

MULTI-MODEL ANALYSIS OF THE UNITED NATIONS' SDG COMMUNICATION STRATEGY ON INSTAGRAM

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submitted by

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ABSTRACT

This thesis introduces academic outlook on environmental communication on the Web and social media platforms. Starting from the analysis of media paradigm transition from human-centred to planet-centred which human is a part of, the author presents review of sustainability communication and literacy research. Using digital methods, the UN communication about SDGs on Instagram is analysed. After the Big Data extraction, the visual and textual analysis of posted content and comments is performed. Basing on the content analysis outcomes, perspectives on future of environmental communication research are suggested.

Keywords:

Environmental communication, ecomedia, digital methods, Instagram, SDGs, UN, international organisations, social media, content analysis, framing

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1 Introduction

The beginning of the 21st century has been marked by the need to mitigate global problems such as climate change, poverty and social inequalities. Humanity faced the need to reconsider its relationship with the planet. Different actors such as governments, NGOs, activists, and academia have been reflecting on this societal transformation, but within the scope of this thesis, international organizations' perspective is taken. In response to this paradigm shift, international institutions started to develop new frameworks for long-term societal development.

Accordingly, United Nations (the UN) has developed the Sustainable Development Goals framework (the SDGs) which aims to unite global community. Defining the SDGs is a quite tricky task since it has been seen as both action plan and ideology. Processing different definitions on the web published by international institutions, the SDGs are generally perceived as an action plan for different stakeholders to consider while developing policies and agendas in line with diversity, equality and sustainability values. Following this, the audience is getting engaged to share a sustainability mindset consisting of named values. Sometimes the SDGs are defined as "a universal call" for collaborative action for a better future which can be perceived as an ideological foundation. In the following *Figure 1*, there are keywords from 7 definitions found on the institutional websites presented (the full definitions are in Appendix 1). Overall, the definition hugely depends on the organization and its relation to the SDGs' realization.

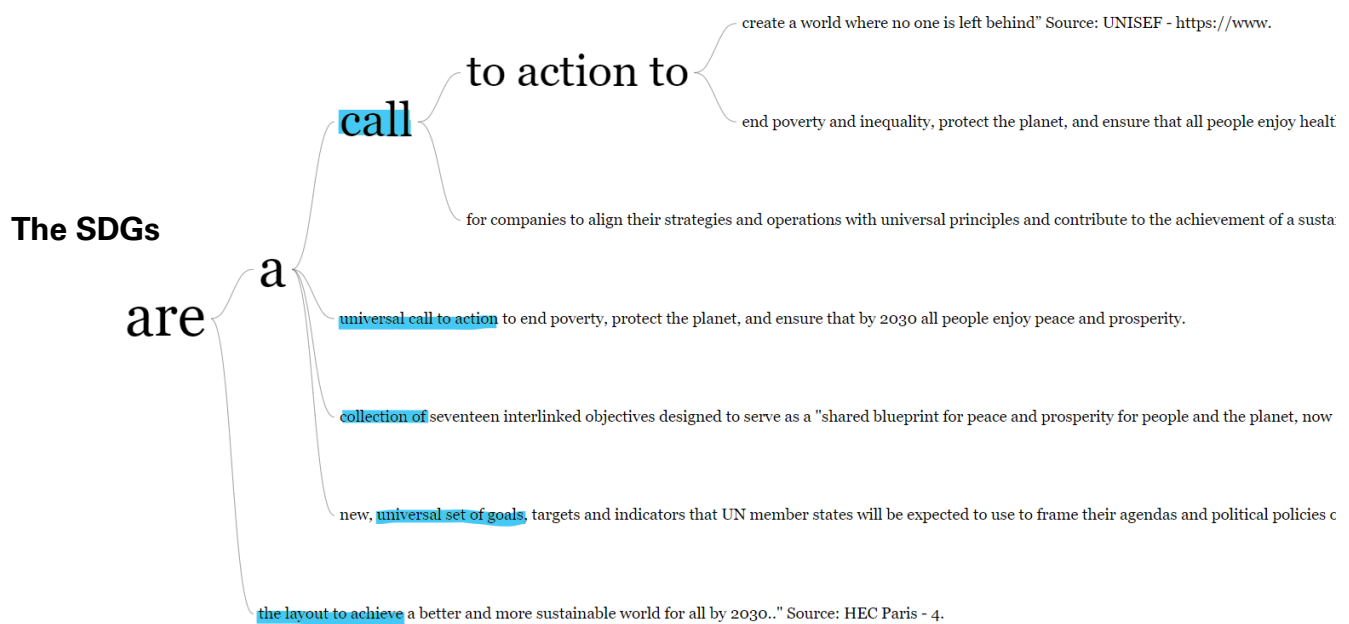


Figure 1. International institutions definitions on the Web

As McLuhan predicted, new media changed the way people get content (McLuhan, 1964). Social media platforms have revolutionized content distribution, enabling users to receive real-time updates, news, and other forms of content at any time and globally via the Internet. Another McLuhan's concept of the "global village" refers to how electronic media, like television and the internet, collapse spatial and temporal barriers, connecting people worldwide into a single community. Instagram, as a social media platform, contributes significantly to this global village phenomenon. People from different countries and cultures can interact, share, and consume content seamlessly, fostering a sense of interconnectedness and shared experiences (McLuhan, 1964). In terms of environmental communication online, Instagram as media channel has great potential to create green communities which exchange knowledge about eco-friendly habits and sustainable practices. The United Nations among other channels take advantage of social media platforms opportunities to promote the SDGs.

With emerged greenwashing phenomena in information flows, environmental communication by official channels of international organizations is highly relevant. In the context of environmental communication, greenwashing can be defined as misleading messages to create a false image of environmental and social responsibility. Greenwashing phenomena are worsened on social media platforms since they have dynamic information flows naturally. As a result, online users need official and scientific-based information about sustainability. This explains the relevance of this thesis.

This thesis represents my meaningful contribution to the broader field of environmental communication studies in online environments, focusing specifically on content flows related to sustainability through the lens of the UN. By conducting this research, my aim is to gain a comprehensive and in-depth understanding of the key narratives prevalent in environmental communication. Furthermore, I hope to uncover innovative and novel ways of applying digital methods to advance the research on environmental communication.

The hypothesis driving this thesis is rooted in the belief that the online messages disseminated by international organizations, like the UN, significantly influence the general public's perception of a sustainable future. In light of this, it becomes imperative to consider the dimensions of environmental communication to ensure the effective promotion of the Sustainable Development Goals (SDGs).

By exploring content flows and narratives in this context, I seek to contribute to the broader understanding of how digital platforms can shape public perceptions and attitudes towards sustainability. Ultimately, I aspire to offer valuable insights that can inform communication strategies, fostering more meaningful engagement and support for sustainable development initiatives. As the world increasingly relies on digital media

for information consumption, comprehending the impact of environmental communication in online spaces becomes all the more essential for promoting a sustainable and environmentally conscious future.

The structure of this thesis will begin with a robust theoretical framework of environmental communication, incorporating insights from prominent scholars like Cubitt and his concept of Ecomedia, which signifies the transformative nature of environmental discussions in media. Subsequently, a comprehensive review of existing research on environmental communication will be presented, providing a systematic analysis of political and digital aspects. Moving on to the study itself, the content and engagement analysis of the UN's Instagram communication is being conducted through the application of digital methods. This section will encompass an exploratory analysis of how digital methods can be effectively utilized in environmental communication research, in addition to conducting visual and textual analyses of the content disseminated by the UN on the platform.

The ultimate goal of this study is to establish a significant connection between the sustainability narratives propagated by the UN and the subsequent public response to these messages. By deciphering these relationships, the thesis aims to contribute valuable insights into the efficacy of environmental communication in shaping public perceptions and attitudes towards sustainability. Through this structured approach, the thesis endeavors to bridge theoretical knowledge with practical application, offering a holistic and comprehensive exploration of environmental communication dynamics in the digital age.

2 Sustainability communication as a scholarly topic

Sustainability communication is a burgeoning area of scholarly interest that spans across multiple interdisciplinary fields, including environmental communication, science communication, social marketing, and sustainable development. As a research subject, sustainability communication explores a wide array of communication methods and information dissemination across various channels, such as mass media, interpersonal communication, and social media. Researchers in this field aim to understand how messages related to sustainability and sustainable development are conveyed to the public and how they influence attitudes, behaviors, and decision-making.

Researchers in this area analyze the effectiveness of different communication strategies, messaging approaches, and narrative frameworks to identify the most impactful methods for promoting sustainable behaviors and fostering public engagement with sustainability issues. Moreover, they explore the role of stakeholders, organizations, governments, and advocacy groups in shaping sustainability narratives and driving meaningful change.

By investigating communication patterns, information flows, and the reception of sustainability messages, scholars contribute to the development of effective communication strategies that can drive sustainable development initiatives, raise public awareness, and mobilize collective action towards a more sustainable future. As sustainability continues to be a pressing global concern, understanding and optimizing sustainability communication becomes increasingly essential for creating a positive impact on individuals, communities, and the planet.

Within the framework of this thesis, I am going to conduct background research on sustainability communication and its specifications in modern media. This chapter will be devoted to analysis of the emerging shift in social perception of oneself and the environment, and how this is reflected in the media. To start with, with reference to Sean Cubitt's ecomedia concept, the role of media in facilitating environmental discussions is being analysed. (Cubitt, 2005) Thereupon, trends in media such as digitalization and politicisation are being discussed, which influence environmental communication. Following this, there is an overview of the methodology being used by scholars lately to capture online environmental communication.

Diving into the nature of sustainability communication nowadays, it is highly cooperative among interested institutions at the international level. The United Nations organisation is actively involved in solving these problems, initiating international meetings and creating strategic programs and, specifically, developing Sustainable Development Goals to be achieved by 2030. The eco-education mechanisms developed by the UN have become an important step towards global cooperation in order to mitigate the environmental crisis. In the context of mass communications, the coordination of the interests of all participants in negotiations to overcome the climate crisis is possible only with effective communication, manifested in the precise formulation and transmission of information. I intend to start with reflecting on the philosophical conversion of media from human-centric to planet-centric standpoint explaining the relevance of sustainable communications studies and then track this transformation by recording changes in the online media. All these takeaways and more are examined in the following sections.

3 New media and ecomedia

With ongoing climate change and increasingly extreme weather events across the globe, the world has witnessed a growing concern for the planet's future and governments and international institutions like the United Nations (UN) have acknowledged the need for sustainable solutions to address the environmental challenges the modern world faces. Furthermore, millions among the global population are still living in extreme poverty without access to essentials such as food, healthcare, clean water or electricity. Academics and politicians have realised that environmental problems are complex and cannot be fixed without addressing social and economic ones. Given that problems should be remedied together, in 2015 the UN on top of the existing Millennium Development Goals framework (MDGs) created the action plan of 17 Sustainable Development Goals (SDGs) to achieve by 2030 (Roser, Ortiz-Ospina, 2018). Unlike MDGs, SDGs emphasise the co-dependency of global problems to be solved together. The SDGs are meant to be universal and applicable to all countries, following the slogan "leaving no one behind". They recognize that sustainable development cannot be achieved unless the most vulnerable and marginalised populations' needs and basic rights are addressed.

Meanwhile, the media sets 'the agenda of the day' and is supposed to raise public awareness regarding the complex global problems we face. Going back to the last century, in the 1920s Walter Lippmann proposed a theory regarding the "agenda-setting" role of media (Lippman, 1922). He observed that mass media are focused on some topics and tend to silence less important topics from their point of view and, as a consequence, media owners, editors and journalists jointly set priorities of news to be told what influences public perception of what's going on. Therefore, it's important to realise what emphasises and biases media sources are taking. Then it becomes

obvious that there should be a variety of voices and opinions about global problems, but still, there should be scientific-based knowledge being spread widely when it comes to sustainable development. Social, economic, ecological issues and institutional development shouldn't remain "what politicians decide" and should be addressed on all levels, regionally and globally.

Supporting the evidence of the agenda-setting media effect, Cohen contends that mass media does not necessarily direct public opinion on issues, but it significantly shapes the discourse around any public phenomena: "The press may not be successful much of the time in telling people what to think, but it is stunningly successful in telling its readers what to think about" (Cohen, 1963). Therefore, the media can silence some significant issues about the climate crisis and other sustainability-related problems for the involved actors' interest, and create narratives supporting nature exploitation. The narratives about the environment modern media creates will be discussed later in this chapter. However, although the agenda-setting theory sheds light on how media impact on the relative significance of any issue, it does not define public opinion itself. Environmentalists and green activists have a prior strong interest in sustainability which cannot be faded away if problems are silenced. Therefore, it is impossible to state a direct correlation between media coverage concerning sustainability and its corresponding impact on public perception.

Ecomedia, the intersection of ecology and media, has emerged as a crucial aspect of contemporary environmentalism. In 2005 Sean Cubitt published a groundbreaking book in media studies called *Ecomedia* where he first introduces the definition of ecomedia. He starts by analysing the influence of popular media on ecological politics and decisions by analysing environmental topics in films and television

programs since the 1980s. He warns that the human-nature-technology system is unbalanced (Cubitt, 2005, p.133). He was sadly admitting that mass media represent existing environmental issues through the prism of dominant political-economic discourse, and, therefore, climate change and other global problems were neglected.

Back to early 2000s, Pat Bereton and Sean Cubitt have observed that environmental discourse is shown as utopian in Hollywood which points to the weakness of ecological politics at that time (Brereton, 2004; Cubitt, 2005, p.1). There was low scientific knowledge integration in media and environmental problems remain something of green parties, scientists or corporations headache. In Juri Lotman's terms of "semisphere", there was a small green activist culture inside a global conversation about the future (Lotman, 1990). However, these cultures were influencing each other and the following decade witnessed increased recognition of the urgency to address environmental and social challenges when international agreements such as SDG (2015) and Paris Climate agreement (2016) were adopted and investments to sustainable innovations were increased. These eco-aware actions implementations were turbulent but defending a trend there was a positive change towards prioritising sustainability transition. As a result, in the 2020s, in post-pandemic time, we can see that the sustainability mindset delved into global discourses — it has become part of educational programs, waste management regulations and emissions laws, etc.

