Sustainability as a Message on Social Media: A Case Study of the World Economic Forum's Twitter (Now X) Account

Zrównoważony rozwój w mediach społecznościowych: studium przypadku konta Światowego Forum Ekonomicznego na Twitterze (obecnie X)

Jiří Preis[1], David Klika[2]

University of West Bohemia, Faculty of Economics, Department of Geography,
Univerzitni 22, Plzen, 20100, Czech Republic
[1]E-mail: jpreis@fek.zcu.cz, ORCID: 0000-0002-9123-2776
[2]E-mail: dklika@fek.zcu.cz, ORCID: 0009-0005-3380-0586

Abstract

Sustainability and social media are two current topics, the combination of which can be a compelling means of change for a better, sustainable future. This paper analyses the Twitter profile of the World Economic Forum, a global leader in promoting sustainability, over five years, from 2016 to 2020. The main focus of this work is to analyse the content and nature of the World Economic Forum's contributions (tweets) focusing on topics of Sustainable Development Goals. The results are presented in three categories – geographical focus, thematic focus, and most popular content. The results can indicate the trend, what topics and geographical locations related to sustainability are emphasised online, how the audience perceives it, and how to popularise sustainability among the public.

Key words: sustainability, social media, SDGs, World Economic Forum, Twitter

Streszczenie

Zrównoważony rozwój i media społecznościowe to dwa aktualne tematy, których połączenie może być przekonującym środkiem zmian na rzecz lepszej, zrównoważonej przyszłości. W artykule dokonano analizy profilu Światowego Forum Ekonomicznego na Twitterze, światowego lidera w promowaniu zrównoważonego rozwoju, na przestrzeni pięciu lat, od 2016 do 2020. Głównym celem tej pracy jest analiza treści i charakteru wpisów (tweetów) Światowego Forum Ekonomicznego. skupiając się na tematyce Celów zrównoważonego rozwoju. Wyniki prezentowane są w trzech kategoriach – skupienie geograficzne, skupienie tematyczne i najpopularniejsze treści. Wyniki mogą wskazać trend, jakie tematy i lokalizacje geograficzne związane ze zrównoważonym rozwojem są podkreślane w świecie online, jak postrzegają go odbiorcy i jak popularyzować zrównoważony rozwój wśród społeczeństwa.

Słowa kluczowe: zrównoważony rozwój, media społecznościowe, Cele zrównoważonego rozwoju, Światowe Forum Ekonomiczne, Twitter

Introduction

Sustainability and sustainable development are at the forefront of contemporary political debates and corporate and business efforts, which have become public discourse worldwide. In 2015, the United Nations General Assembly (UNGA) announced its mission to create a better world by 2030. By signing the resolution commonly known as the *Agenda 2030*, they presented 17 *Sustainable Development Goals* (SDGs), following their previous *Millennium Development Goals* (MDGs). SDGs have quickly become popular and used as a metric for sustainability by a multitude of actors, from small businesses to transnational organisations (Sachs, 2012).

Similarly, the Internet and the rapid spread of digital technologies across the globe are bringing more and more people into the online environment. In the words of Sedláček, our soul is slowly moving to the *digital habitat* (Sedláček, 2020). The Internet provides social and community platforms where individuals, organisations, and governments can share their thoughts, interact, and discuss contemporary world issues. Even further, over the years, some of the so-called social media platforms have become vital faucets for announcements by public figures and politicians and commonly used sources for the more traditional media.

The main goal of this paper is to examine one such example, the *World Economic Forum* and how they present themselves on the popular social media platform *Twitter* (now *X*). The World Economic Forum is a high-impact organisation focusing on cooperation between the private and public sectors. They established multiple platforms for mobilising the private sector, from individuals to companies, to take action on the contemporary topics of sustainability, technological progress, social equality and others. Today, the main body of their efforts is based online through their website and profiles on multiple social media.

Goals of the paper

As such, the first goal of this paper is to describe the presence of the WEF in the online environment, with the main focus being the WEF's operation on the social network Twitter. We examine the overall metrics regarding the profile and assess the availability of relevant data.

