Talking Green on social media: An exploratory study of online environmental communication in Greece

Ioanna Archontaki*, Iliana Giannouli**, Achilleas Karadimitriou***, Stylianos Papathanassopoulos****

* PhD Candidate – Researcher, Laboratory of Journalism Studies and Communication Applications, Department of Communication and Media Studies, National and Kapodistrian University of Athens (ioannarx@media.uoa.gr)

** Adjunct Lecturer – Researcher, Laboratory of Journalism Studies and Communication Applications, Department of Communication and Media Studies, National and Kapodistrian University of Athens (giannoul@media.uoa.gr)

*** Assistant Professor of Journalism and NewsContent Production at the Department of Communication, Media, and Culture of Panteion University in Athens (achillesk@panteion.gr)

**** Professor in Media Organization and Policy, Director of Laboratory of Journalism Studies and Communication Applications, Department of Communication and Media Studies, National and Kapodistrian University of Athens (spapath@media.uoa.gr)

Abstract

Traditional news media have long been the primary source of information on environmental issues, influencing public perceptions and shaping discourse on ecological sustainability. Media representations play a central role in forming public opinion, especially on climate change, which has become a highly politicized and polarized topic, both offline and online. Political ideologies, economic interests, and government agendas significantly shape how the public discusses and responds to strategies for addressing climate change.

This study focuses on the most engaging environmental content posted on social media and explores whether climate change is the dominant topic in these discussions. It also examines which actors (e.g., politicians, institutions, citizens) and sources (legacy media or alternative media) are featured in the most popular content. The aim is to identify the factors that drive user engagement on platforms like Facebook, Twitter (now X), and YouTube, and to investigate how social media users contribute to the plurality and diversity of voices shaping the discussions on environmental issues. The study considers whether these platforms support the democratic potential of public debate.

Over a three-month period (Sept.–Nov. 2021), the study monitored social media and compared non-professional user's posts with professional content from legacy media. The findings show that institutional actors dominate the online debate on environmental issues and climate change. Facebook engagement largely revolves around content from organizations and politicians, while Twitter users refer to organizational sources. On YouTube, however, local and regional media content is more prominent. This is surprising since surveys suggest that Greeks mistrust legacy media and prefer social media for information, viewing traditional outlets as corrupt and biased towards the dominant class.

Keywords: climate change, legacy media, social media, environmental issues, climate news

Introduction

For years traditional news media have been the main sources of information on climate change (Schäfer, 2015), with media frames providing the main vehicles for interpreting and evaluating such a crucial environmental

phenomenon. Several studies on environmental framing show a diversification of frames through the years, in accordance with the political or scientific developments. In their examination of climate and energy policies within the online news publications of Finland's national public broadcasting institution, Vikström et al. (2023) discerned that a multifaceted discourse surrounding climate issues is evolving; nevertheless, climate change continues to be framed as an isolated issue, subordinated to economic policy. Other longitudinal studies indicate not solely a rise in environmental reporting over the years, but additionally a heightened diversity of themes used in the coverage of environmental issues, as well as a transition from a focus on environment in the context of nature to a predominant association with the urban landscape (Castrechini et al., 2014).

In Greece, media coverage of environmental issues is notably marked by politicization (Gkiouzepas & Botetzagias, 2017). For instance, the investigation into the media representation of the Mati wildfire in Greece during 2018, indicated that news organizations framed it primarily as a political issue, rather than an ecological one (Karyotakis, 2022). What is more, the narratives propagated through the media exhibited a populist rhetoric, endorsing a divisive perspective that entailed a favorable depiction of the principal opposition party while concurrently presenting a detrimental view of the governing body. At the same time, there has also been a discernible rise of SLAPPS initiated by economic entities, including corporations engaged in the energy transition, aimed at targeting journalists investigating environmental violations or highlighted ecological concerns related to extensive mining and energy initiatives (Zafeiropoulos, 2024).

Despite the framing of environmental news, political and business interests also affect the choice of environmental topics covered by the media, leading to the concealment of certain issues that are at odds with their vested interests (Kostarella et al., 2013). The lack of environmental dedicated journalism within the Greek media landscape has also been seen as a substantial deficiency in the Greek society, posing a string of challenges in tackling with climate change and environmental awareness (Morfis, 2024). Against this backdrop, it comes as no surprise that in Greece, a significant proportion of people paying attention to documentaries (55%) versus major news organisations (35%) for getting informed on climate change (Robertson, 2022).