Supporting this observation, the sustainability agenda is frequently concentrated for governing local environments, such as a city or country. These surrounding ideas are all around us, much like texts' contexts, and influence our perception of the world. According to Latour, individual mindset is influenced by an existing cultural set of beliefs and values. No human life is self-contained, which is

consistent with systems theory and ecology (Latour, 2004, p.223). Personal consciousness transcends a person's bodily limitations. To conclude, the author argues that it is incorrect to take "the best for the majority" approach when it comes to sustainable development since different communities have different needs.

Cubitt does a complex analysis for understanding how different forms of media facilitate ecological discussion and encourage inaction and invisibility of existing problems. He basically reads messages in given contexts and observes that the majority of humans are refusing to take part in solving complex social and environmental problems remaining with the capitalist idea of wealth creation at any cost. However, the media takes responsibility for generating meanings for the audience, so in terms of ecology in the media, it means to make all voices raised including nature, wild animals etc.

He observes the fundamental shift of social science from a human-centric to a broader, planet-centric understanding of society which also includes nature, animals and the planet (Cubitt, 2005, p.93). Indeed, nowadays we can observe a shift in mass and social media that endless consumption and money creation is not the only way for society's existence and there are some alternatives gaining popularity such as sustainability mindset. He argues that modern media shapes perception on environment and society where the planet is perceived as a complex system of "more-than-human" relationships and highlights human-nature codependencies. The basis of sustainability mindset is the understanding of a planet-centred approach unlike human-centred one.

The author believes that environmental degradation is "slow violence" and calls mass media for action. "Slow violence" is a concept introduced by environmental

scholar Rob Nixon to describe forms of violence that occur gradually and over an extended period of time, often away from the immediate gaze of public attention. It affects communities and ecosystems in ways that may not be immediately visible or easily attributed to specific causes.

Nixon argues that slow violence encompasses a range of interconnected environmental and social injustices, such as the degradation of ecosystems, the impacts of climate change, the loss of biodiversity, and the long-term health effects of exposure to toxins and pollutants. These forms of violence disproportionately affect marginalised communities and future generations, as they bear the brunt of the slow and often invisible harm. Furthermore, slow violence goes in hand with environmental racism and often occurs in geographically distant or marginalised places, making it easier for these issues to be overlooked or disregarded by mainstream media and political systems.

Having a closer look at modern green media we can see that there are some sustainable practices promoted such as zero waste, shift from owning to sharing, green energy, organic farming, sustainable transportation, wildlife conservation as well as climate change scepticism which will be discussed later.

Lately influential groups, such as churches, trade unions, and minority political parties, engage audiences to organise fundraising and to foster communication campaigns, whereas environmental organisations are crafting narratives. The ubiquitous presence of the Internet and mass media has become an irreplaceable component in the dissemination of both radical and conservative perspectives concerning the phenomenon of global warming. These emerging discussions around

sustainable ways of living emphasise that many in society are interested in doing their contribution to solve complex problems.

Unpopular and dangerous nature-exploitation practices are observed globally. On the one hand, everything has started from industrialization, and European colonialism in the past. These are many different reasons behind unsustainable economic models around the world but there is a common solution plan suggested in SDGs.

Barry Holden notes that there is a predominant view that democracy enhances environmental protection (Cubitt, 2005, p.135). However, the global decision-making political process is still full of hierarchies where there are different levels of influence by electorates, national governments and international institutions. There is a lot of lobbying happening behind closed doors. For example, the World Trade Organization has been involved in various disputes related to environmental policies and regulations, and its decisions have often had an impact on global environmental politics. There are some positive examples of when WTO mitigates environmental problems via regulations such as GMOs restrictions in the EU in 2006 (European Commission, 2006) and country-of-origin labelling in the USA in 2012 (WTO, 2012), as well as negative ones such as WTO standing against India's solar power program in favour to US solar exports in 2019 (United States Trade Representative, 2019), and WTO standing against the European Union's ban on imports of palm oil-based biofuels in favour to Indonesia, one of the world's largest producers of palm oil, although this ban was aimed to fight deforestation (WTO, 2020). For the present, it is hard to balance sustainability and WTO principles on non-discrimination and non-technical barriers to trade.

Characteristically, Cubitt also examined the social dimension of the sustainability mindset. The issue of environmental sustainability and poverty alleviation is complex, with multiple factors contributing to the problem. Sustainable development at the current stage presents a double-bind scenario. It seems unlikely for developed regions to reduce consumption or dependency on carbon fuels, which causes more pollutions. Additionally, developing countries cannot afford access to good education and well-paid jobs, and consequently immiserated populations cannot prioritise sustainability over surviving (Cubitt, 2005, p.138).

Indeed, addressing sustainability challenges requires decisive action from decision-makers to facilitate a balanced and sustainable transition. However, the inherent nature of governance often results in decision-makers being distanced from the people they represent. Bridging this gap calls for a more ecologically informed concept of mediation, one that goes beyond merely providing solutions but instead focuses on understanding the complexities of the issues at hand. By embracing a comprehensive understanding of sustainability issues and involving a diverse range of stakeholders, decision-makers can develop more inclusive and impactful policies that lead to positive change. It recognizes the importance of engaging communities, civil society, and diverse interest groups in the decision-making process, fostering a sense of ownership and empowerment towards sustainable initiatives.

Therefore, to address the environmental challenges we face, we must take into account the social and economic realities of different populations and work towards creating sustainable solutions that are inclusive and considerate of all. This requires the involvement of all sectors of society, including policymakers, educators, and green movements, to create a comprehensive approach to addressing the issue of poverty

and environmental sustainability. Only through collective efforts can we hope to create a more sustainable and equitable world for all.

Later, fellow researchers, in line with the *Ecomedia* book, demonstrate the significance of environmental framing in ecophotos, ecofilms, and ecomedia as a whole. The findings of recent research made by Soles & Chu can be contextualised by referring to earlier works developed by Émile Durkheim and Erving Goffman on framing phenomena in the 20th century, which laid the foundation for our understanding of the significance of ecomedia. (Durkheim, 1893; Goffman, 1974) They have shown evidence that the representation of any information can influence how it is understood and interpreted by audiences. Since humans are primarily visually-oriented beings, visual media plays a prevalent role in shaping our understanding of the world. However, this framing can also harm sustainable development by emphasising certain aspects and relationships while omitting others. As a consequence, ecocritical ideologies are often misrepresented or ignored in the media. (Soles, C. & Chu, K., 2016)

Ecomedia studies aim to analyse how visual media frames the environment and its relationships with humans. At present scholars drive attention to framing phenomena in public opinion to capture framing effects and gain a deeper understanding of the factors and motivations to engage different audiences in decision-making processes concerning climate change. It helps to understand why different segments either acknowledge or dismiss arguments, risks, and aspects of the climate change debate. Although framing has a negative impact on defining sustainability agenda, it also helps to define the commons among different audiences. (Newman, 2015, p. 366)

Environmental communications scholars are keeping pace with rapid changes in media being online and understanding the effects of framing there. Diving into the online sphere, information gaps are primarily covered by advocacy-oriented media and eco-driven activist commentators. Scholars observe that this behavioural shift has resulted in framed interpretations presented by bloggers and advocacy journalists and lack of in-depth reporting on scientific and policy relevant updates about climate change and sustainability. Also online news and comments are heavily influenced by social context. As a matter of fact, they are preselected by individual bias defined by their worldviews and political preferences and, on the other side, technically by online media platform algorithms defined by past browsing history. (Newman, 2015)

To analyse these trends and framing effects environmental communications scholars can get insights from Big Data analysis and code the frames of social media discussions. By developing typologies of frames they can track sustainability discourses across different online media and audiences. This type of study will be provided in the next chapter where the UN online communication about sustainability will be analysed. (Newman, 2015)

Ecomedia plays a crucial role in shaping a "non-speciesist" perception of our planet, transcending the traditional human-centric worldview. By shifting subjectivities away from human-centric perspectives, ecomedia studies can promote a more earth-centred view of the world that includes the importance and value of non-human species. In the context of sustainability and environmental communication, ecomedia challenges the notion that humans are superior to other species and fosters a more inclusive and compassionate outlook towards all life forms. This non-speciesist approach aligns with the principles of social justice, striving to dismantle discrimination

based on species, just as racism or sexism seeks to eradicate prejudice based on race or gender (Soles, C. & Chu, K., 2016, p.22). Soles, C. & Chu, K bring eco-photography as an example. By featuring non-human subjects in films and emphasising their importance and value, it challenges the anthropocentric worldview that dominates our society nowadays. The environment is perceived as a complex and interconnected system that includes humans and non-human species alike (Soles, C. & Chu, K., 2016, p.17).

López supports Newman's evidence and points out that the problem of environmental communication is not lack of information in science. Instead, there are cultural, political, economic and psychological limitations. (López, 2022, p. 116) But instead of biases he touches upon ecomedia literacy. He argues that it is rather the audience's inability to deal with the information they get, scientific-based information is too complex to relate to their everyday life. Unfortunately, climate change perception depends on political affiliation rather than the academic evidence. It remains a political debate not scientific.

Lopez points out that in fact, the global economy is still operating in the neo-colonial system where environmental costs of pollution, and deforestation are held by most vulnerable populations (López, 2022, p. 118). This brings the relevance of environmental communication research, where in the media sphere a new alternative worldview in the transition world can be represented. Till now, the sustainability mindset is more relatable to people who can afford to think about tomorrow, not today. The UN as an international institution attempts to define the commons in terms of sustainable development and communicate it to everyone via online channels globally. This is an appealing issue since in line with industrialization and business as

usual scenario, a climate crisis is going to emerge since more resources still bring more profits. Sustainable development is sacrificed in favour of today's profits, and the existing global economy lacks long-term vision.

Media originally aims to define the system we live in and how to perceive it. As one of the key outcomes, ecomedia promotes "eco-citizenships" meaning new eco-aware sustainable lifestyles, and the audience takes action for fighting the climate crisis (López, 2022, p. 120). As a solution, ecomedia literacy aims to normalise circular economy practices and favour discussions around environmental policies.

Lopez introduces key functions of media literacy. Ecomedia literacy serves an understanding of the interconnectedness between media, global economy and living systems; differentiates anthropocentric and ecocentric discourses; cultivates awareness of the ecomedia commons; and empowers individuals to take action towards addressing the pressing climate crisis (López, 2022, p. 120).

4 Environmental political and digital communication

Environmental communication serves to effectively communicate scientific knowledge to various stakeholders, including policymakers, the general public, and industry leaders. It helps to bridge the gap between scientific research and the public, creating awareness of and engagement with the climate crisis, ultimately contributing to a more sustainable future for all.

According to a recent literature review on climate change communication (Chen, et al., 2022), climate change communication research has emerged as a distinct field of study in social science (Chen, et al., 2022),. As concluded by them, climate change communication research has undergone three stages in terms of the number of

publications. Starting from the preliminary phase (2000–2007), where only 39 relevant articles were found, during the five years of the steady growth phase (2008–2013), 194 articles were published. But starting from 2008, there was an exponential growth in publications, approximately 117.8 publications per year till the end of the studied period in 2021. Scientists have driven more attention to environmental communication due to two contributing factors. Firstly, because of new findings in natural sciences, where human influence on climate change scale-up was detected. Secondly, because of the shift to social orientation in academia, where public institutions and NGOs facilitated more discussions about consequences for the environment and society.

After systematic analysis of gathered articles on climate change communication, authors conclude that developed countries lead this area in research while developing ones are creating local discourses around sustainability (Chen, et al., 2022). George Mason University, Cornell University, Oxford University, and Cardiff University were dominant in the 2000s accumulating research in this area, and in the meanwhile, the Chinese Academy of Sciences made a notable contribution to this research area in the 2010s as well. Looking into trends in climate change communication research, it is becoming an independent discipline in communication studies, gradually decentralising, networking and differentiating.

A review of environmental communication illustrates that the visual and informational content from media regarding the planet shapes audience perceptions of the environment and guides their attitudes towards nature. Environmental communication can be defined as "the process by which individuals, groups, and organisations create, share, and analyse information to construct and negotiate meanings about environmental issues, risks, and hazards" (Hansen, Cox, & Newsome,

2015, p. 1). People exchange meanings through symbolics and construct an image of society, nature and their place in there using symbols. Studying environmental communication helps to identify symbols of the climate crisis communicated by media and narratives which support sustainable development widely.

Symbolics and naming are essential parts of studying sustainability rhetorics. Sustainability rhetorics involve various green stakeholders such as politicians, NGOs, journalists, and activists who create messages and set narratives regarding sustainable development. Nunes defines sustainability rhetoric as " the set of techniques and methods used in the public debate on sustainability that aims both to convince recipients of the validity of certain arguments and to incite concrete actions that change the state of things" (Nunes&Park, 2022, p.5). Today, in the light of the abundance of information in the media and the Internet, it is important to spread objective reliable knowledge about the importance of sustainable development, and making green actors voice heard is an art.

Lately, there has been a growing concern about the use of rhetoric detached from reality in sustainable development communication. Fakes and misinformation can potentially serve secondary interests, mainly political and economic, which can lead to suspicion and scepticism from the audience. Unesco has combined different forms of misinformation, disinformation, and mal-information into the concept of information disorder which can deceive individuals, leading to potential negative consequences on public understanding of climate change, decision-making, and general societal trust. (Wardle&Derakhshan, 2018) It can seriously damage the effort of academia and green activists to draw public attention to the emerging climate crisis.

According to the Lewandowsky's study on climate change disinformation, the key drivers of climate scepticism and denial are word views and elite cues. Last one is associated with populism and conspiracy theories associated with science denial. Likewise smoking in the last century, climate science witnesses to be politicised. (Lewandowsky, 2021)

These are following narratives in climate disinformation defined as questioning the scientific consensus and uncertainty, attacking individual scientists and institutions, and developing alternative sceptical media channels. In order to fight disinformation, many media channels use fear as a “call to action” technique with catastrophic narratives about business-as-usual future. However, since threats are not clearly observed by the majority of readers, fear communications are not working since there is no easy solution existing which leads to avoidance and denial. (Lewandowsky, 2021) Here official institution information having in hand scientific-based evidences about actual climate change can effectively respond to any sort of misleading information and get a resonating public response on it.