We then focus on a selected dataset of tweets posted over five years between 2016 and 2020. We analyse the information in the acquired dataset, focusing first on the basic statistics of the WEF's posts – the average number of posts, interactions, etc.

As our second goal, we establish three main categories for further analysis and processing, which we use to produce relevant outputs based on our data, focusing on sustainability and SDGs. Generally, we search for geographical, topical and popularity contexts of WEF tweets regarding sustainability and SDGs in particular (see Fig. 1).

Figure 1. Organigram Contexts of WEF tweets, source: own elaboration
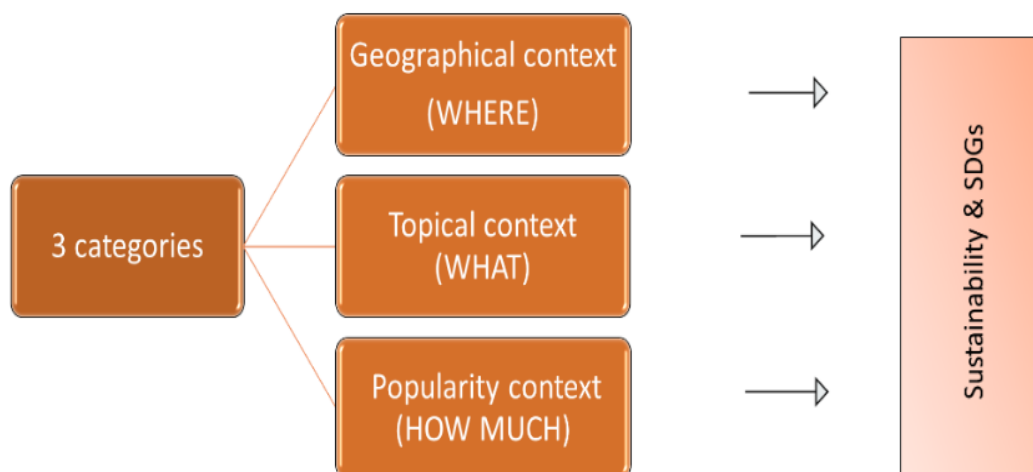
First, we establish a connection between the text of a tweet and the possible geographical location, in our case, individual countries, based on related keywords. Our goal is to utilise Twitter's location functionality along with keyword-based searches. The planned output is a list of countries, their popularity, and a simple map as a visualisation.

Second, we focus on the context and topic of each tweet. For this purpose, we utilise Twitter hashtags based on the popularity of their usage. We categorise the tweets into overall categories based on the hashtags, and their content connects them to individual SDGs.

Third, we focus on the most impactful WEF' tweets using Twitter's metrics, such as retweet, reply, and quoted retweets. We then analyse the content of those tweets to extrapolate major topics into a group of keywords and establish a connection between those and individual SDGs.

Globalisation & Sustainability: Theoretical Background

The field of economics as a science inherently deals with the essential activities of how people produce, consume, trade, and distribute goods and services among each other. Further, many of such activities require a geographical area where such activities take place, as such economic activities can take place at a specific location or place, within a specific territory or at a particular scale (Coe et al., 2013). Furthermore, the key thought behind the

spatiality of the economy is the uneven distribution of its activities throughout space with the underlying connections to other aspects of uneven distribution within the realms of societal (demographic, cultural, etc.) and environmental topics (Sýkora, 2000; Coe et al., 2013).

The economy and economic thinking were highly localised for a long time. It included households and people's access to the local market. The division of labour was present at the time but was not as specialised (Coe et al., 2013). However, throughout the years, technological progress and cultural changes within society have allowed emerging economies to have high degrees of specialisation. This global interconnectedness of society and economy leads us to another important topic – *globalisation* and its impacts.

