monitoring to global climate change. Sustainability challenges for organizations are many, and social media applications offer the opportunity to discuss, network, and initiate action about these important issues.

An Overview of the Sustainability Construct

There are multiple approaches to sustainability; the definition used here describes sustainability as development that meets present needs without compromising the ability of future generations to meet their needs (Godemann and Michelsen, 2011). Sustainability considers responsible economic development and social objectives that preserve natural and human resources. A variety of factors underpin the growing engagement with this topic. Examples include shortages of nonrenewable resources (e.g., the rare earth minerals needed for manufacturing computers); regulatory constraints such as carbon emissions standards; consumer demand for organic and fair trade products; and community concern with the future of the planet. Given its broad scope, sustainability is often measured with multiple metrics that use the concept of *net impact*. Net impact refers to the overall impact of a sustainability action or policy when all major aspects are considered. An illustration is the trade-off in tourism development between positive employment growth and negative overcrowding in the local community.

One popular framework for assessing sustainability performance is the *triple bottom line*. This model includes environmental, economic, and social elements (sometimes called the planet, profit, and people dimensions). Fig. 1 presents an overview of this approach to sustainability, with examples of metrics. A similar model is the ESG framework that assesses Environmental, Social, and Governance measures; governance refers to an organization's leadership, controls over issues such as executive pay and audits, and shareholder rights. This framework evolved in capital markets to assess socially responsible funds, an increasingly popular investment option. Global sustainable investment assets under ESG guidelines were \$30.7 trillion in early 2018, up 34% from 2016, according to the nonprofit US SIF (the Forum for Sustainable and Responsible Investment); see www.ussif.org.

A different approach to modeling sustainability uses the *circular economy* framework. Here, the emphasis is on proactively designing a business operation to focus on restoration and regeneration. The circular model moves beyond the linear approach of making, consuming, and discarding products, focusing on three underlying principles: designing out waste and pollution; keeping products and materials in use; and regenerating natural systems. For example, circular economy techniques in a production plant may include new ways of extracting recyclable materials and remanufacturing outputs from these elements (rather than discarding). The circular economy framework is especially relevant for manufacturing firms, as the tweet below from Unilever illustrates.

Unilever @Unilever. 9 November 2018.

We are working hard to tackle plastic packaging waste in our own operations and beyond, to help us achieve our 2025 sustainable packaging targets. We've just taken another major step forward with three new partnership initiatives #CircularEconomy.

Environmental sustainability

Factors affecting the physical and natural environment (air, water, land, ecosystems); being 'green'

Metrics include:

- global warming emissions, such as greenhouse gases
- other pollution
- water usage
- hazardous waste
- engagement in recycling

Economic sustainability

Activities concerning the contribution to the ongoing viability of a broader economic system

Metrics include:

- distribution of wealth
- use equitable business practices
- impact on the local economy
- flow of capital among stakeholders
- infrastructure investment.

Social sustainability

Assesses impact on the people and local area in which an organization operates*

Metrics include:

- support human rights
- foster diversity
- provide safe working conditions
- equal opportunity and fair trade
- community development
- produce safe products

*Corporate philanthropy is sometimes coupled with social sustainability

Fig. 1 The sustainability triple bottom line.

Challenges in Measuring Sustainability Performance

Evaluating sustainability performance is complex, not only due to multiple metrics. As yet, few agencies require monitoring of sustainability measures, and independent third-party assurance (comparable to accounting audits) is not yet in general use. Although European Union rules mandate regular reports (from 2018) on the social and environmental impacts of large company activities (see www.ec.europa.eu/info/business-economy-euro_en), sustainability information is often self-reported data published on a voluntary basis. Some firms do participate in the Global Reporting Initiative (GRI), an independent, international organization established in 1997 that seeks to make sustainability reporting a standard practice (www.globalreporting.org). In addition, some industries do employ self-regulation (Herzig and Schaltegger, 2011). One example is Leadership in Energy and Environmental Design (LEED) certification (Platinum, Gold, Silver, and Certified) awarded for green building construction worldwide (<http://leed.usgbc.org>).