Lewandowsky believes that visual illustration of climate change effects has big potential since numbers and statistics can be illustrated in easy-to-understand forms. Another important factor which can improve environmental communications he defines as a culturally aligned messaging. Understanding the reasoning of scepticism in particular contexts and already existing common values, media can align the messages accordingly. (Lewandowsky, 2021)

Taking developed countries' perspectives, the discourse surrounding climate change in the media displays noteworthy geographical deviations, influenced, in part, by the level of industrialization of respective countries or their reliance on fossil fuels.

One example of how the media in industrialised nations presents climate change is by depicting it as a geographically removed and depersonalised problem. (Leiserowitz, 2012)

Nowadays plenty of international companies and institutions advertise themselves as sustainable and eco-friendly. However, it tends to be greenwashing and the responsibility for unsustainable practices is put on distributors or suppliers which helps to detach the climate crisis from brands to someone else. To illustrate this evidence in 2010 Greenpeace pointed out the use of palm oil in Nestle products where the use of palm oil leads to deforestation which is silent in their promotions (Nunes&Park, 2022, p.5). Similarly, they found greenwashing created by Unilever, and Procter and Gamble when the emphasis was put on their investment to resolve social and environmental issues, while their business model and understandable production system remains the same. Based on this Greenpeace created video advertising against multinational companies where they point out their lies. This campaign is a bright example of when sustainability rhetoric is used for sustainable development and not against it.

Moving on from industry perspectives, we can observe sustainability rhetorics in the political sphere. For instance, in 2019 French president Emmanuel Macron commented on the Amazon rainforest that our house is burning, pointing out the significance of the problem and the significance of developed countries in it (Nunes&Park, 2022, p.6). Environmental anxiety can be observed from environmental activists' angles and might sound like populism, and therefore, neglected by decision makers since sustainability transition does not serve elite interests in short term.

However, raising sustainability issues on the political scene is a great contribution to the resolution of the climate crisis.

Considering the variety of information spread in the media and online nowadays, raising awareness on sustainable development and the climate crisis is not enough. Even after being engaged in green activities for a long time, audiences start to lose attentiveness and interest, partly because modern development problems require long-term strategic solutions. (Cox&Pezzullo, 2017) Social media can help to solve this problem, and institutional activity on social media helps to amplify environmental communication. Official institutional communication online is particularly important for sustainability promotion since they deliver scientific-based relevant knowledge about the problem and social media give an opportunity to spread this information faster than any earlier form of media.

Central to social media's role in environmental communication, Cox acknowledges that social media enhances engagement, collaboration and collective action to address the climate crisis. Considering the global scale of sustainability importance social media helps to break geographical distance and quickly deliver the information (Cox&Pezzullo, 2017).

Recent studies have identified innovative methods for investigating environmental communication through social media channels. Digital traces left by a person on social media in the form of likes, reactions, comments, etc. reflect his perception of a public phenomenon. Social media channels including Twitter, Facebook, and Instagram offer an exceptional data source for the analysis of climate change communication, broader and diverse users' data, unlike traditional methods.

These platforms have become a powerful tool for studying real-time public opinion, attitudes, and behaviours related to climate change.

A succinct review of online climate change communication research is provided by Su, etc. where different research methods are discovered. They introduce content analysis, sentiment analysis, network analysis, and text mining for social media studies in the context of climate change communication (Su, etc, 2017). The content analysis looks at what people are talking about on social media, like climate change denial, scientific evidence, and emotions. Sentiment analysis is a technique that examines individuals' emotional responses and reactions towards issues related to climate change. Network analysis is a way to look at social media connections to find key influencers and opinion leaders. This helps us understand how information and ideas are spread on social media. Text mining is a way to find out patterns in the way people write. It uses computers to learn about the most common words and ideas in text fragments. In addition to them, there are many other ways to study climate change communication on social media such as cross-cultural research, surveys, and social experiments.

Social media infrastructure also plays a significant role in online communication studies. Users might face the effect of an echo chamber where algorithms will show on threads the most common, most popular and most hype topics of climate change. Obviously, online climate change communication will also differ for each particular user depending on his search history or interests, and preferences. (Su, etc, 2017)

Weaver indicates another significant aspect of environmental communication online named sponsored messaging. They define special features of such a kind of climate change promotion on Facebook and conclude that it has economic benefits

rather than environmental ones. Also, they name specific kinds of actors who tend to do this kind of environmental communication — corporations and industry groups. Regarding the nature of sponsored messaging, communication tends to shift the focus from industry responsibility to individual one which results in blurring the complexity of the climate change problem. As a result, authors call for higher transparency and control of sponsored climate change communication on social media. (Weaver, etc, 2022)

International institutions, NGOs, and other environmental advocacy groups are mobilising efforts to adopt selective content perception by online audiences to be heard. By tailoring their communication efforts to align with the interests and preferences of their target audiences, these green voices aim to break through the digital noise and gain greater visibility for their sustainability initiatives. Through networked digital communications, international institutions and environmental organizations can bridge geographical barriers and reach audiences across the globe. In the end, networked digital communications helped to increase the degree of visibility of environmental communication and developed policies globally.

A few investigations have evaluated the cross-cultural nature of environmental communication. The United Nations admits the importance of diversity in Sustainable Solutions creation where cross-cultural communication is the key. Therefore, environmental communication requires common terms, transparency and understanding between each other. Globalisation contributed to bringing diversity, yet people still keep unconscious cultural biases which led to miscommunications and misunderstandings. According to Aririguzoh, culture-literate communications can

understand and respect different ways of thinking, behaving and cultural values. They can bridge cultural differences for solution creation (Aririguzoh, 2022, p.2).

People from different cultures may have different attitudes towards the environment which may be influenced by their religions or beliefs, economic or social circumstances, or historical experiences. Also transmitting symbols in environmental communication led to misunderstandings which may arise due to different meanings for readers in their cultural contexts. If it's not considered, environmental communication fills up with stereotypes, prejudgments and discrimination. It also hinders effective feedback.

Taking into consideration culture in the SDGs framework, diversity provides the opportunity to recognize the difference between each other and create a common vision of a sustainable future (Aririguzoh, 2022, p.5). To tackle this matter the United Nations proposed strategies to enhance culture-literate communications at every stage of work, to improve communication efficiency and media literacy (or co-called ecomedia literacy, introduced above). Effective communication between all actors sustains societies and gives ground for sustainable solutions implementation.

Environmental communication will be more efficient if locally and culturally relevant cultural differences can be considered and managed by the UN, and shape people's attitudes towards the environment. The mitigation of cultural barriers is a key element of environmental communication.

5 UN's institutional role in SDG promotion

As previously stated, The United Nations (UN) has set a target of achieving the Sustainable Development Goals (SDGs) by 2030. The SDGs cover various areas,

including poverty eradication, environmental sustainability, and social and economic development. To achieve these goals, the UN has recognized the critical role of institutions, including itself.

The UN has taken measures such as increasing awareness of the goals and supporting countries in implementing the SDGs. The UN has recognized the significance of effective communication in promoting the SDGs. As part of its agenda, the UN has incorporated culture as a causal agent of sustainability, emphasizing the importance of reinforcing economic, social, and communal fabrics that regulate social cohesion (United Nations, 2021a). Effective communication is essential to achieve these objectives. The UN has recognized that communication makes a difference, keeping up social order and promoting the development of a more sustainable world.

The UN has also established various communication channels and platforms to promote the SDGs. The UN's website features various resources on the SDGs, including infographics, videos, and other multimedia content, which explain the SDGs in an accessible manner (United Nations, 2021b). The UN has also developed a Global SDG Indicators Database to track progress towards achieving the SDGs, which is accessible to the public (United Nations, 2021c).

Furthermore, the UN has encouraged member states and other stakeholders to engage in SDG-related communication efforts. The UN has called on governments, the private sector, civil society, and other actors to develop and implement communication strategies to promote the SDGs (United Nations, 2021d). The UN has also emphasized the importance of involving and engaging communities in SDG communication efforts, as community involvement can foster a sense of ownership and commitment to achieving the SDGs.

6 Method overview. Introduction to digital methods and application in sustainability research

As the internet grew in popularity, scholars are gaining more and more interest in the social and cultural implications of online environments. Taking methodological roots from media studies, digital methods give a chance to get insights from online communities' interactions and cultures. Additionally, social media platforms allow scholars to study social networks which at high relevance to sociological, psychological and anthropological research.

Herring highlights the importance of integrating methodologies from various disciplines, such as linguistics and sociology, into traditional content analysis to address the challenges posed by new online media. She suggests that this sort of interdisciplinary research including social network analysis, link analyses, platform features analyses, and computer-mediated discourse analysis, helps to better understand the networked nature of web content, which includes hyperlinks, tags, and buttons (Herring, 2010).

With the rise of big data processing tools, internet and social media studies expanded to incorporate quantitative analysis and data-driven research. Researchers started to use data mining, natural language processing, and network analysis techniques to study large-scale patterns and trends in online behaviour and social media data. All these sorts of research tools are united under the umbrella of digital methods.

Rogers suggests exploring how the Internet can be used to diagnose cultural change and societal conditions. The divide between the virtual and the real has been a persistent issue in Internet research, partly due to the technical nature of the Internet and its association with the concept of cyberspace (Rogers, 2009; Niederer, 2016). New

modes of “post-demographic” research in online environments incorporate learning from profilers' scraped data. The technical infrastructure of social media platforms is also an important aspect to consider since they are collecting user preferences and targeting other users or friends (Rogers, 2009).

Even though there is a big debate regarding the limitations of virtual spaces to capture societal trends, the limitations of digital methods are of high importance to consider. Rogers proposes a renewal of Internet research by recognizing that the Internet is not just a site for studying online culture and its users but can also serve as a valuable source of data about society and culture. (Rogers, 2009) To conclude, the focus of Internet studies is no longer on researching it and its users but on studying culture and society by leveraging the resources provided by the Internet. In every study, researchers develop their methodologies according to the research question. Some examples of digital media studies will be considered.

These are some important limitations that scholars have discussed concerning digital methods. Digital methods are highly dependent on web infrastructure since social media platforms tend to be unstable and keep changing (Rogers, 2009; Van Dijck, 2013; Marres, 2015). Sometimes it is hard to distinguish between the web platform and data insight itself. These two aspects are interconnected and codependent. Marres brings an example that the most retweeted content on Twitter can be the most promoted not the most engaging which limits the understanding of the studied phenomenon. Perhaps it can say more about social media algorithms (Marres, 2015).

Environmental communication scholars also note the significance of social media for changes in protest facilitation and bottom-up political action about climate change (Rogers, 2009; Salah, 2013; Bounegru, 2020; Sanches, 2022). Digitally mediated social

networks enable users to share multimedia content, engage in discussions, and collaborate on environmental initiatives, creating a sense of online community and social support for environmental causes. Digital networks also offer opportunities for real-time monitoring of environmental events, such as weather patterns and natural disasters, and for tracking and analyzing public opinions and attitudes towards environmental issues. For instance, Sanches emphasises the diversity of analytical setups while studying digital structures. Her research team studied TikTok environmental activism by analysing public discussions formed in content scraped by hashtags. The research investigates how the features of TikTok enable a specific form of activism, allowing individuals without specialized expertise to participate in public discourse, so they can collectively contribute to and amplify discussions on climate change via social media (Sanches, 2022).

Since social media blurs the geographical dimension the most among media channels, it gives a wide range of opportunities to study climate change communication which is international to some extent. For example, Daros conducted image research on the internet search query "climate change" where he found the transformation of climate change perception through the internet. He observes the framing of climate change depending on location and mainstream image language to represent climate change. Also, his research gives insights into the most common sources and web entities of climate change images. He applied digital methods tools combining machine learning and visualization to create advanced clustered graphs. As an outcome, he develops climate change image trends based on the following stages: understanding, recognition, movement, awareness, knowledge, and solution (Daros, 2019).

Niederer introduces the PhD thesis devoted to climate change communication on Web and Twitter. She focused on the social and cultural implications of mediated

messages. the analysis reveals that the climate change tweets focus is dominated by animals and nature, rather than society and nation which demonstrates the distinction between peoples' actions and climate change. Therefore, the author found high social vulnerability to climate change in online communication (Niederer, 2016).

Studying environmental communication regarding the IPCC report on global warming of 1.5 °C on YouTube, Bounegru considered both channels and YouTube's search engine rankings in video content selection. Thus, extending the data scraping methodology, she was able to capture the public response to the IPCC communication strategy. The research pointed out that climate change is drowning as catastrophe as ever, but public response involves political and technological discussions along with ideological ones which can be perceived as positive change in sustainability terms (Bounegru, 2020).

Elgesem focused on information flows between bloggers (users), their reception of the Paris Meeting on climate change and the web sources they were referring to. So, from a methodological standpoint, the author focused on constructing a co-citation network and analysed the relationship between different web entities (Elgesem, 2017) From a cultural studies perspective, network analysis helps to select and structure data consisting of text, codes, and meanings according to network. Network analysis also helps to integrate different types of data in one network: image-source, user-posts, hashtags-comments etc. Among the numerous data relationships, certain ones help to address the specific research questions of the project at hand (Salah, 2013).

In another event study, visual content on social media such as images, videos, and gifs was taken as research objects to evaluate how people perceive climate change

and COP21. After sampling key relevant stakeholders on Twitter, the authors evaluated posts texts and images holistically. Past research has shown that visuals are important in environmental communication strategy since images are easier to cognitively process. This study clarified how media visualise climate change via symbols. As an outcome, there were “codebooks” for both visual social media and climate frames developed which demonstrate the transition from environmental policy and activism illustrations to climate change as a process impacting people's lives every day (Hopke, & Hestres, 2018).

The importance of delivering scientific knowledge engagingly is also one of the key areas of environmental communications research. Pavelle & Wilkinson’s study examines how social media platforms can be utilized to engage the public with messages related to environmental communication. The findings indicate that online videos on social media help to raise awareness, entertain and engage the audience, establish emotional connections, and generate interest in science and environmental topics. (Pavelle, & Wilkinson, 2020)

In conclusion, digital methods offer diverse approaches to studying environmental communication and various tools to extract and process big data from the Web and social media platforms. I have explored different examples of studying environmental communication across diverse social media platforms, utilizing various queries such as keywords, hashtags, profiles, and web entities, and employing a range of methodologies, including visual, textual, and networked analysis. While there is no one-size-fits-all strategy for applying digital methods in environmental communication research, the effectiveness of the approach depends on the specific research questions and objectives at hand. Each method offers unique insights and strengths, providing

researchers with a wide array of tools to uncover and understand the complexities of environmental communication in the digital landscape.