It is worth mentioning that during the latest parliamentary elections (May and June 2023) in Greece, environmental issues were "conspicuously absent" not only from the final TV debate between the leaders of the country's most prominent parties, but also from the significant pre-election speeches delivered by all political figures (Zafeiropoulos, 2024). However, this seems not to be aligned with priorities of Greek citizens, who give significant attention to environmental issues, regardless of their political orientation. In fact, as the findings of a relevant study reveal, in Greece, the difference in the proportion of people on the political left in comparison to people aligned to the right who are interested in climate change news is only 16% (Robertson, 2022).

The 2021 Eurobarometer survey reports 84% of Greek respondents perceive the climate crisis as a "very serious problem", a higher percentage compared the EU27 median (78%). This finding is within the realm of expectations, considering the geographical positioning of the nation, identified as a "climate change hotspot", and having experienced a variety of occurrences related to climate change over recent decades (such as extended periods of high temperatures, wildfires, and flooding). Moreover, a significant portion of the population (78%) expresses the belief that governmental efforts to address climate change have been insufficient (Eurobarometer, 2021).

In this context the rise of social media platforms has challenged the dominance of legacy media in shaping the public agenda, as sharing and consuming news through social media has become a significant part of our information digest (Hermida et al., 2012; Kümpel, et al.,2015). A Pew Research Center survey (2021) has revealed that younger Americans are more likely to engage with content on climate change via social media

compared to older generations. This increased interest results in the expression of anxiety and anger regarding the future outcomes of the climate crisis. In the Greek context, due to the perceived political and corporate influence on news media, a significant portion of online users (61%) currently rely on social media as their primary source of news, with Facebook being the most popular platform among them, accounting for 46% of all respondents (Newman et al., 2022).

By and large, apart from the legacy media organisations, social media platforms, and particularly Facebook, have been successfully associated with the role of raising awareness on scientific issues, representing considerable information places for science-related topics which facilitate learning (Mueller-Herbst et al., 2020) and may encourage participatory engagement and interest in an environmental context (Pavelle & Wilkinson, 2020). As a result, we should not underestimate the role of digital platforms in fostering awareness of climate change (Diehl et al., 2021) or even more in urging citizens to adopt a sustainable green lifestyle (Li et al., 2024).

Given the significant role of social media in shaping the public debate on environmental issues in the online public sphere, this study attempts to investigate whether climate change is the most salient one on social media platforms in Greece. It further investigates which actors (politicians, institutional actors, citizens) post the most engaging content, as well as the format and the sources mostly used (legacy media or alternative media) within the relevant posts. The objective of the study is to determine the factors that influence user engagement on platforms like Facebook, Twitter (now X), and YouTube, while investigating how social media users contribute to the plurality and diversity of voices in environmental discussions. Additionally, the study evaluates whether these platforms promote the democratic potential of public discourse.

The role of social media platforms in environmental communication

Past research associating social media use with viewpoints or information dissemination about environmental issues indicates a wide range of framings and strategic options denoting the versatile role played by the new media platforms in the field of scientific and environment communication (Haider, 2016; Walter et al., 2018). By studying platforms mainly through publics, themes and professional communication, research on social media communication is argued to incorporate empirical findings referring, among others, to climate change debates framed by polarization and echo chambers and by the pattern of "settled science" (Pearce et al., 2019, p. 10).

This diversity is reasonable considering that the diverse ecology of digital platforms has given rise to a new communication sphere in which users can effectively exchange opinions and disseminate information about several issues among which stand out the environmental crisis-related or climate change-related topics in the context of cross-border virtual communities (Fernandez et al., 2016, Moe et al., 2023).

In the contemporary hybrid media field, digital platforms are believed to be giving voice to different actors, often marginalized by the mainstream news media organisations, opening the way for new actors to shape the public discourse on climate change. Within this novel "hybrid media system", conditions exist for the potential rise of a new discursive power among a diverse range of participants (Jungherr et al., 2019). For instance, Newman (2017) discovered that during the publication of the fifth IPCC report (AR5), most of the widely shared tweets originated from non-elite users (bloggers and citizens). Additionally, the examination of hyperlinks that users embedded in their tweets suggests that although mainstream media sources were the most frequently discussed, science news, blogs, and other online-only platforms were also commonly cited. What is more, in studies regarding the portrayal of climate change issue on social media platforms through visualizations, it has been

found that on top tweets where individuals are featured, the focus tends to be on ordinary citizens rather than on politicians and celebrities, who are predominantly highlighted in traditional news media (Schäfer & Yan, 2023; León et al., 2022). Regarding proximity, studies show that engagement is clearly related to the national angle of news (Heidenreich et al., 2022).