A related issue is the sophisticated nature of many sustainability metrics (Reilly and Hynan, 2014). These may require translation of technical terms not familiar to the community at large: carbon offset trading, the Human Development Index (HDI), and gray water are examples. This challenge is especially relevant in social media, where messaging is brief and often visual. Technical experts in sustainability are needed to translate their expertise to the nonexperts—corporate leaders, politicians, and consumers—who will be making sustainability policy decisions. Further, lack of standardized metrics makes it difficult to compare sustainability performance across industries and organizations (Herzig and Schaltegger, 2011; Reilly and Hynan, 2014). Without required and standardized metrics, many organizations are able to focus their sustainability communication on areas in which they perform well or receive awards. The following is an example from Nestlé’s corporate website (www.nestle.com):

We are not driven by awards and recognition. Nonetheless, we are proud to have our sustainability efforts and achievements acknowledged in 2018 by world-leading ratings and rankings agencies. We are also open to working with their suggestions to support continuous improvement.

Greenwashing

With the prevalence of self-reported data, sustainability social media communication is especially prone to *greenwashing*: misrepresenting actual sustainability practices or activities to promote a false image of responsibility (Saxton et al., 2019). Prior research has noted that organizations are reluctant to disclose sustainability ‘bad news,’ leading to overly positive messaging (Reilly and Hynan, 2014). According to Herzig and Schaltegger, communication about sustainability is often characterized by information asymmetry in which the audience cannot easily access firm sustainability data, leading to low credibility (2011, p. 157). Thus, organizations may be able to portray themselves as sustainability stewards because stakeholders must rely on the companies’ own messaging. One greenwashing illustration is Procter and Gamble’s announcement of its 2018 introduction of Pampers Pure Diapers:

For parents searching for diaper and wipe options in the “natural” category who don’t want to sacrifice performance, the new Pampers Pure Collection offers another choice. It is the first-ever diaper and wipe collection made with premium cotton and other thoughtfully selected materials, stylish prints, and the Pampers protection.

(See Procter and Gamble News Releases: https://news.pg.com/news_releases/all/all/all Thursday, February 22, 2018 11:34 am EST).

Calling disposable diapers and wipes ‘pure’ and ‘natural’ ignores that these products require energy to produce, are not recyclable and generally end up in landfills.

Sustainability and Social Media at Multiple Levels

Individual Sustainability and Social Media

The interactive and inexpensive characteristics of social media have contributed to its popularity among individuals engaged in the sustainability domain. Several studies have examined bloggers who actively post about personal choices that support sustainability, such as Joesse and Brydges’ (2018) study of green bloggers. According to Joesse and Brydges, these bloggers serve as ordinary nonexperts acting as intermediaries of information about topics including a sustainable lifestyle, beauty products, and food (2018, p. 689). Such sustainability communication may support a process of individual and voluntary behavioral change, such as water conservation or recycling (Godemann and Michelsen, 2011). In addition to tracking their own personal sustainability achievements, many individuals blog about the sustainability progress (or lack thereof) by business and public organizations.

Business Organization Sustainability and Social Media

Business firms regularly use multiple social media platforms to communicate about sustainability (Reilly and Hynan, 2014). As Saxton and his colleagues note (2019), simply creating a related social media account suggests a company is signaling its

engagement in the sustainability agenda. Sustainability reporting indicates an organization's willingness to communicate about societal issues, contributing to a positive relationship with its stakeholders (Herzig and Schaltegger, 2011). Stakeholders have become increasingly aware—and often critical—of corporate sustainability performance (Fieseler et al., 2010), so sharing their sustainability activities has become an integral component of many firms' corporate communication (Reilly and Larya, 2018). Below is a Twitter example from McDonalds:

McDonalds Corporation @McDonalds Corp. 9 May 2019.

DYK [Did you know] that we'll be using packaging made from renewable, recycled or certified sources by 2025. So far, we've eliminated more than 300 million pounds of packaging, recycled 1 million tons of corrugated boxes and reduced waste by 30%.

<http://McD.to/6011E9k95> #ScaleForGood.

Some prior research has indicated that a company's sustainability engagement may follow multiple paths. Many initiatives are directed by top management strategy, such as a firm-wide program to reduce solid waste production in manufacturing. But other activities may be grass-roots changes driven by lower-level employees; e.g., an in-house recycling program (Reilly and Hynan, 2014). Herzig and Schaltegger (2011) propose that corporate sustainability communication should consider internal stakeholders (employees and managers) as well as external constituencies (consumers, stockholders, and the media). Whether the messaging is vertical or horizontal and internal or external, social media offers a critical tool for effective sustainability engagement and dialogue (Fieseler et al., 2010). Fig. 2 provides some illustrations of sustainability-related social media messaging.