By leveraging digital methods, researchers can gain a deeper understanding of how environmental issues are perceived, discussed, and shared online, and how these communications shape public attitudes and behaviours. The ability to access and analyse vast amounts of data from social media and web sources opens new avenues for exploring the intricacies of sustainability narratives, public engagement, and information dissemination.

7 Methodology

7.1 Topic formation

Within the scope of this thesis, I am going to analyze the content of official United Nations global profile on Instagram (@theglobalgoals) to identify the UN key messages and representations of SDGs. The characteristics of the profile by the time of research initiation (March 2023) are given in *Figure 2*:

Name	username	n. of followers	link	posts count 2022
UN Global	theglobalgoals	452k	https://www.instagram.com/theglobalgoals	238

Figure 2. Studied Instagram profile description

Online content analysis on social media typically focuses on the content created by organizations or individuals. However, it may not provide a comprehensive understanding of the target audience's attitudes, beliefs, or behaviors which consequently limit the ability to tailor strategies effectively. Given this, I intend to consider the feedback on posted content provided in number of likes and comments,

comments texts. Capturing symbols and meanings exchanges between the author (UN) and the audience is the central idea of my research.

Returning to the limitations of digital methods, when it is challenging to distinguish social and technical impacts on content audience response, query design of my research mitigates this obstacle since I narrow my analysis down to one official UN Instagram account and its audience. Although findings of the study are not representing the whole online audience perception on the SDGs, they are nonetheless vital for getting insights into the effectiveness of the UN's Instagram communication strategy and the interactions between the organization and its followers on the platform. Outcomes of this study can be considered in further environmental communication strategies.

Another limitation of the study can be found in sample bias. Taking posts during the 2022, it is important to consider social context of posts at that time, and to bear in mind that communication strategy of taken Instagram profile might change over time. It may not represent the diversity of the SDGs perspectives in dynamic nature of the Instagram. The best development of this study is to track changes over time. It may provide insights into trends, shifts in public opinion, or the effectiveness of strategies, but it requires consistent data collection over extended periods.

Besides, talking about ethical considerations, this study involves analyzing only publicly available information, any personal or sensitive data are not considered. Scraped databases do not contain any personal or demographic data of Instagram users. The data being processed are publicly available posts by the UN or comment texts, commenters' profiles are not considered.

Regarding problem definition, this thesis aims to address the existing gap in research on SDGs promotion by international institutions on social media. The research question is as follows: *What are the main topics on UN global official Instagram account about SDGs in 2022?*

The supporting sub-questions are:

- What are the key messages of UN shown in posts text and images?
- Did they change during the year?
- How does the audience react to this content?

The research has yielded several key outcomes that shed light on the UN's approach to sustainable development communication. Firstly, the study defines the prevailing visual representation of sustainable development through the utilization of Computer Vision API, which processes image labels. This analysis uncovers a set of symbolics that encapsulate the essence of sustainable development and visually represent the UN's initiatives and goals.

Secondly, the research delves into the key narratives present in the posts' texts and content formats by employing keyword analysis. By identifying prominent themes and messaging patterns, the study unveils the core ideas and topics that resonate with the audience and align with the UN's communication strategies.

Lastly, the research gauges the effectiveness of various content formats and identifies the most engaging topics by evaluating crucial engagement metrics, including likes, comments count, and comments' content. This analysis provides valuable insights into which content formats attract the most attention and elicit active participation from the audience.

7.2 Social media platform description

Instagram, a popular social media platform, has rapidly emerged as a significant player in shaping the way people communicate and interact. It was chosen for this study since Instagram is a visual-centric platform which gives opportunities to conduct complex analysis of shared images with accompanying texts. Taking Instagram as a platform to work with, I get the integrated analysis of the visual and textual representation of sustainability. From a technical standpoint, Instagram has a unique structure with standardized and rather brief content formats (up to 10 visuals and up to 2200 symbols) which ease the data processing.

Instagram is giving various ways for visual storytelling creation such as posts, image carousel, videos, reels (short video), stories (images being posted for 24 hours), live broadcasts. Environmental advocates, NGOs, and governmental organizations have recognized the potential of this platform to reach a broad audience with captivating imagery and compelling narratives about environmental challenges and solutions. The platform's ease of use and instant sharing capabilities have enabled the rapid dissemination of environmental messages, making it an essential tool for the modern state of environmental communication. In studied profile, the UN mostly uses images and reel to visualize infographics. The stories format is not considered in this study.

Instagram's emphasis on visual content has enabled environmental communicators to tell compelling stories about environmental challenges and solutions. Through powerful images and videos, they can create emotional connections with their audience, helping to bridge the gap between distant environmental issues and everyday lives. This visual storytelling approach has the

potential to foster greater empathy and understanding of environmental concerns, motivating people to take action to protect the planet.

In relation to environmental communication, international organizations can leverage their large followings and engage new audiences in discussions about sustainability, conservation, and climate change. Their ability to humanize environmental issues and make them relatable has contributed to the platform's capacity to foster meaningful conversations about the environment.

While Instagram presents numerous opportunities for environmental communication, it also faces challenges, including the spread of misinformation and greenwashing. The ease of sharing content on the platform makes it susceptible to the rapid dissemination of misleading or false information about environmental topics. Addressing misinformation and ensuring the accuracy of environmental content on Instagram is being addressed by the UN which creates profiles about SDGs where it promotes its SDGs framework as well as spread actual scientific findings and global official statistics in relation to sustainable development.

Measuring the impact of environmental communication on Instagram is a complex task. Traditional metrics like likes, comments, and shares provide insights into engagement levels, but they may not capture the true extent of behaviour change or environmental action prompted by communication efforts. Comments can show audience feedback to posted content, their thoughts and feelings. Yet, it does not show the full picture of long-term effect of posted content on audiences, how their perception on SDGs has changed.

Instagram has become a central hub for modern environmental communication, offering a visually immersive space for individuals, organizations, and influencers to share their perspectives, stories, and initiatives about environmental issues. Its visual storytelling capabilities, influencer engagement, and youth appeal have significantly contributed to raising awareness and mobilizing action on environmental challenges. However, the platform also faces challenges related to misinformation and accurately measuring its impact. As environmental communication continues to evolve, embracing the potential of Instagram while addressing these challenges will be key to harnessing the platform's power for positive environmental change. By continuously adapting and refining strategies, environmental communicators can leverage Instagram's vast reach and influence to foster a more sustainable and environmentally conscious global community.

7.3 Research design.

This study employs a combination of quantitative and qualitative research approach with application of digital methods to ease the big data processing. The research design protocol is shown on *Figure 3*.

The research design employs a multi-model approach, which combines both quantitative and qualitative research methods. Quantitative research involves the collection and analysis of numerical data. In this study, quantitative methods are utilized to measure engagement metrics such as the number of likes, comments, shares, and follower growth. These quantitative data points provide valuable insights into the level of audience interaction and the overall popularity of the UN's SDG-related content on Instagram.

Qualitative research involves the examination of non-numerical data, focusing on understanding meanings, perceptions, and motivations. In this study, qualitative methods are applied to analyze the meanings and contexts behind the content and comments on the UN's Instagram posts related to the SDGs. This approach delves deeper into the portrayal and interpretation of the SDGs by the UN and its audience on the platform.

To ease the big data processing, this study adopts digital methods and tools. These digital methods include Phatombuster which scrapes Instagram profiles, posts and comments data, Google Vision API which process visual data on images, and TagCrowd as well as Voyant and Wordtree tools which process textual bigdata to identify key words and main topics covered in post texts and comments.

Both textual and visual content are considered for analysis to get comprehensive understanding of SDGs representations created by the UN. Instagram is primarily a visual platform, and images play a significant role in communicating messages. By analyzing the visual content, the study discloses how the UN presents the SDGs visually to its audience and how these visuals contribute to the overall communication strategy.

Furthermore, the textual content, including post texts, captions, hashtags, and comments, provides additional context and meaning to the visual content. Text analysis uncover the narrative and messaging strategies employed by the UN and explore how the audience engages and interacts with the content.

This study takes inspiration from past research in the field of environmental communication mentioned in previous chapter which analyses particular bloggers,

sustainability relevant events on different platforms. Within the scope of this thesis, international institution – the UN – perspective is taken on Instagram social media platform.

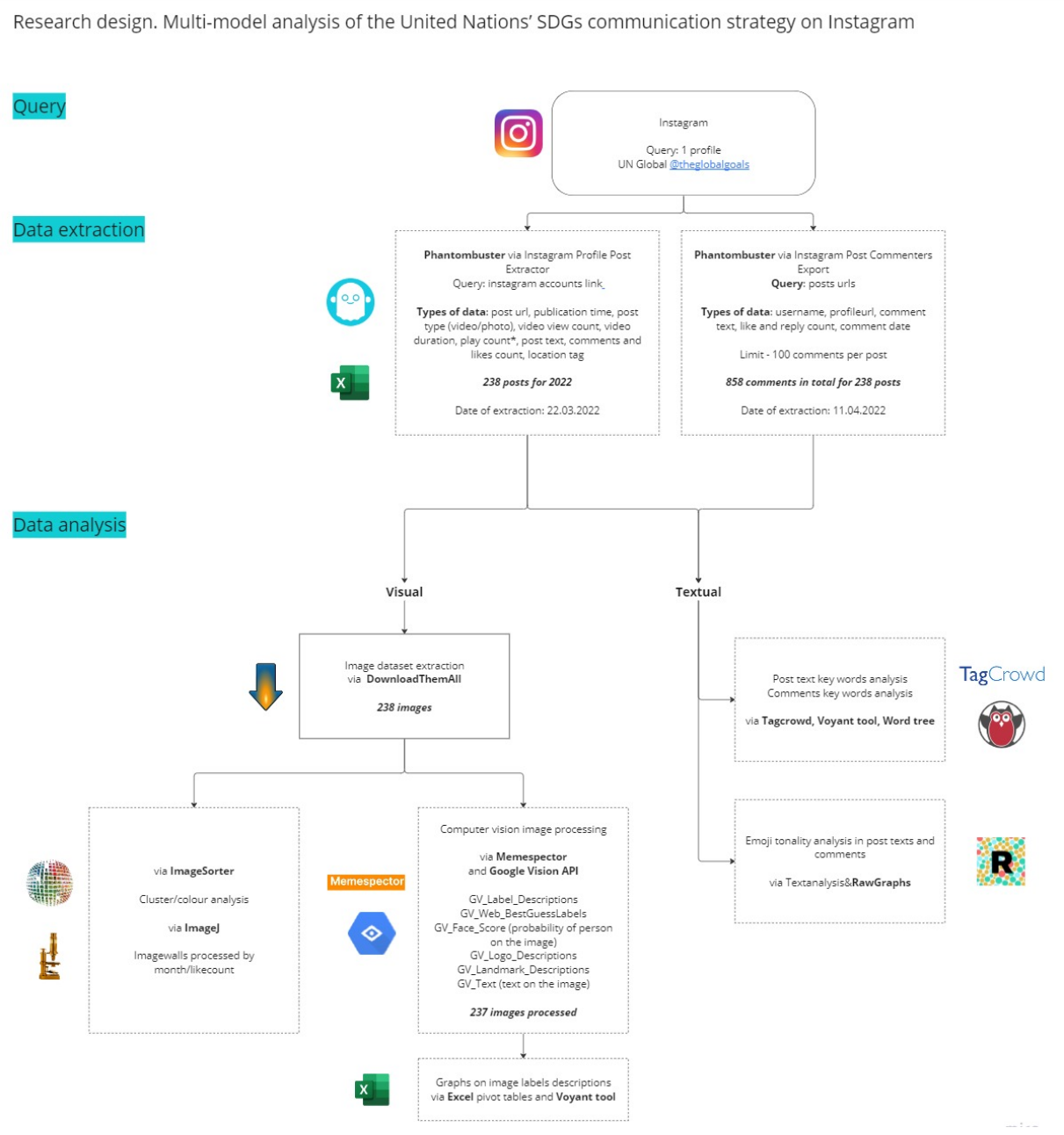


Figure 3. Method protocol of the study

7.4 Data extraction

The databases of posts and comments were extracted via PhantomBuster online tool. Social networking sites (or social media) make their data available through application programming interfaces (APIs) which PhantomBuster has access to. In total there were 2 datasets created – for posts from taken Instagram profile (extracted on 22.03.2022), and second one – with comments to all extracted posts (extracted on 11.04.2022). Considering dynamic nature of social media, any changes in like/comment count or deleted content are not covered in the research. Databases included post or comment link, date of posting, like or view count. In total there were 238 posts published for taken period, 2022. The datasets are attached in *Appendix 1* and 2. Due to technical limitations of the software, it was possible to extract up to 100 comments per post even if there were more. After cleaning up the database from duplicates, I have got 858 comments for all 238 posts. Before switching to data analysis, I have also extracted post images via DownloadThemAll software. The extracted post images are provided in the form of image wall in *Appendix 3*.

7.5 Data processing

At the following stage, data processing, two main directions were taken: visual analysis and textual analysis. For the visual analysis, the ImageSorter tool was utilized to closely examine the types of content posted on Instagram related to the SDGs. This examination helped in defining key representations and themes of the Sustainable Development Goals, which will be presented in the Discussion section of the thesis. Additionally, the software ImageJ was employed to create advanced visualizations of the posted images, aiding in identifying the most engaging posts during the selected period.

Moreover, the Google Vision API, invoked through the Memespector software, was used to process the images, resulting in a database of computer vision outputs with key labels defined on the posted images. This analysis provided insights into the visual elements and content characteristics that resonated with the Instagram audience in relation to the SDGs.

In the context of textual analysis, qualitative content analysis techniques were employed to identify common themes, sentiments, and framing present in both the posts and comments. The analysis began with exploratory keyword analysis and emoji sentiment analysis using online services like Tagcrowd, Voyant, and WordTree. These services facilitated the extraction of significant keywords and sentiments from the textual content, offering valuable insights into the communication strategies and audience responses surrounding the SDGs on Instagram.