When it comes to storytelling formats on the web, De Fina (2016) argues that the characteristics of storytelling are highly dependent upon the characteristics of the platforms were the narratives take place, suggesting that social media platforms' affordances foster a specific type of storytelling which is marked by "dialogicity and openness".

As the author explains, what makes storytelling distinct in social media is "precisely the way narratives are shared, recontextualized, commented upon, and subject to continuous reconfigurations and reinterpretations" (p.477).

Regarding the power of the framing in the social media era, a study which explored the effects of message framing (gain vs. loss) and social media virality metrics (numbers of likes and shares; SMVM) on the perceptions and behavioral intentions of message recipients, revealed that gain framing, in contrast to loss framing, led to a heightened perception of social desirability for pro-environmental messages that were associated with high SMVM (Park & Jung, 2022). Other environmentally focused frames, as demonstrated by social media platforms, pertain to the articulation of global climate non-governmental organizations' strategic communications on Facebook. Relevant research has shown that these organizations predominantly utilize the diagnostic frame through messages stressing the "problems" linked to climate change. The issue that receives the most frequent reference is climate action, succeeded by discussions on climate impacts and efficacy (Vu et al., 2021, pp. 104-105). As the authors suggest, boosting the use of efficacy frame in NGOs communication, might lead to an increased engagement of the public, which in turn would actively support the causes that these organizations fight for.

Research so far has indicated a preference for image orvideo-based content (Moran et al., 2020; Hodson et al., 2020). Moreover, the literature of digital mobilization has emphasized the effective role of the internet memes in raising awareness of the political discourse regarding issues such as climate crisis, bearing the potential of agenda-setting and of establishing online networks. They are considered an "effective strategic content format" in the context of digital activism on social media, having the capacity to turn users' attention to the topics and objectives raised by the activist movements (Johann et al., 2023, p. 234).

Digital users can also gain knowledge through online campaigns focusing on increasing environmental transformations (Briandana & Mohamad Saleh, 2022), presented to the public according to the affordances of each platform. From his perspective, Larsson (2017) distinguishes between older and newer social networking sites, noting that older platforms, such as Twitter and Facebook, focus more on content resharing, while emerging platforms, such as Instagram and Snapchat, prioritize personal and private interactions (2017, p.10).

Social media platforms have also been recognized as a powerful tool for advocating and enacting climate-related initiatives, despite their susceptibility to spreading misinformation and disinformation (RoshandelArbatani et al., 2016; Arnot et al., 2024). These networking platforms, taking the form of new environments of manifestation and resistance, have even permitted children to organize their pro-environmental actions in different ways and places aimed at promoting content (interactions and discussions) relating to climate justice, representing activism practices favoured by digital literacy (Orrico Serrao et al.,2021).

On the other hand, Couldry (2023) challenges the notion of the positive impact of social media in fostering solidarity among individuals to address global challenges such as climate change. He asserts that social media

platforms are inherently detrimental, being structured around profit-driven motives, encapsulating their inception as "capitalist enterprises" rather than forums for collective identification based on shared altruistic goals.

However, instead of a deterministic approach on the role of social media in cultivating social engagement towards environmental protections, it would be better to focus on cross-platforms comparisons aiming at highlighting the intrinsic potential and limitations of each social media interface in fostering climate change awareness (Gómez-Casillas & Gómez Márquez, 2023). Alternatively, like certain other research initiatives, one could delve more deeply into investigating the impact of a particular social media platform on the discourse surrounding climate change (Shapiro & Park, 2018; Effrosynidis et al., 2022). In the next section, we will try to provide an overview of relevant studies on the field to highlight the differences and the similarities in the approach of the climate change issue on different social media platforms.

Climate change awareness through the particularities of distinct social media platforms

The correlation between climate change and social media has been thoroughly examined by researchers, who primarily concentrate on specific social media platforms and online forums, with Twitter emerging as a key focal point in these analyses. The exploration of climate change discourse on social media via publics, topics, and expert communication is considered a unique characteristic of this area of study (Pearce et al., 2019).

Pearce et al. (2014) have found in their study on the discussions took place on Twitter regarding the 2013 IPCC Working Group 1 Report a notable use of hashtags associated with social aspects of climate change, a result interpreted by the authors as an attempt to "make the socially intangible phenomenon of climate change more tangible" (p.9). In the same vein, Newman's (2017) analysis of tweets following the IPCC AR5 report also revealed that the most propagated tweets revolved around "public understanding", with a primary aim of providing the public with key points and conclusions from the scientific report. According to the findings of another study on Twitter content on climate change, the online debate around this issue has been revolved around four key areas namely a) calls for action and fostering awareness on climate change, b) discussions on the consequences of climate change with tangible results such as extreme weather circumstances, c) policy debate about climate change and energy and finally d) discussions raised from local events associated with the climate change topic (Veltri & Atanasova, 2017).