Public Organization Sustainability and Social Media

The broad sustainability agenda is also relevant for policy makers in public organizations. Indeed, the missions of many public agencies deal directly with sustainability issues, ranging from environmental preservation (e.g., the European Environment Agency) to health (the U.S. Department of Health and Human Services) to workplace conditions (United Nations International Labour Organization). These organizations also have multiple stakeholders—citizens, employees, activists, and the community at large—that hold them accountable for their sustainability performance. Boulianne (2015) found that civic and political engagement correlated positively with social media use, and social media content from companies perceived as socially responsible is more likely to be shared (Saxton et al., 2019, p. 374). Further, the interactive nature of social media allows for an immediate response, which is helpful in implementing sustainability programs or calling for action.

Given the broad reach of international public organizations, they are often expected to provide sustainability leadership because issues such as climate change, water shortages, and social inequity cross national borders. One example is the United Nations' 17 Sustainable Development Goals, adopted by all UN Member States in 2015 as part of the 2030 Agenda for Sustainable Development. The 17 goals seek to provide a shared blueprint and a call for action at the global level, and they address a wide array of environmental, economic, and social sustainability challenges (<https://sustainabledevelopment.un.org/sdgs>). A list of the 17 UN goals is presented in Fig. 3.

Community Sustainability and Social Media

Social media sustainability communication may diverge across various forms of communities. Godemann and Michelsen (2011, p. 6) propose that the task of sustainability communication is to introduce an understanding of the relationship between people and their environment into broader social discourse. Different communities will have diverse interpretations about these elements—and the nature of social discourse itself. Boulianne (2015) points out that social media provides a forum for information and news that is often filtered through a network of trusted others. These networks—and the trusted others in them—will vary, leading to corresponding differences in messaging. Demographics continue to matter: Table 2 shows that platform usage varies by community type, with rural users least active across platforms, perhaps reflecting Internet availability.

Community social media activity may also reflect differences in purpose and location. While some sustainability challenges (e.g., climate change) are global, others may relate specifically to particular users. For example, high-profile sustainability challenges in urban areas may include employment disparity and unequal access to public education, while sustainability concerns in rural and agricultural districts may involve genetically-modified crops and animal welfare. Social media is frequently used to support non-profit activist and social movement actors (Saxton et al., 2019), such as #girlrising, a global movement to educate girls that had 117,000 followers in early 2019. In addition, sustainability messaging also reflects characteristics of the communities involved. The tweets below contrast environmental sustainability posts for a rural wilderness area (Grand Teton National Park in Wyoming) with that of the Sierra Club in urban Chicago.

Grand Teton NPVerified account @GrandTetonNPS 9 May 2019.

Biologists w/the Interagency Grizzly Bear Study Team will conduct grizzly bear research and trapping operations in Grand Teton May 15–Oct 21. This is part of on-going efforts required under the 2016 Conservation Strategy for Grizzly Bear in the GYE.

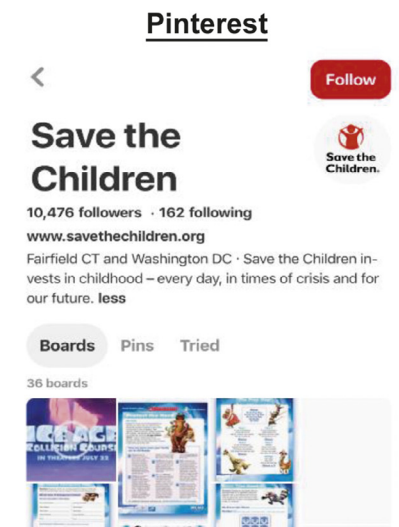
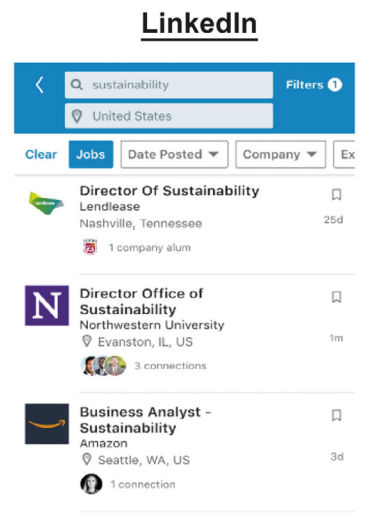


Fig. 2 Illustrations of sustainability-related social media posts.