To present the results effectively, visualizations were created using RawGraphs, aiding in showcasing patterns and trends discovered during the text analysis process. These combined visual and textual analyses will contribute to a deeper understanding of the UN's SDG communication strategy on Instagram and its impact on the platform's audience. The outcomes of these analyses will be discussed and interpreted in the relevant sections of the thesis, providing a comprehensive analysis of the UN's efforts in promoting the SDGs through visual and textual content on Instagram.

7.6 Content analysis

The scraped 238 posts on @theglobalgoals Instagram account were categorized by type of the post, date of publication, image visual and textual content (if applicable). These are following types of posts found: image, gif, carousel, video, reels. Animated gifs are more common than photos in given image dataset. The key

topics of the extracted posts are SDGs adoption progress and obstacles globally (events, reports), enlightenment, feminism, environmental protection, refugees, interactive games, political events (70th anniversary of the accession of Queen Elizabeth II, War in Ukraine, Protests in Iran).

Regarding engaging formats, games and comment discussion were found, nearly 5 posts per 238. Posts which were intended to stimulate commenting activity did not bring higher users engagement in comment or likes than usual getting 40 comments (*Figure 4*) However, word guessing games brought higher engagement in the comment section getting over 200 comments (*Figure 4*). From the middle of December 2022, there was a daily content rubric about the SDGs achievements during the year which increased number of likes – 615 on average, 4729 max. (*Figure 4*) More engaging metrics will be discussed in the following chapter.



Figure 4 Posts stimulating engagement

On the *Figure 5* there is an image wall of extracted post images using ImageJ software which shows the post images by month. The chart clearly illustrates that the content on the analyzed profile is meticulously planned and organized, adhering to a

well-structured schedule concerning timing, topics, and design. Notably, there is no apparent seasonality in the posting activity, with the only observed exceptions being a slight decrease in posting frequency during August and October. On average, around 20 posts are published each month.

Addressing thematic diversity in their posts, the studied profile also emphasizes the representation of various regions and people, with a noticeable focus on sustainability events in the Global South.

Following other relevant research mentioned above, the shift to emphasizing SDGs impact on people's everyday life is observed — along with the global sustainability conferences there are also charity, Black Friday, Earth Day, Walking day, mental health topics covered in posts.

The content predominantly comprises infographics and graphically designed items, rather than a reliance on photographs in the image database. This strategic approach to content creation underscores the profile's commitment to delivering information in a visually engaging and impactful manner, potentially enhancing its reach and effectiveness in promoting sustainable development initiatives.

2022

January



February



March



April



May



June



July



August



September



October



November



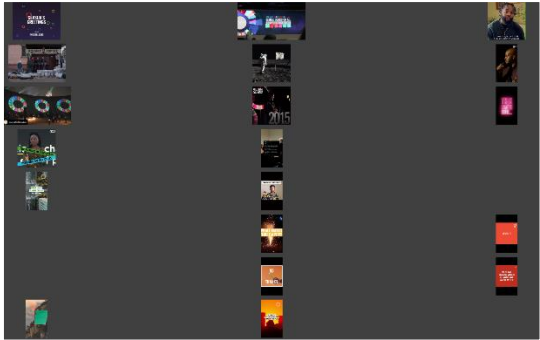
December



Figure 5. Image Wall of posts per month

The ImageSorter tool proved to be instrumental in conducting a color analysis, unveiling significant insights into the key narratives prevalent in visual communication. The SDGs communication demonstrated a dedicated focus on crucial themes, including environmental protection, gender equality, sustainability enlightenment, safety, and zero waste (*Figure 6*). These visual narratives were strategically presented by the UN using bright and vibrant colors, strategically chosen to captivate attention and create a positive image of the SDGs.

By employing such vivid colors, the UN effectively enhances the visual appeal of their communication materials, making them more eye-catching and engaging for the audience. This intentional use of colors aligns with the organization's objective to foster greater awareness and understanding of the Sustainable Development Goals. Moreover, the bright color palette contributes to conveying a sense of optimism and hope, further reinforcing the positive image associated with the SDGs.

	
Black cluster.	White cluster.
Conference, media, infographic gifs	Logo, text, quote
	
Blue cluster.	Green cluster.
Environment and ocean protection, activism, diplomacy, gender equality	New Year, environment protection, activism

	
Red cluster.	Yellow cluster.
Gender equality, human rights	Infographics, zero waste

Figure 6 ImageSorter colour clusters content description

The visual analysis conducted using the Google Vision API provided valuable insights into the general trends in SDGs representation across a large number of images. The analysis revealed a considerable emphasis on positive portrayals of the SDGs, encompassing diverse individuals and addressing a wide range of topics, both environmental and social (*Figure 7*). This supports the evidence from ImageSorter findings regarding the inclusivity and diversity of the SDGs which underscores the UN's commitment to promoting a comprehensive and equitable approach to sustainable development.

The post text analysis aligns with the insights from the visual analysis. The post text analysis aligns with the insights from the visual analysis, providing valuable corroborative evidence. The general findings are given on *Figure 8*. The studied posts predominantly revolve around SDGs achievements and events, and they are consistently delivered in a positive and uplifting manner. Climate action-related content often incorporates statistics to highlight the magnitude of the problem, coupled with actionable solutions that encourage reader participation. Furthermore, the majority of texts include narratives that cultivate activism, fostering a sense of empowerment and engagement among the audience.

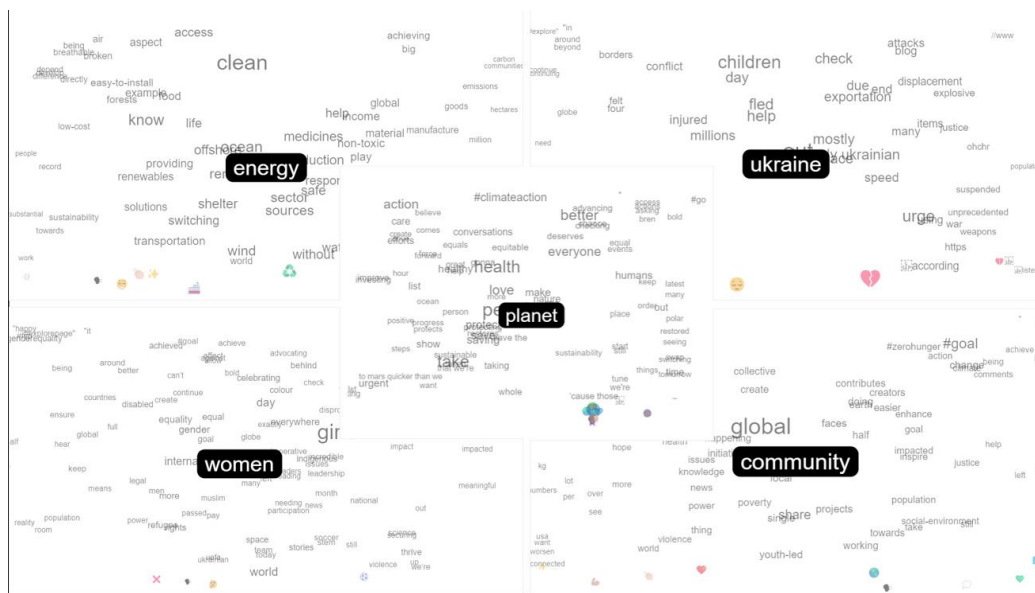
In addition to the call-to-action texts, SDGs promotion is thoughtfully connected to significant global events that transpired in 2022. This strategic alignment helps illustrate the urgency and relevance of sustainable transition within the context of current affairs. For example, Goal 7 (Affordable and clean energy) is linked to the Energy crisis, Goal 5 (Gender equality) is associated with the Iranian #mahsaamini protests, and Goal 16 (Peace, Justice, and Strong Institutions) is tied to the war in Ukraine.

Given the prevalence of visual channels such as videos and gifs, post texts tend to be concise, typically comprising just a few sentences. The primary focus lies on delivering information through captivating visuals. To promote the posts and facilitate content categorization, each text concludes with a set of hashtags, incorporating the mentioned SDGs and related keywords. These hashtags play a crucial role in expanding the reach of the posts and facilitating their discoverability among the target audience.

Top-50 post text words



Post texts semantic clouds



Energy

"Some great news for #Goal7 - with a world record being broken. 🙌💎

Did you know the energy sector is responsible for almost three-quarters of the emissions that have caused global temperatures to rise? That's why we need more solutions, like solar power, to reduce carbon emissions.

#GlobalGoals #SDG7 #SolarEnergy
#Innovation #CleanEnergy"

Women

As the women and girls of Iran raise their voices in protest, artists around the world are using their platforms in solidarity. 🇮🇷

Protest art is an effective and popular way to spread messages of justice and resilience, transcending language barriers and giving people all over the globe a way to support people facing oppression. 🌍
#Iran #IranWomen #IranProtests
#ProtectWomenAndGirls
#MahsaAmini

Community

There is strength in numbers! 🤝
When we act as a collective global community, the easier it will be to achieve all 17 of the #GlobalGoals by 2030. ❤️ Who will you partner with to achieve of the Goals? 🤝
#SDGS #GlobalGoals
#SustainableDevelopmentGoals
#Goal17 #SDG17 #Partnership
#GlobalCommunity #FYP
#ExplorePage

Emojis Post Tonality



Figure 8 Post text keyword analysis

7.7 Feedback analysis

Following the content analysis of posted content on the UN SDGs Instagram profile, the engagement metrics are explored to provide insights into effective strategies for international institutions environmental communication and engage with diverse audiences on the Instagram and other social media platforms.

Taking such engagement metrics as the like, comment and play counts, I can conclude that audience engagement depends on the social context of publication rather than post itself. On 66 videos posted during 2022 there was on average 34.000 with maximum of almost 230.000 views which points to a high rate of engaged audience. According to the image wall categorised by like count, during 2022 it was normally several hundreds, up to 1000. Posts which went beyond that number were associated with some global hype events, activism, and art. (*Figure 9*)

Among the analyzed posts, it is evident that those receiving a substantial number of likes, ranging from 3000 to 5020, garnered higher interest primarily due to their compelling topics and relevance. These posts effectively resonated with the audience, capturing their attention and generating significant engagement. However, what stands out significantly is one particular post that garnered over 19,000 likes, representing an exceptional event of activism. More information regarding top-5 most liked posts is provided in *Figure 10*.

2022

150-1000



1000-2000



2000-3000



3000-5020

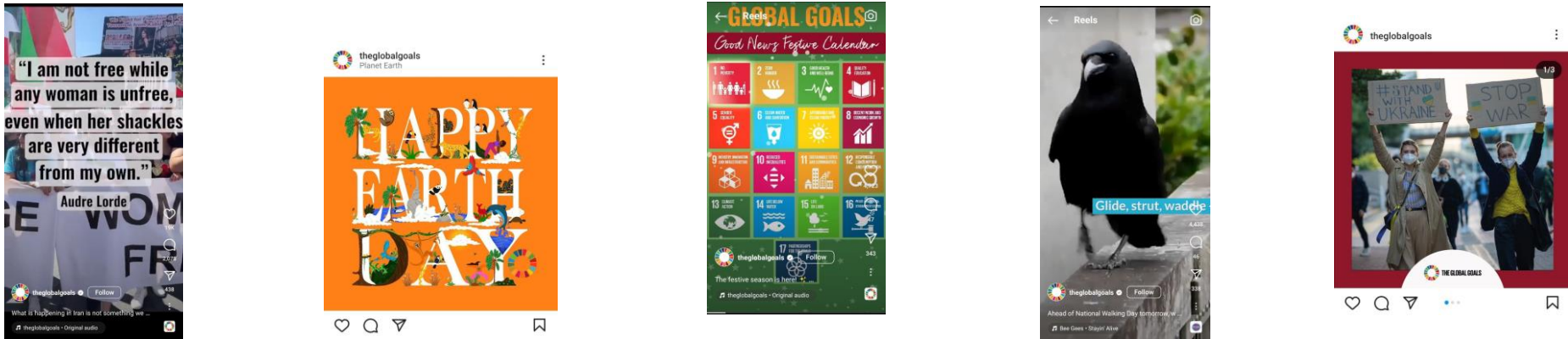


>19000



Figure 9. Image Wall of posts per like count

Top-5 highest post like count



likecount	19141	5028	4733	4453	3949
link	https://www.instagram.com/p/CkqiUllq6i/	https://www.instagram.com/p/CcpjfhNoj6y/	https://www.instagram.com/p/CmMB7EJoqv/	https://www.instagram.com/p/Cb-ZaKQI9lg/	https://www.instagram.com/p/Cah1gdCICOW/
publication date	07.11.2022	22.04.2022	15.12.2022	05.04.2022	28.02.2022
content description	In response to hashtag and comment activism on previous posts and emerging protest activity in Iran, there was supporting video posted, it got lots of positive feedback from Iranians and global audience.	Post is an illustration dedicated to the Earth Day associated with SDG 13	This is the first post of the series of interactive posts about SDGs achievements in 2022	This is a funny bird post about National Walking day which touched the audience	This is the first post shared by studied profile about war in Ukraine which resonated with audience

Figure 10. Top-5 posts with highest like count

Top-5 highest post comment count



comment count	2484	2088	268	238	178
link	https://www.instagram.com/p/CkVplr6lcaz/	https://www.instagram.com/p/CkqiUlllq6i/	https://www.instagram.com/p/CIYgnntodEs/	https://www.instagram.com/p/CYMDkPmLd1O/	https://www.instagram.com/p/Cam5Cvkl7Ks/
publication date	30.10.2022	11.07.2022	25.11.2022	01.01.2022	03.02.2022
content description	Post about pumpkin waste during Halloween gets high comment engagement on Iranian protests happening at the same time where online audience call for protests coverage	First post on Iranian protests gets high comment engagement to spread more messages about protests	Following previous weeks, online audience keep posting messages about news in Iran, not related to post itself, supporting Majidreza Rahnavard, arrested protester	Being the first of 2022, interactive post engage audience around word game, where visitors share their results	Post about War in Ukraine gets a lot of meaningless comments in the form of random symbols among other ones, resembling bot activity

Figure 11 Top-5 posts with highest comment count

The analysis of comments on the studied profile reveals distinct categories of user engagement (*Figure 11*). Firstly, there are comments that express users' opinions on the post topics or the Sustainable Development Goals (SDGs) in general, reflecting their thoughts and perspectives. Secondly, some comments consist solely of emojis, serving as quick and expressive reactions to the content. Additionally, activism-related comments were found to be prevalent on the profile, characterized by repetitive texts advocating for specific causes or initiatives.