Twitter's role has also been investigated in the context of natural disasters. In their examination of Twitter's use during and after the impact of Typhoon Haiyan on the Philippines, Takahashi et al. (2015) found that social media was predominantly used by various stakeholders for the dissemination of second-hand information, coordination of relief efforts, and memorialize those affected (p. 392). The study also revealed that distinct categories of users, rather than fully exploiting the structural affordances of Twitter as a social media platform, had chosen to employ Twitter in manners that aligned with their traditional roles; for instance, news agencies and journalists participated in reporting second-hand information, celebrities and ordinary individuals engaged in memorializing, and non-governmental organizations (NGOs) focused on coordinating relief efforts (p.397).

Among the various social media platforms, Facebook has been widely investigated in terms of its usage patterns aimed at enhancing citizens' awareness and knowledge of environmental issues. From an audience perspective, it is considered a useful means of disseminating information and ideas with the view to combating the causes of climate change (Rabha & Singh, 2022). The public debate on this issue has been informed by polarized features, however Facebook has been related to advancing the consensus voices rather than the sceptic ones and giving more space to civil society content rather than the business one (Grouverman et al., 2018).

The use of Facebook at a national level as a news source has been found to be mostly negatively related to perceived climate change efficacy across Europe. Particularly, in regions where social media use is at high levels, climate change efficacy viewpoints have proved to be lower (Tuitjer & Dieksmeier, 2021). However, research initiatives focusing on whether internet use for purposes of news consumption via social media correlates with perceived climate change efficacy have reached antithetical results. A negative relationship even at individual level has been observed in several European countries such as Germany, Finland, the UK, the Netherlands and France (Tuitjer&Dieksmeier, 2021) as opposed to Taiwan where the internet use has been found to affect beneficially perceptions of climate change efficacy (Huang, 2016).

A study analysing a Facebook fan-based page from the perspective of engagement behaviour and communication activities reveals that credible information pertaining to climate change is instrumental in generating digital users' reactions with content relating to weather and climate/natural disaster provoking greater engagement (Deo & Prasad, 2020: 12). The research also highlights that climate change awareness on social media differs between the developed and the developing countries, particularly small islands, with the latter displaying increased awareness on climate change issues. Moreover, the frequency of posts' emergence was found to be unrelated to promoting engagement but related to enhancing visibility of the contents to the digital users. Increased post visibility that intensifies post engagement proves beneficial in fan growth (Ibid.: 13).

YouTube is among the less explored media platforms regarding their uses and implications in climate change communication (Duran-Becerra et al., 2020, p.281). In their study on the potential of YouTube to function as an educational tool for raising awareness regarding climate change, Shahbazi and Nowaczyk (2024) tried to identify the "recipe" that makes videos on YouTube successful in terms of users' engagement. According to the findings of the study, factors such as visual attractiveness, narrative coherence, and relevance of the content to viewers' preferences were regarded as influential elements in improving engagement with climate change videos. In their analysis on the 100 most widely viewed videos regarding climate change on YouTube Duran-Becerra et al. (2020) found that most videos provided support to the "reality" of climate change and highlighted the consequences of climate change on the environment. On the other hand, only a few videos focused on the actions needed to prevent climate change.

From their part, Shapiro and Park (2015) investigated the ten most-watched videos related to the search query "global warming" on the YouTube platform. Their analysis revealed that these videos could be categorized into three main groups: videos advocating for action to combat global warming, videos advocating for action to address shortcomings in the scientific or political aspects of global warming, and a small number of videos not belonging to a specific category.

In the social media ecology, elements not embedded in the content per se, but triggered by it, such as the comments submitted in response of a video in YouTube can also have an impact on the way users reflect upon the discussed topics (Shapiro & Park, 2015). Specifically, they noted that numerous assertions were made in the comments section challenging the accuracy of the scientific content in the videos and efforts were made to introduce alternative perspectives by guiding viewers to external sources such as newspapers, magazines, and academic journals. The most interesting finding was that most of the comments were found to be unrelated to the video content in which they were posted. As a result, the authors determined that the comment section following the videos primarily served as a forum for discussing climate change itself, rather than focusing on the specific information and data presented in the video (Shapiro & Park, 2015).