- 1: No Poverty
- 2: Zero Hunger
- 3: Good Health and Well-being
- 4: Quality Education
- 5: Gender Equality
- 6: Clean Water and Sanitation
- 7: Affordable and Clean Energy
- 8: Decent Work and Economic Growth
- 9: Industry, Innovation and Infrastructure
- 10: Reduced Inequality
- 11: Sustainable Cities and Communities
- 12: Responsible Consumption and Production
- 13: Climate Action
- 14: Life Below Water
- 15: Life on Land
- 16: Peace and Justice Strong Institutions
- 17: Partnerships to achieve the Goal
- 18: Sustainable development

Fig. 3 United Nations sustainable development goals (2015).

Table 2 Adult American active users by community type.

<i>Social media site</i>	<i>Users in urban communities (%)</i>	<i>Users in suburban communities (%)</i>	<i>Users in rural communities (%)</i>
Facebook	75	67	58
Twitter	29	23	17
Instagram	42	34	25
YouTube	80	74	59
Pinterest	29	31	28
LinkedIn	30	27	13
WhatsApp	28	19	9

From Pew Research Center, Social Media Fact Sheet (2018, February 5). Retrieved from www.pewinternet.org/fact-sheet/social-media/.

Sierra Club Chicago @SierraChicago 10 May 2019.

We're very grateful to the musicians of the Civic Orchestra of Chicago for putting together this string quartet program celebrating nature, on Sunday, May 19. Enjoy an afternoon of beautiful music, and help plant seeds in a community garden!

Conclusions

Social media has revolutionized global communication in many realms, including sustainability. Researchers and users alike agree that social media messaging and format will continue to shift, tracking developments in technology. New applications are introduced regularly, often extending current platforms' functionality and user appeal. Social media market penetration is expected to grow, although some countries do monitor or censor online information access and interaction (including China, Iran, and North Korea). While digital sustainability messaging offers many benefits, important challenges remain.

One critical ongoing problem affecting social media communication is source credibility. Limited government monitoring, much self-reported data, and stale information contribute to this problem. Sharing information via social media is simple and (if desired) anonymous, permitting easy transmission of 'fake news.' According to [Joosse and Brydges \(2018\)](#), social media sources are often viewed as providing low-quality information, frequently serving as 'echo chambers' to confirm already-established opinions. In addition, the tremendous amount of social media information available may lead to information overload ([Herzig and Schaltegger, 2011](#)). [Kaplan and Haenlein \(2010\)](#) point out that the growing number of outlets and platforms, coupled with the high volume of messages, make it difficult to analyze social media activity—in any realm—in depth.

Social media users thus may benefit from a healthy skepticism in interpreting messaging. Consider the source: Is the data provided by an organization with stringent ethical reporting guidelines, such as a reputable news organization, an established

educational institution, or a respected research agency? Independent fact-checking websites exist, such as FactCheck.org, a project of the Annenberg Public Policy Center of the University of Pennsylvania (www.factcheck.org). Furthermore, reports released on social media may be funded by organizations with ideological agendas, or sponsored by entities with a direct interest in the outcomes. A well-known example is the tobacco industry. Despite the 1964 U.S. Surgeon General's report outlining the health dangers of nicotine, tobacco companies continue to market cigarettes today.

Another fundamental concern is the right to individual privacy for documentation collected and shared over the Internet. High-profile lawsuits involving Facebook and other companies illustrate that social network platforms may track, save, and reveal private information such as personal identification and online browsing histories. According to a Pew survey, about 80% of American social media users reported anxiety about advertisers and businesses accessing data shared on social media platforms; almost two-thirds called for more government regulation (Pew, 2018). While public safety issues are clearly important (such as monitoring threats posted on social media), so also is the privacy of personal information.

Within the sustainability domain, resource scarcity and climate change suggest that global interest in sustainability will continue, supported in part by social media communication. Some intriguing questions here concern underlying values. For example, where does responsibility for sustainability rest—with personal, organizational, or government actions? (see Joosse and Brydges, 2018) Individual decisions contribute to sustainable lifestyle choices, but broader environmental, economic, and social issues arguably demand broader responses. Sustainability policy decisions may also challenge long-held beliefs about individual and organizational behavior. To illustrate, Joosse and Brydges (2018) noted differences in how individual consumption and sustainability preferences varied about 'needing versus wanting' goods. Sustainability choices may also relate to the field of macromarketing, which addresses how society as a whole distributes goods and impacts consumer behavior via marketing strategies. Decisions such as these, coupled with emerging technologies, suggest that social media will continue to impact sustainability actions for the future.

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