However, it is worth noting the presence of bots in the comment section. Unlike the majority of analysed posts, those associated with the War in Ukraine attracted some meaningless comments, suggesting the involvement of automated accounts or bot activity. Observed suspicious activity in comments were found under two posts associated with War in Ukraine. (*Figure 12*) These comments are characterized by irrelevant messages or a set of words or symbols, and accounts of authors might be bots. Along with bot comments, these posts got high number of likes which demonstrates high engagement.

Detecting bot accounts on social media platforms like Instagram can be challenging as bot creators continuously evolve their strategies to mimic genuine user behaviour. However, in taken cases there have been some common characteristics captured of accounts which created such comments. The reasoning for that might be shadowed in spam comments generated by bots. Bots can flood the comment sections of posts on an official Instagram profile with irrelevant, repetitive, or inappropriate comments. Bots frequently post templated or messages that are highly repetitive.

To start with, these profiles had few or no description. This includes usernames with random characters or a lack of profile pictures, and minimal bio details. Secondly,

many from them have no posts indicating that they were recently created or have not been actively used like genuine accounts. Also, the followers of detected as bot accounts appear to be mostly inactive or low-quality accounts. Although these parameters themselves do not point to define taken profile as bot, after taking complex assessment of comments content and profiles description of authors, I suspect taken accounts being bots. To confirm whether an account is a bot, sophisticated algorithms and data analysis can be applied to detect suspicious patterns and behaviour.

Traditionally, bot detection has been approached basing on account-level data. This means that each social media account is classified as either a bot or a human user. Machine learning models are trained to identify patterns and features that distinguish bots from human users based on account-level data. However, moving from account-level binary classification to comment-level classification for bot detection allows for a more comprehensive understanding of user behavior on social media platforms. Comments can help identify the presence of bot-like behavior within an account.

Bots post meaningless comments on Instagram for various reasons, primarily to achieve specific objectives related to spamming, engagement, and manipulation. It could be done by studied account supporters which aimed to increase engagement metrics on the targeted posts. Higher engagement can potentially lead to increased visibility on the platform's algorithm, making the posts more likely to appear on the Explore page or in users' feeds. Meanwhile, it could be done by studied account opponents in order to hide real voices of support or opinions.

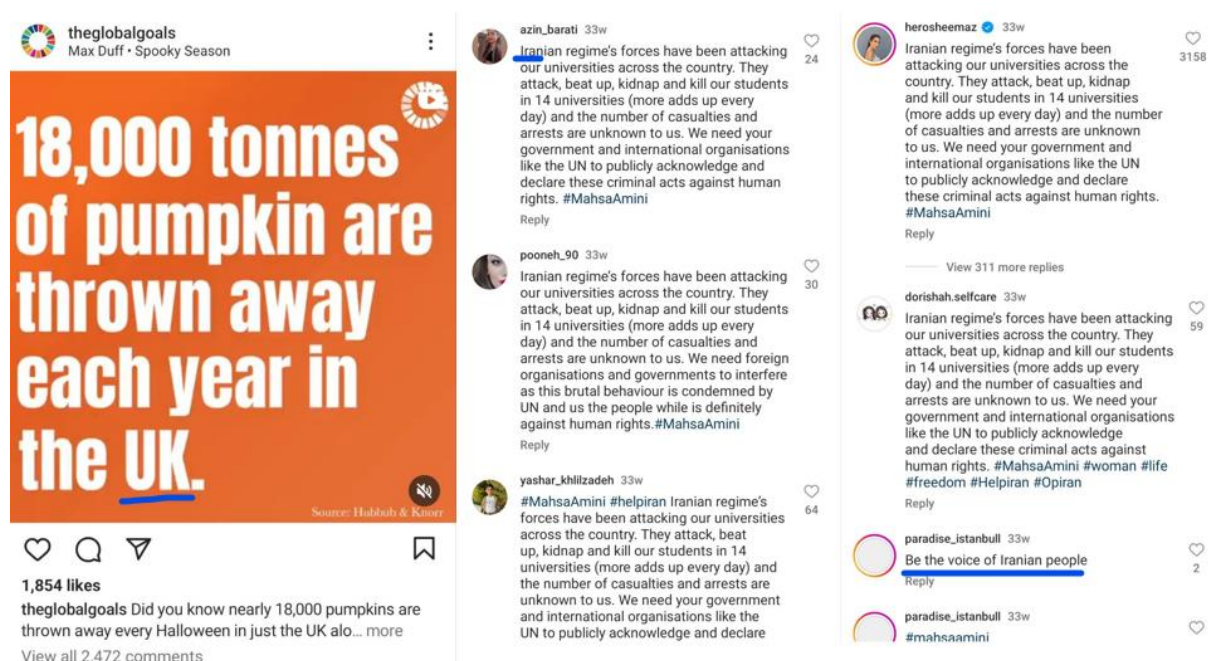


Figure 12. Bot commenting activity on posts

Comment/hashtag activism happened to be unexpected outcome of this study. Before the most hype post of the 2022 about protests in Iran, in October, there was significant increase of commenting activity on general SDGs posts calling for raising

voices and asking for help for Iranian protestants. The Mahsa Amini protests refer to the widespread demonstrations that took place in Iran following the death of Mahsa Amini, a 29-year-old woman who died because of police brutality in Tehran in September 2022.

Big influencers and ordinary people were sharing similar texts about state of Iranian protests. In case of studied profile, on *Figure 13* there is a contrast indicated between post about foodwaste in the UK and comment section flooded of MahsaAmini protest movement. In response to comments bombing, one week later a video was posted supporting protesting movements, associating protests with gender equality and human rights aspects of the SDGs. However, under this post there was a new wave of comments about protests.



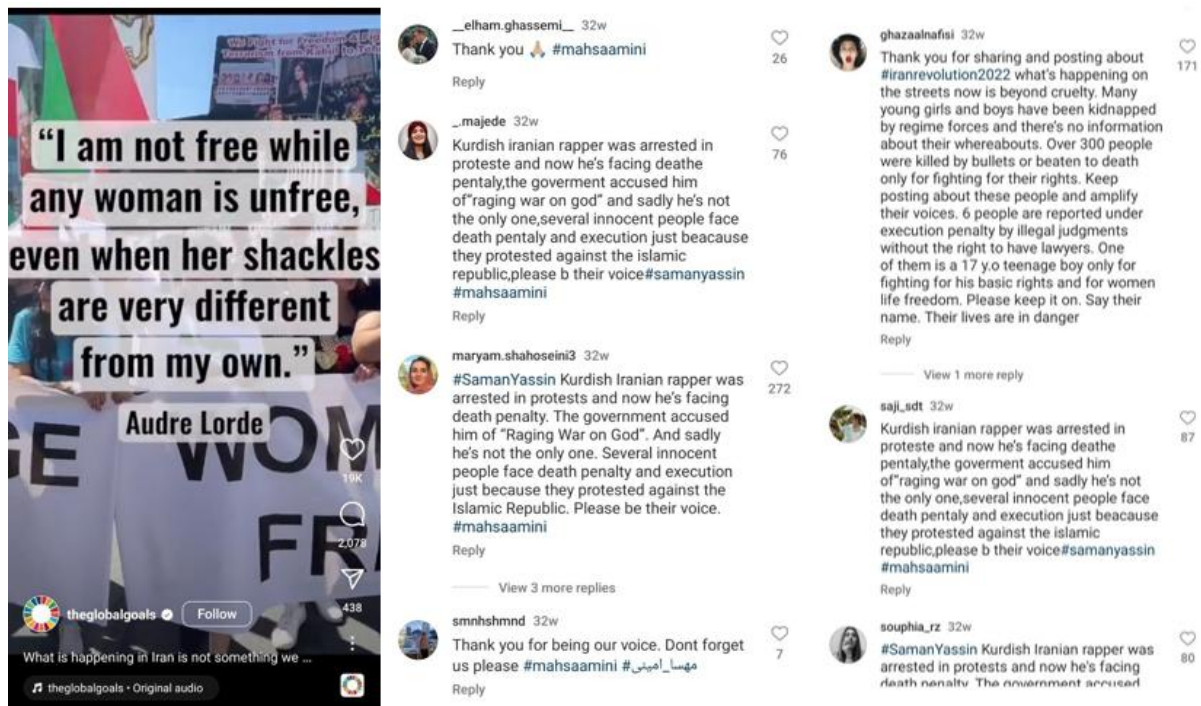


Figure 13. Posts with activism comments on Iranian protests

These three posts happened to be most commented, and therefore, I conduct deeper thematic analysis of this protest movement to get deeper understanding of the nature of MahsaAmini protest movement in given context.

Social media activism unlike offline forms of protests does not require many actions and taking big risks to participate (Goswami, 2018). Social media platforms to facilitate the rapid spread of information, engage diverse participants, and amplify marginalized voices. Being oppressed by Iranian government, people started to seeking help from international institutions, such as the UN. Although it is quite challenging to online support into real-world impact, high online media coverage enhances the attention of global community, faster emergency response (Goswami, 2018).

Social media platforms provided new opportunities to mobilize collective action, and rapidly share information to a broad audience thanks to their networked nature. Starting from nearly 2010s, social media audience started to exchange alternative opinions and independent news to facilitate social change. Social oppression of minors or opposition is a key factor of online activism. Also, platforms like Facebook, Twitter, YouTube, and other blogs facilitate communication, coordination, and information dissemination during the protests. One of the earliest online activism campaigns can be found in Arab Spring that took place across the Middle East and North Africa in 2010-2011 (Frangonikolopoulos, C. A., & Chapsos, I., 2012; Bebawi, S., & Bossio, D., 2014). Activists utilized hashtags, shared videos and images, and coordinated actions through social media, which helped mobilize and unite people. Hashtags, such as #Jan25 in Egypt, #Bahrain and #Syria, were widely used to label and aggregate related content, making it easier for people to find and follow updates on the protests.

By focusing on the Arab Spring as a case study, Bebawi and Bossio explored how social media provided opportunities for citizen journalism and circumvented censorship fostering political change. They also have covered how public opinion is influenced both within the region and internationally. They stress that there are different key narratives in Egypt and Arabic contexts, but still at the broader level, public is demonstrating active political action towards democratisation (Bebawi, S., & Bossio, D., 2014).

Another example of early political online movement is the Occupy Wall Street movement, which began in September 2011 in the USA (Tremayne, M. 2016). Audience connected posts by hashtags like #OccupyWallStreet and #WeAreThe99Percent to spread the movement's ideals and bring attention to its goals. Social media has become dynamic and alternative space for social movements. In his Twitter networks study, Tremayne captured key influencers and the movement framing process. He found that Adbusters, Canadian NGO, initially facilitated the movement and protests. This organization did not consolidate the movement itself, their messages resonated with wide audience due to previous recession in 2008 which was followed by low accountability of the USA government. Capturing social trend, NGO created central narratives of the #OccupyWallStreet movement (Tremayne, M. 2016).

Going back to my study, MahsaAmini online protest movement is characterised by spreading same messages in the comments. Pre-written and standardized texts save time and effort for people to quickly copy and paste a message for every comment or post. This convenience enables activists to engage with a larger number of posts and reach a wider audience. This also helps to keep consistency of protest key

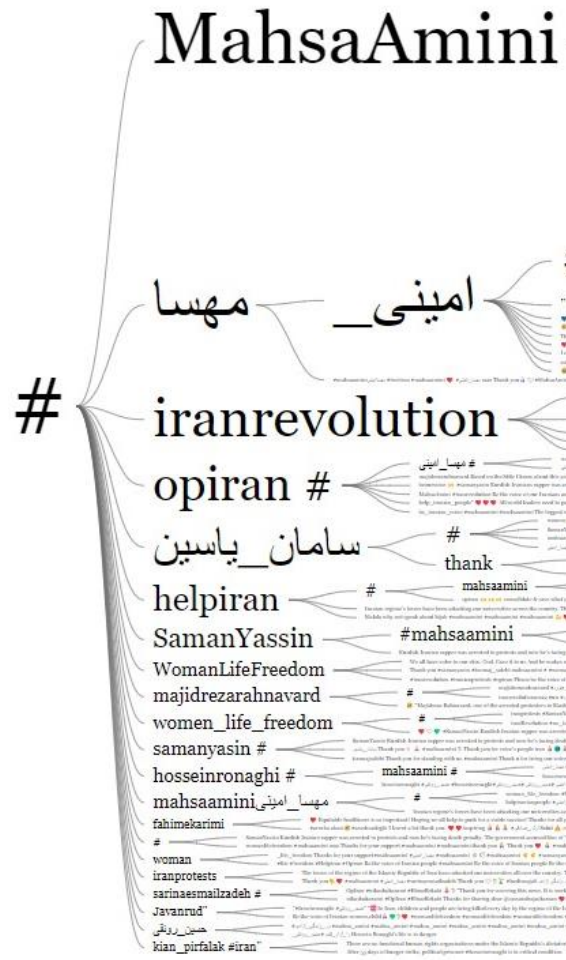
messages and unite people around particular ideas. Besides, hashtags help to make minor voices heard even if audience is not engaged with particular Instagram profiles.

Moving on found hashtags, MahsaAmini protest movement is associated with central person symbolizing the protests (#MahsaAmini), feminism agenda (#womanlifefreedom), political crises (#Iranianrevolution). (*Figure 14*) On the second wave of MahsaAmini activism on studied account, “thank you for being our voice” movement was found which was supposed to encourage the UN to delve into the protest. Additionally, users started to tag celebrities and influencers in comment section, encouraging them to break the silence on Iranian protests.