In addition, Shapiro and Park (2018) by analysing the comment thread of the most popular videos on YouTube related to the climate change issue, found that a few "elite" users have a disproportionate public presence, many

of whom were driving the discussion in the pursuit of their own interest (either pro or against of climate change-related action). Under this scope, as the authors argue the deliberation potentials of YouTube towards a balanced public discussion remain marginally developed, providing evidence for the politicization of a crucial issue.

"Mind the gap": Challenges on environmental communication through social media platforms

The role of social media as incubators of misinformation around scientific topics, such as the climate change and global warming and their subsequent correlation with the polarization of the online debate has also attracted the attention of the researchers (Al-Rawi et al., 2021).

For instance, a study investigating the rhetorical and networking strategies of digital climate denial communication, based on data from two Facebook denial groups, reveals the operation of Facebook pages as echo chambers favouring the dissemination of misrepresentations and threats against a background of scientific information's manipulation (Bloomfield & Tillery, 2019). Another challenge concerns fake news dissemination on climate change through Facebook, whose proper evaluation by the digital users seem to be reliant on efforts to improve their critical thinking and motivated reasoning as well as to cultivate knowledge about climate change (Lutzke et al., 2019).

From their part, Falkenberg et al. (2022) to investigate the extent of polarization on political debates regarding the issue of climate change examined Twitter data focused on the Conference of the Parties on Climate Change (COP) between 2014 and 2021. The findings revealed a rise in climate scepticism rhetoric since late 2019, primarily influenced by increased right-wing engagement, which posed a challenge to the prevailing pro-climate narrative at that time. As a result, a highly polarized online climate debate has taken place on Twitter during COP26. In the same vein, a diachronic analysis of climate change discussion on Twitter has revealed that climate change deniers and believers differentiate themselves regarding the terminology used to address the issue, selection of topics as well as tonality expressed in their tweets, pointing to the highly politicization of the issue (Effrosynidis et al., 2022).

Twitter's role in fostering polarization in public debates, has also been examined by Golder and Graham (2024), whose analysis on Twitter posts that integrate climate change issue with health, indicated that Twitter functions as a polarized platform, characterized by the prevalence of two conflicting frames; one attesting to the reality of climate change along with its tangible repercussions on public health and a second one maintaining that that climate change is a fabrication, with any purported health consequences being similarly unfounded. This latter, "hoax" frame presents a counter-narrative to the "reality" frame, by questioning the validity of scientific findings as well as the governmental policies.

Methodology

The present study focused on conducting a quantitative analysis on the most engaging posts regarding environmental topics on three social media platforms: Facebook, Twitter and YouTube (n = 327). These platforms were the most popular social media platforms for Greeks to get their news (Reuters Institute, 2021). The methodology framework for the sample collection regarding the period and the social media channels was part of a synchronic analysis in ten countries for the EUMEPLAT project (Cardoso et al., 2021).

The posts were collected from September to November 2021 based on a catalogue of 24 keywords related to the environment (i.e. climate, biodiversity, ecology, pollution) and 15 keywords regarding the European Union (i.e. Brussels, MEPs, EU Green Deal etc.). The posts collected were ranked based on user engagement metrics, namely "total interactions" for Facebook and "total reach" for Twitter. In order for the sample to be balanced all participating countries analysed the 60 most popular posts of each category. Unfortunately, in the Greek case there were not enough posts on YouTube during the period under examination, therefore all related posts were included in the sample, regardless of their popularity. It is important to note at this point that these platforms use different metrics for user engagement, therefore the results of the study were analysed within the platforms and not among them.

In our analysis, we examined all content within each post, including text, images, videos, and links. If a post contained a link to an external site, this link was also analysed. The analysis focused on several aspects: the format of the posts, the entity that posted the content, the topic of the post, the type of sources cited (whether legacy media or alternative sources), the type of journalistic content (if any), and the scope of the post (global, European, or national).

By examining the most popular posts published by media accounts, Facebook groups, and individual users, the study aimed to identify the elements that drive users' engagement with a post, with the goal to define best practices for environmental communication on social media platforms. Therefore, our research questions are formed as follows:

RQ1: Are there different patterns of engagement across the three social media platforms?

RQ2: Do patterns of engagement vary significantly according to content format, topics, posting agent, type of source, or scope of the post?

Based on the theory we expect to find the following: H1: *Video and image to be the most engaging types of content*. H2: *Climate change to be the most prominent and most engaging topic among environmental issues.* Moreover, given the low trust of Greek citizens to media and institutions we expect H3: *News that comes from alternative sources to be more engaging* (alternative media, activists, citizens). Finally, regarding proximity we expect H4: *News with a national scope to be more engaging than those with European or global scope.*

Results

In our analysis we considered the most popular content published on social media by different kinds of sources. Both in Facebook and Twitter, we distinguished content coming from media organisations as well as from individual users. In the YouTube case, considering the small volume of relevant posts, all content was treated as one group, as shown in table 1.