Historically, authors and documents noticed economic activities' growing spatiality and interconnectedness (Sýkora, 2000; Dicken, 2015). The term has been used in English since the early 20th century, albeit sparsely. However, its use has become more common in recent decades as a notion for the economy *to become global*. Tomáš Sedláček quotes Adam Smith, the modern founder of economics: *The wealth of the nations comes from specialisation*. (Sedláček, 2013). Globalisation uses this principle on a global scale.

Some people may feel that globalisation steals their last values, so they may tend to hide under a *protective cocoon* of nationalism or religion, hoping that they will find a hiding place there (Rowntree et al., 2013).

When the topic of *sustainability* is brought up, one may intuitively understand what it encompasses. However, throughout the years, the term itself and the accompanying term of *sustainable development* evolved in its meaning, targeting various aspects of the world around us.

The first proper definition of *sustainable development* dates back to 1713 when Hans Carl von Carlowitz published his book on forest sciences called *Sylvicultura Oeconomica*. The author speaks about a concept called *Nachhaltigkeit*, which can be translated into English as *sustainability*. Carlowitz describes the threatening shortage of available timber and proposes that local forests and their timber should be *used with caution in a way that there is a balance between timber growth and lumbering.* (Carlowitz, 1713). Thus, it adds an essential layer to sustainability - a long-term*,* multigenerational process where the balance between consumption and production is crucial.

Based on this initial definition, the 1987 World Commission of Environment and Development (known as the *Brundtland Commission*) came up with its own: *Sustainable development meets the needs of the present generation without compromising the ability of future generations to meet their needs.* This definition of sustainability, with three components as key pillars (environmental, economic and social), is often used verbatim or with slight variance in public discourse and media and by politicians (Keiner, 2005).

Sztumski (2023) points out that if we summarise all definitions and consider time and space, there will always be *a non-conflict of interests* – in other words, all efforts go in the same direction.

At the beginning of the new millennium, a global debate on sustainability arose. Thus, in 2000, the UNGA held an important meeting, bringing two significant ideas for the future of economic development and sustainability.

The first was the adoption of the United Nations *Millennium Declaration* on the 8th of September 2000. The 189 member states expressed their vision and outlook into the 21st century, promoting values such as freedom, equality, solidarity, tolerance, respect for nature, democracy, human rights and environment protection. (United Nations General Assembly [UNGA], 2000).

The second was the *Millennium Development Goals* (*MDGs*) proposition, focusing primarily on least developed regions (Liverman, 2018).

While 2015 marked the end of the MDGs, where the UN drew their conclusions in their report (United Nations [UN], 2015a) to at least partial success for most of its goals and targets, they also recognised the growing scope of sustainable development problematic. Thus, beginning in 2015, they adopted a new mission and a new set of broader and deeper goals in its topics. The document, commonly known as the Agenda 2030, was adopted during the 70th session of the UNGA and introduced 17 new goals for sustainable development with the target year of 2030 – *the Sustainable Development Goals* (UN, 2015b). Accomplishing SDGs globally and regionally is often the topic of various analyses and studies (Grzebyk et al., 2023; Marzouki et al., 2021).

World Wide Web and Social Media: example of Twitter (now X)

From its inception in the early 1960s, the *Internet* has gone a long way; from a relatively small-scale network connecting universities and research institutions, it has found itself connecting billions of people who use it daily for news reading and answering emails, or complex tasks such as content creation in the form of videos, blogs, or podcasts.

The rapid spread of its use is apparent. In 2005, only 16.8% of the people used the Internet regularly; in 2010, it was 29.3%; in 2015, 41.5%, and finally, by 2021, it was 63% of the global population (International Telecommunication Union [ITU], 2019; ITU, 2021). The latest ITU report even argues that the global pandemic of COVID-19 has accelerated the spread of Internet usage even further, as for many individuals and companies, it has become a necessity during those trying times (ITU, 2021). It was further confirmed in their latest report with the annual growth of online traffic by 30% between 2019 and 2023, with a peak in 2020 and a following slowdown

in 2022 (ITU, 2023), which mirrors the growth and recession of the pandemic. A similar increase is seen among the regular users (ITU, 2023).