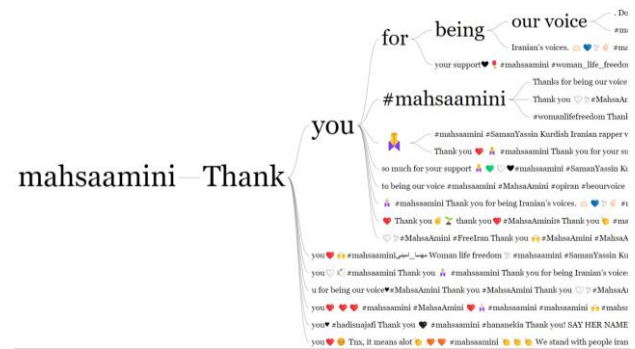
Captured MahsaAmini online protest movement can be described as depersonalised and standardized commenting, resonated around a certain person – Mahsa Amini, the victim of police brutality.

Hashtags related to MahsaAmini protests (2022) on Instagram used in posts comments

List of hashtags



#thank you for being our voice



#iranianrevolution

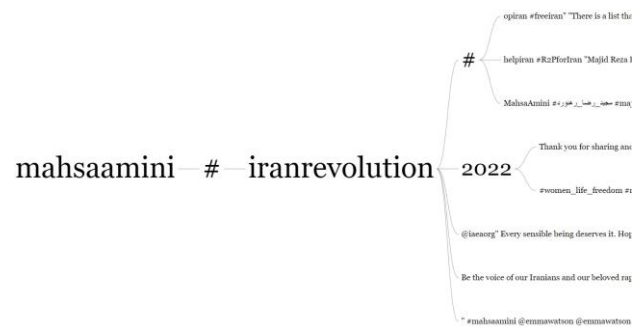


Figure 14. MahsaAmini protests Hashtag activism

In January 2022, a unique type of high comment activity was observed, centering around a word game (Figure 15). The post encouraged audience participation by challenging them. Word games are an effective way to foster user involvement and generate a sense of community participation.

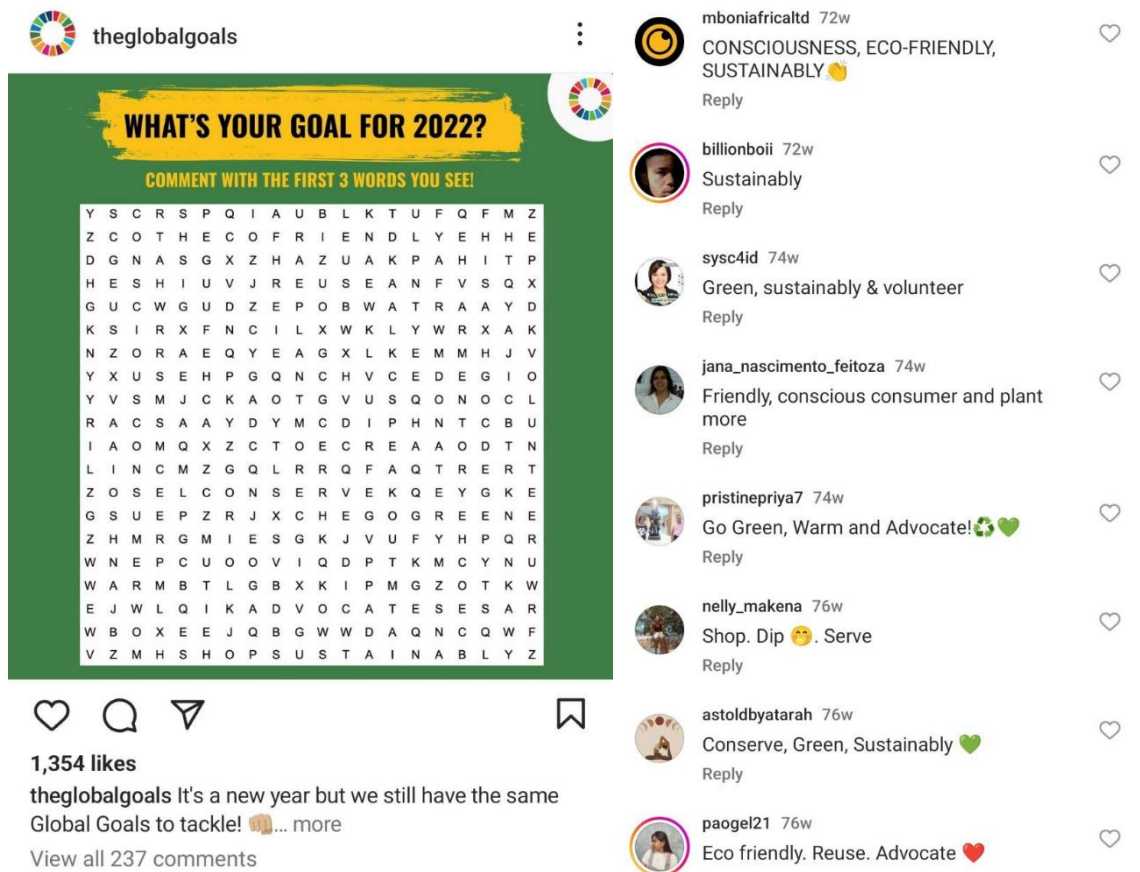


Figure 15. Post in word game format with high comment count

Closing the findings section, I conduct the thematic analysis of the emojis. The use of emojis in the posts' texts and comments provides valuable insights into the emotional exchange between content creators and the audience. Emojis serve as a means to convey emotions, ideas, or reactions within digital conversations, and they play a significant role in providing feedback, particularly in comments. The UN actively employs emojis in its post texts, reinforcing the messaging through the use of

expressive emoji gestures like "speaking head" and "clapping hands." Among the most common emojis observed, "green hearts" stand out, symbolizing climate action as a prominent sustainability topic in 2022. Additionally, the link icon indicates references to external sources, enhancing the credibility and context of the UN's content.

From the comments perspective, emojis such as "red heart," "clapping hands," and "handshakes" are prevalent, signifying support and approval for the ideas presented by the UN. On the other hand, emojis like "SOS" and "Iran flag" emerged in response to protest activity, reflecting the audience's engagement with global issues and their expression of solidarity. (Figure 16)

Emoji Post text

Comments

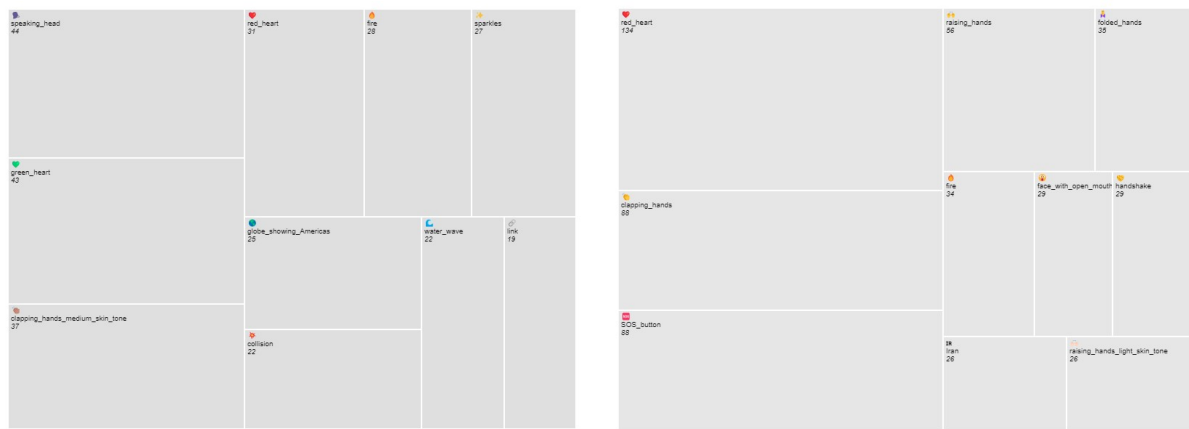


Figure 16. Emoji tonalty comparative analysis

8 Discussion

In this chapter, there is summary of findings from @theglobalgoals Instagram profile analysis of posts and comments. Considering both visual and text content, as well as insights derived from feedback analysis, it can be confidently concluded that the United Nations (UN) employs a well-structured content plan in its efforts to promote the Sustainable Development Goals (SDGs) with equal representation of environmental, social, and economic implications on a global scale. Thanks to strategic approach there is big community of followers involved. However, it is evident that followers' engagement with the content remains at a moderate level, 145 out of 238 studied posts have got less than 1000 likes and 160 out of 238 posts got less than 20 comments. In order to stimulate the activity, the UN attempts to implement interactivity formats. Yet, content engagement is rather dependent on external factors such as global social events rather than on the content itself.

Going back to the research question, key narratives of the UN cover wide range of topics associated with all 17 SDGs. In 2022 it was gender equality, green energy, environmental protection, safety, and well-being. From the visual and textual portrayal of the SDGs, developed narratives indicate the current trend on connecting people's daily lives with climate change and demonstrating and appealing necessity for sustainable development.

The initial focus of the study was on narratives' analysis; however, due to unforeseen outcomes observed during the engagement analysis, the research direction evolved significantly. It resulted in depth development of a focus on the studied social media infrastructure – Instagram, information flows and anthropological

capturing of the 2022 social contexts in European and Middle East regions. The study uncovered bot activity on some posts associated with War in Ukraine.

Capturing the 2022 social contexts in European and Middle East regions, commenting activism origins were revealed which underly cultural and societal factors that shape the online conversation about SDGs. There were 3 waves of comment and hashtag activism related to Iranian protests in 2022 found. The first wave of comment activism observed was under Halloween-related post to raise awareness about the Iranian protests. With regard to this post, influencers and general audience aimed to draw attention to the ongoing social and political issues in Iran globally perceiving the UN as powerful institution. Once studied profile started to publish posts related to the Iranian protests, activists leveraged massively shared narrative “thank you for being our voice” to create a sense of solidarity among users worldwide. Hashtag activism there served as a powerful tool to spread information and updates related to the protests. Lastly, under second post about Iranian protests online users stimulated engagement about the ongoing oppression and human rights violations faced by protesters, specifically, Iranian students and Majidreza Rahnavaard. This pop-up phenomenon brought to light the importance of the relevance and timeliness of the published content on the UN SDGs account. Apparently, future communicational strategy of the UN should become more complex. While continuing to promote the Sustainable Development Goals (SDGs) equally, the content should also be aligned with acute political topics and local issues to bridge them with sustainable development.

Even though the UN attempts to build the SDGs global image without borders by ensuring diversity of visual representations and covering various topics from

different regions, being an international institution, it faces sudden comment spamming waves which needs to be addressed. In order to bridge the SSG framework with the audience needs, the UN should keep an eye on media agenda to demonstrate the SDGs relevance.

Indeed, social media platforms have emerged as a powerful tool for the United Nations (UN) to promote the Sustainable Development Goals (SDGs) framework on a global scale. These platforms provide the UN with an unprecedented reach and visibility, enabling them to disseminate information about the SDGs, raise awareness about pressing issues, and mobilize support for sustainable development initiatives.

For the online audience, social media serves as an accessible platform to directly engage with and reach out to a prestigious international institution like the UN. It empowers individuals and communities to speak up, voice their concerns, and advocate for their needs, even in situations where they may feel silenced or marginalized. Social media provides a level playing field where people from diverse backgrounds can have their voices heard and contribute to meaningful conversations about the future of our planet.

Through social media, the UN can receive real-time feedback from the global audience, gaining insights into the priorities and concerns of people around the world. This direct engagement helps the UN to better understand the needs of different communities and tailor its strategies to address the most pressing challenges.

Moreover, social media allows for rapid information dissemination, facilitating the swift sharing of important updates, emergency alerts, and calls to action. This

instant connectivity enables the UN to respond to crises and emergencies more efficiently, providing timely support and aid to affected regions.

Overall, social media platforms have revolutionized the way the UN interacts with the public and vice versa. It has democratized access to information and amplified the voices of individuals and grassroots movements, enabling a more inclusive and participatory approach to advancing sustainable development goals globally. As the digital landscape continues to evolve, social media's role in promoting global sustainability and fostering meaningful dialogue between the UN and its global audience will undoubtedly continue to grow in importance.

9 Conclusions

As it can be observed, media is going through significant transformation in terms of philosophical and technological dimensions. Yet, it is not foreseeable that international institutions are flexible enough to adapt to these changes. International institutions have pretty much succeeded in spreading actual information about current state of global problems but face challenges to fit the actual sustainability agenda into global perspective.

Eventually, this master's thesis covered the social science scholars' reflection on media transformation in light of technological advancement and promoted sustainable development framework. In practical part, this thesis introduces a comprehensive content and feedback analysis of environmental communication by the UN global Instagram account dedicated to the SDGs.

The theories of classical media scholars such as Walter Lippmann, Erving Goffman, Juri Lotman, Herbert Marshall McLuhan have set the foundation of

environmental communication in terms of significant aspects of media messages creation and distribution. In particular, media is setting the agenda of societal focus, framing the core media topics, set the base of value exchange, and being transformed in light of easily accessible nature of modern social media channels where horizontal users' relations are prevalent which blurs senders and recipients of information.

The ideas of Sean Cubitt about ecomedia have influenced the philosophy of modern media, its new definition, and new goals in the changing world. Specifically, author illustrates how media is being transformed from human-centered to planet-centered foundation. Initially, media represented society through a dominant political-economic discourse, neglecting climate change and arising global problems. However, by 2000s, with raise of environmental discussions, there has been a shift towards prioritizing sustainability and addressing environmental challenges in media perception. It became important for media to raise awareness and make all voices, including nature and wild animals, heard in environmental communication. It also explores the concept of "slow violence," referring to gradual and often invisible harm to the planet due to pollutions. Additionally, media should promote sustainable practices, such as zero waste, green energy, and wildlife conservation, to foster communication campaigns for sustainable living and engage wide audiences around them. The UN aimed to develop Instagram channel with incipient sustainability topics.

Moving forward, modern environmental communication is bridged with shaping audience perceptions and attitudes towards the environment. Emerging misinformation and disinformation in online environmental communication can lead to suspicion and skepticism from the audience regarding sustainable development as whole. Social media platforms are identified as a powerful tool for environmental communication,

facilitating engagement, collaboration, and collective action to address the climate crisis.