Table 1: Number of posts in the research sample

	Number of Posts
Facebook Users	60
Facebook Groups	60
Facebook Media	60
Twitter Users	60
Twitter Media	60
Youtube All	27
TOTAL	327

In terms of content creators, there are notable divergences among the platforms incorporated in the research sample. As shown in table 2, in most of the cases users on Facebook were politicians, including some journalists and influencers. People posting on Facebook Groups were mostly common citizens, while more than half of Twitter users were coming from organisations, both private and public ones. Finally, most of the YouTube content was posted from media outlets.

Table 2: Type of posting agent

	Posting Agent (n=327)			
	Politician	Media Outlet	Organization	Individual User
Facebook Users	38	7	8	7
Facebook Groups	3	0	0	57
Facebook Media	0	60	0	0
Twitter Users	7	1	36	16
Twitter Media	0	60	0	0
Youtube All	1	16	9	1
TOTAL	49	144	53	81

As shown in table 3, the most frequently used post format included links (n=175), while almost one third of posts included images, and, to a lesser extent, videos (including live videos, Facebook native, YouTube or videos embedded from another source as links). Posts based only on text were very few in the sample (3.4%).

As expected, links were found in all posts coming from media organisations, leading social media users to their corporate websites.

On the other hand, users in Facebook groups as well as in Facebook pages made extensive use of images when posting. Images were not, however, a popular format on Twitter, where users prefer to post links along with their tweets.

Table 3: Type of post format in social media platforms (n=327)

	Post Format			
	Only Text	Link	Image	Video
Facebook Users	3	9	40	11
Facebook Groups	3	12	44	0
Facebook Media	1	56	2	1
Twitter Users	6	40	9	5
Twitter Media	0	58	0	2
Youtube All	0	0	0	27
TOTAL	11	175	95	46

When examining the kind of links shared among users in social media, the dominance of legacy media is indisputable. However, individual users both on Facebook pages as well as on Facebook groups do not provide links for their statements, while users on Twitter link to other kinds of sources, mostly to public institutions' websites.

Table 4: Type of news source (whether mentioned in text or as referring link/ video)

	Legacy Media	Alter. Media	Blogs	Other
Fb Users	8	1	0	0
Fb Groups	3	3	1	5
Fb Media	59	1	0	0
Twitter Users	12	3	0	32
Twitter Media	59	0	0	1
Youtube All	9	6	3	9
TOTAL	150	14	4	47

News content shared on social media platforms consists mostly of simple news reporting. News analysis, feature articles as well as opinion articles are all under-represented (table 5).

Table 5: Type of news content (whether legacy, alternative media or blogs)

	News stories	Analysis	Feature Article	Opinion
Fb Users	8	1	0	0
Fb Groups	5	2	0	0
Fb Media	50	3	6	1
Twitter Users	10	3	1	1
Twitter Media	43	13	3	0
Youtube All	11	2	0	5
TOTAL	127	24	10	7

Regarding the topics addressed on social media, during the period under examination the most prominent topic is energy, and particularly the rising cost of it.

Therefore, our hypothesis that climate change would be the most salient issue is partially rejected. Indeed, energy preoccupies both media and citizens on Facebook (Fb users, Fb Groups). Users of Twitter, on the other hand, tweet mostly about policies regarding the environment and climate change, a fact that explains the frequent use of links to institutional sources.

Moreover, as mentioned above, more than half of the Twitter users incorporated in the sample, consisted of accounts related to both public and private organizations. Topics related to climate change are mostly addressed by Facebook individual users compared to media organisations, while this topic doesn't seem popular on Twitter. On the other hand, topics related to pollution are solely addressed on Twitter and YouTube, while being ignored by Facebook users. Lastly, topics related to waste management are prominent on YouTube by local news media and municipalities (Table 6).

Table 6: Main Topic addressed in social media posts

	Energy	Climate Change	Env. Policies	Fauna	Pollution	Waste Management	Other
Fb Users	25	8	15	9	-	3	-
Fb Groups	24	20	6	6	-	1	3
FbMedia	35	19	6	-	-	-	-
Twitter Users	13	7	27	1	1	5	6
TwitterMedia	27	9	16	1	6	1	-
Youtube All	5	7	-	-	2	8	5
TOTAL	129	70	70	17	9	18	14

The tone of the posts in most of the cases remains neutral. This was to be expected since most of the sources in the sample are institutional. Few exceptions were encountered in posts by single users and users of Facebook Groups, as well as by Twitter users, where almost one in five posts had a negative tone (table 7).