Looking deeper into the data from 2023, we find out that while the numbers for people regularly accessing the Internet are high in Europe (91%), the Commonwealth of Independent States (89%), and The Americas (87%), they get towards the average of 67% in the Arab States (67%) and Asia and Pacific (66%), and finally end up way below the average percentage in Africa (37%). Similar differences can be seen in comparing urban and rural areas, yet comparing the data by gender is relatively uniform for all regions (ITU, 2023).

Further, social media platforms in cyberspace facilitate and enable user networking activity. They are often focused on different content as well as the target groups. As Fiut (2007) says, a post-industrial society shaped by globalisation develops its interactions within social and natural environments via media. Social media puts this interaction to an even higher level, practically allowing for real-time sharing of thoughts.

For our selected time frame, Twitter (now X) was among the world's most popular social networking services. With 436 million monthly users in 2020, Twitter was the 3rd most popular social platform focusing on text-based content combined with multimedia (preceded by Facebook and Telegram) (Statista, 2023a). By 2023, regular monthly users grew to 666 million (Statista, 2023a). Twitter is crucial in communicating with a broader audience to disseminate information, raise awareness, or collect public opinions (Marzouki et al., 2021). Twitter is often used by journalists, politicians, researchers, and publicly active stakeholders. It is frequently quoted as a source by traditional TV media. Especially during the COVID pandemic, the role of Twitter significantly grew because people could not socialise with each other and thus exchanged information and stories via this platform (Glowacki, Wilcox, Glowacki, 2021). On the other hand, the WEF emphasises that during Covid, extreme use of social media opened the door to *infodemia* and *disinformation* (WEF, 2020).

Since April 2022, when Elon Musk began its acquisition, Twitter has been transforming a lot. Linda Yaccarino, the new CEO after Elon Musk, withdrew from this position in June 2023, saying: *Twitter's goal is to be the most accurate real-time information source* and *the global town square* (Heath, 2023). Considering its new vision designed by Yaccarino, it may become more popular among those who want to have an informational edge over others or want to communicate and be heard. The network was rebranded in July 2023 and renamed *X*. However, despite its long-running popularity, the current changes under the new leadership do not have a positive outlook for Twitter. Since its acquisition by Musk and with its new vision, Twitter lost almost 23 % of its users in the USA, along with some of its advertisement revenue (Ingram, 2024), among other problems regarding bots often powered by AI technologies (Pequeño, 2024; Perez, 2024).

The core of communicating through Twitter is the tweets - short messages posted by its users. Formerly, each tweet was limited to a maximum of 140 characters. In November 2017, they doubled this length to a maximum of 280 characters, the standard limit for regular users; the upper limit for users with premium subscriptions is 4.000 characters.

However, like many other platforms, Twitter is not uniformly popular worldwide. It is generally most popular in anglophone countries, the Americas and Western Europe regions, with certain exceptions. Twitter is most popular in the USA, with 95.4 million regular users, followed by Japan with nearly 67.5 million, India with 27 million, and Brazil and Indonesia with around 24 million users (Statista, 2023b). However, along with broader Internet censorship, it has been banned in 36 countries worldwide, with 4 of these bans still present (China, Iran, North Korea, and Turkmenistan) (Statista, 2023c) Yet, in the case of China many people circumvent the ban utilising VPN software; many big companies such as CCTV, Huawei or People's Daily, China do that with government approval (Twitter, 2023a; Twitter, 2023b; Twitter, 2023c).

WEF & Sustainability concept

2021 was an important milestone for the *World Economic Forum* (WEF). It has been 50 years since its foundation by Klaus Schwab, a professor of business and management at the University of Geneva. Formerly known as the *European Management Forum*, it held its first annual meeting in January 1971 in Davos, Switzerland. The founding idea for the Forum was what Professor Schwab calls *stakeholder capitalism*. He proposed that each company should aim to satisfy and serve all its stakeholders, not just its shareholders. This idea resonates with all WEF's ideas and their partner network (World Economic Forum [WEF], 2023a). The relevance of this idea for the WEF can be seen in Schwab's recent book *Stakeholder Capitalism: A Global Economy that Works for Progress, people and Planet* (Schwab, 2021). Since the beginning of Forum's work (Schwab, 1973), we can see the underlying ideas of social responsibility and sustainability. In its modernised 2020 iteration, Schwab (2020) refocuses on companies, further promoting ideas of sustainability, diversity and fairness - now framed by the *digital era*. The ideas such as circular and shared economy, innovative technologies and global citizenship are mentioned.