The study has revealed that the catastrophic portrayal of emerging global problems which NGOs and other actors used to take, does not help to promote any sustainable solution and SDGs, instead, it makes the audience distant from the discussion. In this study it was found that the UN SDGs communication strategy on Instagram seems to consider this aspect and introduces actions everyone can take in content. However, in the studied period, in 2022, in some cases ongoing global events and cultural contexts were not covered enough in content planning. In order to do SDGs attractive at the global scale, regional contexts and needs should be considered.

Conducting social media studies, it is vital to consider that not all segments of the population may be equally represented on social media platforms. Therefore, it is essential to consider the limitations and possible generalisation of findings to broader populations. However, environmental communicators are using social media among other channels to facilitate discussions about sustainability. Social media research aids in comprehending the unique characteristics of online environmental communication and provides valuable insights for devising strategic communication plans.

Being an international organization, the UN should provide comprehensive information about the current state of SDGs achieving, including both strengths and areas for improvement. Since the UN has powerful impact on social events, its official online Instagram profile has witnessed waves of online comments and hashtag activism. This points out the disunity between promoted ideas and actual media agenda and the irrelevance of promoted messages in some regions. The UN tries to address it in further communication.

During the studied period, social media dynamic nature influenced the SDGs promotion. In 2022 there were some social and political events which influenced environmental communication narratives. Although SDGs framework remains stable, social events connected to sustainable development change, and audience is getting more engaged with posted content when posts are connected to current events which are appealing for online audience. As a bright illustration of this phenomena, under the analysed Halloween post about pumpkin waste in the UK many people came in the comment section to shed the light on Iranian protests happening at the same time. It is relevant in terms of sustainable development itself, however, there has been more hype event to cover for the UN according to online audience. In response to this activism wave from old and new visitors, the UN started to post about protests relating local Iranian protests to global sustainable development.

Onwards, it becomes evident that the UN's communicational strategy lacked substantial engagement activity around its content. Notably, the most engaging subjects were related to critical global events, such as Protests in Iran, War in Ukraine, and COP27. The UN's communicational strategy must take this into account and align its content with pressing global issues to foster greater engagement and mobilize support for the SDGs.

From methodological standpoint, conducting social media studies using digital methods presents several methodological challenges that need to be addressed for valid and reliable results. One of the primary challenges is defining a suitable research design that aligns with the specific research question. Social media research often involves analysing vast amounts of unstructured data, necessitating effective data

cleaning techniques to ensure data accuracy and consistency. Furthermore, social media studies must grapple with issues related to privacy, ethics, and data security.

Another critical methodological consideration is the relevance and applicability of the study's findings. Social media trends and user behaviours can change rapidly, rendering short-term studies potentially outdated or irrelevant in a fast-paced online environment.

In addition to these challenges, there are potential biases in interpreting social media data depending on researcher background and knowledge. Having faced Iranian protests in content analysis, I needed to dive into regional contexts and news during 2022 in order to interpret meanings correctly. To enhance the effectiveness of such social media studies, thematic and anthropological techniques should be applied.

While conducting content analysis, the digital methods tools used in this study have demonstrated many prospects for environmental communication studies. This study can be further developed by capturing trends of the UN SDGs communication on Instagram in the following years to indicate the evolution of environmental messaging over time. Furthermore, this study has various ways for further development such as:

- applying the same methodology for analysing environmental communication of other international institutions, or on different social media platforms,
- examining environmental communication on social media across different cultural and geographic contexts,
- narrowing to the social network analysis to understand how environmental messages propagate and reach different segments of social media users,

- diving into social media infrastructure by assessing how algorithms shape the visibility and exposure of sustainability-related messages.

Since environmental communication like any other one is a complex societal phenomenon, it is a highly relevant direction for future media studies. Ultimately, by gaining insights into the content and strategies employed in environmental communication on social media, this thesis provides valuable insights for practitioners, policymakers, and researchers, offering a foundation for further exploration and improvement in environmental communication practices.

REFERENCES

1. Almila Akdag Salah, Lev Manovich, Albert Ali Salah & Jay Chow (2013) Combining Cultural Analytics and Networks Analysis: Studying a Social Network Site with User-Generated Content, *Journal of Broadcasting & Electronic Media*, 57:3, 409-426, DOI: 10.1080/08838151.2013.816710
2. Aririguzoh, S. (2022). Communication competencies, culture and SDGs: effective processes to cross-cultural communication. *Humanities and Social Sciences Communications*, 9(1), 1-11.
3. Bebawi, S., & Bossio, D. (Eds.). (2014). *Social media and the politics of reportage: the 'Arab Spring'*. Springer.
4. Bounegru, L., De Pryck, K., Venturini, T., & Mauri, M. (2020). "We only have 12 years": YouTube and the IPCC report on global warming of 1.5 °C. *First Monday*, 25(2), 1-1.
5. Burgess, J., Harrison, C. M., & Filius, P. (1998). Environmental communication and the cultural politics of environmental citizenship. *Environment and planning A*, 30(8), 1445-1460.
6. Burns, T. W., O'Connor, D. J., & Stocklmayer, S. M. (2003). Science Communication: A Contemporary Definition. *Public Understanding of Science*, 12(2), 183–202. <https://doi.org/10.1177/09636625030122004>
7. Chen, D., Guo, Y., Wang, C., Xu, Y., & Zhang, H. (2022). Dispersion and Disparity: Bibliometric and Visualized Analysis of Research on Climate Change Science Communication. *International Journal of Environmental Research and Public Health*, 19(23), 15766. <https://doi.org/10.3390/ijerph192315766>
8. Cohen, B. C. (1963). The press and foreign policy. *The Public Opinion Quarterly*, 27(4), 565-573. doi: 10.1086/267198
9. Cox, R., Pezzullo, P. C. (2017). *Environmental Communication and the Public Sphere*. SAGE Publications.
10. Cubitt, S. (2005). *EcoMedia*. EcoMedia.
11. Darós, R. R. (2019). *Dairy cattle transition period: disease prevalence and risk factors in grazing and freestall systems* (Doctoral dissertation, University of British Columbia).
12. Elgesem, D. (2017). Polarization in blogging about the Paris meeting on climate change. In *Social Informatics: 9th International Conference, SocInfo 2017, Oxford, UK, September 13-15, 2017, Proceedings, Part I* 9 (pp. 178-200). Springer International Publishing.
13. European Commission (2006). *Europe's rules on GMOs and the WTO* https://ec.europa.eu/commission/presscorner/detail/en/MEMO_06_61
14. Frangonikolopoulos, C. A., & Chapsos, I. (2012). Explaining the role and the impact of the social media in the Arab Spring. *Global Media Journal: Mediterranean Edition*, 7(2).

15. Goswami, M. P. (2018). Social media and hashtag activism. *Liberty Dignity and Change in Journalism*, 252-262.
16. Herring, S. (2010). Web content Analysis: Expanding the Paradigm. In J. Hunsinger & et al. (Eds.), *International Handbook of Internet Research* (pp. 233–249). Dordrecht: Springer
17. Hopke, J. E., & Hestres, L. E. (2018). Visualizing the Paris climate talks on Twitter: Media and climate stakeholder visual social media during COP21. *Social Media+ Society*, 4(3), 2056305118782687.
18. Latour, B. (2004). Politics of nature. In *Politics of Nature*. Harvard University Press.
19. Lewandowsky, S. (2021). Climate change disinformation and how to combat it. *Annual Review of Public Health*, 42, 1-21.
20. Lippmann, W. (1922). *Public opinion*. Harcourt, Brace and Company.
21. López, A. (2022). Ecomedia Literacy. In *Media Literacy, Equity, and Justice* (pp. 115–122). Routledge. <https://doi.org/10.4324/9781003175599-18>
22. Lotman, Y. (1990). *Universe of the mind: A semiotic theory of culture*. Indiana University Press.
23. Lundgaard, D. (2021). *Using Social Media to Discuss Global Challenges: Case Studies of the Climate Change Debate on Twitter*. Copenhagen Business School [Phd].
24. McLuhan, M. (1994). *Understanding media: The extensions of man*. MIT press.
25. Maibach, Edward & Leiserowitz, Anthony & Roser-Renouf, Connie & Howe, Peter & Feinberg, Geoff. (2012). Global Warming's Six Americas in September 2012. 10.13140/RG.2.2.22286.97604.
26. Marres, N. (2015). Why map issues? On controversy analysis as a digital method. *Science, Technology, & Human Values*, 40(5), 655-686.
27. Newman, Todd & Nisbet, Matthew. (2015). Framing, the Media, and Environmental Communication. 10.4324/9781315887586.ch28.
28. Niederer, S. M. C. (2016). *Networked Content Analysis: The case of climate change*. [Thesis, externally prepared, Universiteit van Amsterdam]
29. Nunes, M. F., & Park, C. L. (2022). *Extreme Sustainability Rhetoric and Sustainable Development*. Taylor & Francis.
30. Pavelle, S., & Wilkinson, C. (2020). Into the digital wild: utilizing Twitter, Instagram, YouTube, and Facebook for effective science and environmental communication. *Frontiers in Communication*, 5, 575122.
31. Ritchie, Roser, Mispy, Ortiz-Ospina. "Measuring progress towards the Sustainable Development Goals." *SDG-Tracker.org*, website (2018).
32. Rogers, R. (2009). *The end of the virtual: Digital methods* (Vol. 339). Amsterdam University Press.
33. Sanches, D., Canavarro, M., Almeida, S., & Roberto, L. (2022). Indigenous Activism on Environmental Issues on TikTok. *Smart Data* Spring 2022. https://metodosdigitais.fcsh.unl.pt/?page_id=2859#refs

34. Soles, C., & Chu, K. (2016). Overview: framing visual texts for ecomedia studies. In S. Rust, S. Monani, & S. Cubitt (Eds.), *Ecomedia: Key Issues* (pp. 17-26).
35. Su, L. Y. F., Akin, H., & Brossard, D. (2017). Research methods for assessing online climate change communication, social media discussion, and behavior. *The Oxford encyclopedia of climate change communication*. New York, NY: Oxford University Press. Retrieved from <http://climatescience.oxfordre.com/view/10.1093/acrefore/9780190228620.001, 1>.
36. Tremayne, M. (2016). Anatomy of protest in the digital era: A network analysis of Twitter and Occupy Wall Street. In *Social Networks and Social Movements* (pp. 110-126). Routledge.
37. Tscholl, M., & Sturm, U. (2022). Posting nature: A critical perspective on analysing cultural ecosystem services on Instagram. *Journal of Environmental Media*, 3(2), 255-271.
38. United Nations. (2021a). Culture and sustainable development. Retrieved from <https://www.un.org/en/sections/issues-depth/culture-and-sustainable-development/>
39. United Nations. (2021b). Sustainable Development Goals. Retrieved from <https://www.un.org/sustainabledevelopment/>
40. United Nations. (2021c). Global SDG Indicators Database. Retrieved from <https://unstats.un.org/sdgs/indicators/database/>
41. United Nations. (2021d). Communication and advocacy. Retrieved from <https://www.un.org/sustainabledevelopment/communication-and-advocacy/>
42. United States Trade Representative. (2019). United States Wins Decisive Victory in Dispute Challenging Discrimination Against U.S. Solar Exports. <https://ustr.gov/about-us/policy-offices/press-office/press-releases/2016/september/united-states-wins-decisive>
43. Wardle, C., & Derakhshan, H. (2018). Thinking about 'information disorder': formats of misinformation, disinformation, and mal-information. *Journalism, 'fake news' & disinformation*, 43-54.
44. Weaver, I., Westwood, N., Coan, T., O'Neill, S., & Williams, H. T. (2022). Sponsored messaging about climate change on Facebook: Actors, content, frames. *arXiv preprint arXiv:2211.13965*.
45. WTO. (2012). WTO Appellate Body issues report on US "country of origin" disputes. https://www.wto.org/english/news_e/news12_e/384_386abr_e.htm
46. WTO. (2020). DS593: European Union - Certain measures concerning palm oil and oil palm crop-based biofuels. (n.d.). https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds593_e.htm

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ABBREVIATIONS AND GLOSSARY

The UN= United Nations

The SDGs = Sustainable Development Goals

Like/comment count = number of likes or comments on post by the time of data extraction

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Appendix 1. Top-7 Definitions on the Web for SDGs

1. United Nations Development Programme (UNDP): "The Sustainable Development Goals (SDGs) are a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity."
Source: UNDP - <https://www.undp.org/sustainable-development-goals>
2. United Nations Children's Fund (UNICEF): "The SDGs are a call to action to create a world where no one is left behind"
Source: UNICEF - <https://www.unicef.org/sdg/en/>
3. HEC Paris: "The 17 "Sustainable Development Goals" (SDGs) are the layout to achieve a better and more sustainable world for all by 2030.."
Source: HEC Paris - <https://www.hec.edu/en/faculty-research/centers/society-organizations-institute/think/so-institute-executive-factsheets/what-are-sustainable-development-goals-sdg>
4. Wikipedia: " The Sustainable Development Goals are a collection of seventeen interlinked objectives designed to serve as a "shared blueprint for peace and prosperity for people and the planet, now and into the future" "
Source: Wikipedia - https://en.wikipedia.org/wiki/Sustainable_Development_Goals
5. United Nations Office on Drugs and Crime: " The sustainable development goals (SDGs) are a new, universal set of goals, targets and indicators that UN member states will be expected to use to frame their agendas and political policies over the next 15 years.."
Source: UNODC - <https://www.unodc.org/roseap/en/sustainable-development-goals.html>
6. United Nations Global Compact: "The SDGs are a call for companies to align their strategies and operations with universal principles and contribute to the achievement of a sustainable future."
Source: UN Global Compact - <https://www.unglobalcompact.org/what-is-gc/mission/principles/principle-1>
7. World Health Organization (WHO): "The Sustainable Development Goals (SDGs) are a call to action to end poverty and inequality, protect the planet, and ensure that all people enjoy health, justice and prosperity. "

Source: WHO - [https://www.who.int/europe/about-us/our-work/sustainable-development-goals#:~:text=The%20Sustainable%20Development%20Goals%20\(SDGs,enjoy%20health%2C%20justice%20and%20prosperity.](https://www.who.int/europe/about-us/our-work/sustainable-development-goals#:~:text=The%20Sustainable%20Development%20Goals%20(SDGs,enjoy%20health%2C%20justice%20and%20prosperity.)