Table 7: Tone of posts (n=327)

	Positive	Neutral	Negative
Facebook Users	0	51	9
Facebook Groups	0	47	13
Facebook Media	0	60	0
Twitter Users	10	39	11
Twitter Media	9	38	13
Youtube All	0	26	1
TOTAL	19	261	47

However, the main goal of our study was to determine what drives users' engagement. According to our ANOVA tests, Facebook users are engaged in posts according to their format (text, image, video, link) with a significant effect $F\ (5, 174) = 5.8, p<.001$. Native video was the most engaging type of content, followed by posts that contained only text and posts that included videos from external sources. The effect size (eta square) was 0.143 indicating a large effect, confirming our first hypothesis.

Other factors such as topics, link type and news content indicated a weak to medium correlation rejecting the second hypothesis. However, posting agents, whether politician, media, organisation or individual, indicated a strong correlation to users' engagement $F\ (3, 176) = 15.8, p<.001$. Posts coming from organisations drive the biggest engagement, followed by posts published by politicians. The effect size was 0.212 indicating again a strong correlation.

We therefore had to reject our third hypothesis on alternative sources. Finally, another important factor was the scope of the post, whether global, European, national $F\ (2, 176) = 6.94, p<.001$. National content was by far the most engaging for users on Facebook. The effect of scope for users' engagement was large (η^2= 0.7), confirming our last hypothesis.

Regarding Twitter users, the source of links seems to have a significant effect on users' engagement $F\ (3, 116) = 5.8, p<.001$. The most engaging content for Twitter users comes from legacy media. The effect was close to medium (η^2= 0.13). The type of agent posting the content was also significant $F\ (3,116) = 22.8, p<.001$. The most engaging content on Twitter was published by politicians, followed by media accounts. The effect was large (η^2= 0.37). Finally, we were not able to identify significant factors for users' engagement on the YouTube platform.

Concluding remarks

Social media are believed to have revolutionized the public sphere on many topics, including environmental and climate change issues, by providing citizens and social movements an open space to express their concerns. These new online practices can be regarded as a breakthrough against the background of platformisation of communication where the new affordances and features of social media platforms have modified how digital users evaluate public opinion, perceive source credibility and gauge the opinion climate, leading to the position to

speak out (Leong & Ho, 2021). Moreover, studies have shown that online debates regarding environment-related issues are becoming politicized and increasingly polarized, due to the rise of climate-sceptics and right-wing populism (Falkenberg et al. 2022, Chen et al., 2021, Moernaut et al., 2022).

When interpreting the findings of the present study, it is important to consider that Greek citizens exhibit low trust in both public institutions and the media. Surprisingly, across all social media platforms analyzed, people seem to engage more with content from institutional sources. The posting agent significantly influences user engagement with Facebook content, with organizations and politicians generating the highest levels of engagement. On Twitter, regardless of the posting agent, the content shared among users predominantly originates from organizations, and the most engaging content often includes links to legacy media sources. These findings highlight a paradox where, despite a general mistrust in institutions, institutional sources remain highly influential in shaping public discourse on social media.

Therefore, it is observed that even though people distrust institutions, they don't question the official agenda regarding this topic. Of course, there are also oppositional voices pertinent to national policies, as well as climate-sceptics and deniers in Greek society. However, they have not managed yet to gain big traction on social media. After all, our study focused on the most popular posts in each category, thus examining only the tip of the iceberg. On the other hand, considering the susceptibility of social media to misinformation and disinformation, the increased engagement with institutional sources could be interpreted as an attempt to enhance the credibility of the public discourse (Arnot et al., 2024). In fact, the limited "ecological diversity" of information sources present in Tweets, is also highlighted in another relevant research which revealed that users on Twitter predominantly favour traditional and professional outlets such as newspapers and public broadcasting (Veltri & Atanasova, 2017). However, some other significant trends were also identified. The format of the post proved to be a significant factor in users' engagement on Facebook. Video is said to be the most compelling type of content. Our results are in accordance with other studies in the field of marketing (Moran et al., 2020). It is noteworthy that the media organizations both on Facebook and Twitter utilize a post dissemination distinct from that employed by individual users. Media representatives place a significant emphasis on links as a primary component of their content strategy, contrasting with the preference for images by individual users and groups on Facebook. On Facebook the heightened public engagement appearing with posts accompanied by photos and videos underscores the platform's audiovisual-centric nature, to which users and groups adapt their posting techniques accordingly. Consequently, the format of post presentation emerges as a substantial predictor of audience's engagement.