Thus, through its annual conference, more frequent local meetings, or online activities, the WEF seeks to provide a platform for business owners, politicians, academics, or influential individuals to meet with their stakeholders – the public. They aim to be a leading global platform for private and public cooperation (Pigman, 2007). Over the

years, it has centralised itself in talks about sustainability, climate action, and the environment with a significant online activity to support its private and public cooperation ideas. In 2015, the WEF adopted a sustainability policy that committed the Forum to be a leader in sustainability. The WEF strives to connect global leaders of society to improve the world (WEF, 2023b).

WEF on Twitter

Since the end of our dataset, the number of WEF followers has increased steadily from 3.94 million in January 2021 to 4.47 million in January 2024. A further shift in the profile's management can be noticed; the number of accounts WEF itself is following almost doubled from 516 to 951 (Social Blade, 2024), while their post frequency continued to decline steadily from the tens of tweets a day to roughly 4 tweets a day (Social Blade, 2024), with the regular spikes following important summits and meetings (WEF, 2024a; WEF, 2024b). The language in which WEF tweets is English; while Twitter allows for automated translation of tweets from and to many languages, there is still a bias towards anglophonic users. Furthermore, while the account operating under the handle of @wef is WEF's primary one, we can find further additional accounts related to the Forum - @Davos focusing on automated content (Twitter, 2023e), and several others focusing on concrete subtopics and WEF platforms.

Methodology

The key questions we had to assess when we decided to work with Twitter and individual posts - tweets as our dataset for future analysis were:
1. What would be an ideal timeframe for such analysis?
2. What methods should we use to acquire and analyse the dataset?

Selection of the time frame

Our first task was the choice of a suitable time frame. The first data collection was done in late November of 2021. As such, the time frame from 2016 through 2020 was chosen. However, given our further work with the dataset, it seemed insufficient for the proper analysis. Thus, subsequent data collection was done in early 2024 to assess the key points of our initial findings from 2021 to 2023. Throughout 2022, Twitter was subject to many changes, including its former API and users' ability to access and download large amounts of data.
We wanted to cover the majority of WEF's tweets. Thus, even though WEF's official account has existed since 2007, we chose a period in which most of their tweets were made. As of November 2023, WEF had posted 174 399 tweets (Social Blade, 2024), where 129 276 (74,12 %) had been posted over the initial selected time and 13 378 (7,67 %) over the second time frame (for further context, see Content analysis and Results). As is further apparent from the Social Blade (2024) data, since 2021, the number of daily tweets has steadily declined to the average of 4 tweets a day.
The changes to Twitter's API made since late 2022, limiting the number of tweets a user can access over a short period, would require using different methods than initially. For such a purpose, a similar large-scale approach was deemed impracticable. Thus, we focused on already established trends and popular topics through hashtags and utilised Twitter's inherent search functionality to extrapolate the trends till 2023.

Acquiring the dataset

From the beginning, we aimed to work with a relatively large dataset. As such, we decided to utilise multiple software tools to help us with our analysis, from publicly available *scraping* tools to spreadsheet software and custom scripts to help us with data cleaning.
We can split our process into the following steps: *data analysis*, *choice of a 'scraping' tool*, *data acquisition*, *data cleaning and storing*, and *initial dataset analysis*.
The initial step focused on identifying possible *native* methods to acquire the content of tweets, which at the time seemed unreasonable given our goal of the robust dataset.
Since Twitter API (application interface – a way through which other software can interact with data on the site directly) did not offer a way to download tweet data in a structured manner for free, we chose to utilise an already existing and publicly accessible scraping tool, *Snscrape* (JustAnotherArchivist, 2023). *Scraping* is a term used in programming to describe a process of acquiring structured data suitable for further software analysis from the text formerly intended for a human reader (usually containing irrelevant information about formatting, lacking proper labelling, etc.). At the time, Twitter did not limit the amount of tweets that could be accessed over a short period (within a few hours).
Once the data were downloaded, we used custom scripts to clean the dataset and restructure it in a way suitable for a spreadsheet editor for further analysis.