Although Facebook groups disseminate exclusively typical news content they are informed by a somewhat balanced pluralism -compared to Facebook users or Facebook media accounts- in terms of the sources cited within the disseminated news content. Their references to legacy and alternative media, to blogs and other sources imply an inclination to open a dialogical communication with many agents within society, a pattern of news dissemination found in Twitter users' accounts and YouTube accounts as well. By contrast, media accounts both on Facebook and Twitter, when it comes to sources, are distinctive by adopting a more one-dimensional practice emphasizing mainly those sources coming from mainstream media organisations even though their posts operate as disseminators of different types of news typologies (fact-oriented and analysis-oriented news, opinionated or/and feature narratives). Nevertheless, these divergences among the different social media accounts seem to play an insignificant or minor role in how the audience is engaged with the content.

According to research findings, for Facebook users the content was most engaging when it referred to environmental issues from a national perspective, a finding that was also expected. Most of the factors that

proved considerable on Facebook platform displayed a medium significance for Twitter users. In fact, the most important factor for Twitter was the posting agent, but in this case politicians' content has the biggest popularity, followed by organisations. This finding can be explained also by the nature of Twitter as a niche platform in Greece consisting mostly of politicians, journalists and social movements. Finally, content linking to legacy media was the most engaging for Twitter users. This finding is also interesting, since in our sample media organisations had bigger numbers of followers, but their content did not drive big engagement when posted from their corporate accounts. It is worth mentioning that our findings align with previous research on the discourse of climate change on Twitter, presenting support for a "highly centralized information flow" within the platform. Specifically, an examination of Twitter demonstrated that a select few established entities (prestigious media, news aggregators, celebrities, organizations) alongside a newly emerged group of influential bloggers, continue to hold significant influence in shaping conversations related to climate change (Kirilenko & Stepchenkova, 2014). Social media engagement is a complex procedure referring to a state of cognitive and emotional immersion in the use of social media tools (Smith & Gallicano, 2015), involving users' feelings about social media content and their reactions towards it (Bennett et al., 2011). From this perspective, the role played by the posting agent's credibility in how digital users evaluate information online and obtain willingness to express their reactions should be considered reasonably pivotal, since in the platform era netizens have proved frequently reliant on group-based means and "cognitive heuristics", enabled by web-based tools (social networking sites, online ratings and reputation systems), to implement their assessments regarding the credibility of online information and sources (Metzger et al., 2010). The research results of the present study highlight that on social media platforms the content communicator - and not just the content per se - is a positive predictor of enhanced engagement on the part of the users, a finding reflected in part in previous research outcomes arguing that, particularly in Facebook environment, the effect of content creator's credibility has proved significant in influencing users' willingness to express themselves. The same influence has been found to be in operation when there is a moderate opinion climate agreement with the comments posted on the platform bearing the potential to impact considerably the perceptions of the opinion climate (Leong & Ho, 2021).

In conclusion, one of the most notable findings of this study is the dominance of institutional voices on social media platforms in Greece concerning the environmental agenda. Although adversarial voices are present, they have not succeeded in challenging the official agenda on this topic. Furthermore, actors seeking to gain visibility on these platforms should focus on creating compelling content with a strong visual component, particularly videos on Facebook and links to trusted sources on Twitter. YouTube, on the other hand, is not widely utilized for addressing environmental issues and climate change. This makes it a favourable medium for smaller actors, such as local media and local and regional political figures, to present their policies and convey their messages.

Before concluding, it is crucial to address the limitations of the study. First of all, this study was common across ten countries resulting in a rigid research frame regarding the period and social media channels under investigation. Moreover, the datasets were constructed based on (anonymised) public information collected through the platforms' APIs in compliance with GDPR regulation. Therefore, during the period under examination there was most probably more content produced, but that was not accessible, given that it came from private accounts.

In our analysis we considered "total reach" for Twitter and "total interactions" for Facebook, based on the understanding that these are the most suitable proxies for gauging the level of user engagement within a post. It is also important to note that each platform has its own unique structure and approach to networking. For instance, Facebook features individual profiles, public pages, and groups. Twitter supports both individual and

corporate accounts, whereas YouTube is primarily centered around content creators and consumption, with little focus on user-to-user networking. As a result, it is expected that differences will arise between these platforms in terms of both content creation and consumption. Finally, it is worth noting that this study is synchronic, meaning that the results may vary significantly across different periods of time.

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