However, since the aforementioned changes to the API, we returned to our initial idea of utilising Twitter's native search for further data collection, albeit at a much smaller scale than before. However, given the decline in WEF's post-frequency since 2021 and especially in 2023, it was more reasonable to do so.

Content analysis, keywords & indexing

Our first goal was to understand the *modus operandi* of the WEF's Twitter account and familiarise ourselves with the data for further keyword indexing. For this purpose, we utilised the standard tools of descriptive statistics and interpreted such results in the context of Twitter and its specifics. We sought to understand the pattern in which WEF tweeted, based on the post frequency and the structure of their posts, whether they focused on original content or retweeted or quoted retweeted content from other users. Further, we explored how WEF tweeted - how they utilised localisation, whether their tweets contained further media, and whether they interacted with particular topics using the built-in functionality of mentions and hashtags.

As our goal was to analyse the content of each tweet further, we decided to focus on analysing using keywords. For this purpose, we chose two approaches. First, we decided to utilise hashtags used by the WEF, as they are used both as topic-bearers and essential words of the tweet. Second, we constructed a dictionary of words from all of the tweets. Based on that, we sought to identify key and popular topics based on the categories we established: geographical context, topical context, and popularity context. Our goal, especially for the topical and popularity context, was to connect those to sustainability and SDGs. The hashtag approach was further utilised for the follow-up analysis from 2021 to 2023, focusing on the previously established trends. Utilising the dictionary approach further would require a more sophisticated method, which was not available at that time.

Lastly, we utilised indexing for the third category of our results, the most popular tweets categorised by reactions. Based on the tweet's full content, we derived both general keywords regarding the tweet and the connection with individual SDGs. We used a similar strategy for the topical category. The connection between a keyword or a full tweet was made based on the content analysis of the formulation of each SDG and its underlying targets and our associated keywords.

Results

We focus on the WEF account's activity mainly between 2016 and 2020, with the follow-up analysis focusing on the hashtags as topic-bearers for 2021 through 2023. We seek to describe the way WEF used their Twitter account, as well as to contextualise the results from the sustainability topic's point of view.

In the initial 5 years, this account posted 129,276 tweets, averaging 71 daily. Of those tweets, only 684 (0.53%) were replies to other tweets, which include replies to WEF's tweets to create the so-called *threads*, where self-replies further expand the context following up the original tweet. Further, the WEF has made 19 (0.01%) quoted retweets and 0 retweets from other users. From this, WEF's Twitter activity focuses primarily on its posts, as it seeks to raise engagement of its content, often including links to articles and videos on its website. That can be further seen in Tab. 1 and Tab .2., below.

Table 1. Table of tweets including links/media/hashtags/mentions, source; own elaboration, Data: WEF Twitter Account

Type	Total	Percent
link	128 129	99,11%
media	127 658	98,75%
hashtag	88 378	68,36%
mention	14 432	11,16%

Table 2. Table of types of media (image, vid, gif), source: own elaboration; data: WEF Twitter Account

Type of media	Total	Percent
image	121 052	94,83%
video	6 067	4,75%
animated image	539	0,42%

When analysing the average interaction with each tweet, we conclude that like and retweet are the most often used, with replies and quotes landing in single digits. To put the numbers in Tab. 3 into perspective, the most popular tweets in each category amounted to 22 359 likes, 7 554 retweets, 3 225 quotes, and 4 654 replies.

Table 3. Table of statistics by reaction type, source: own elaboration, data: WEF Twitter Account

Reaction type	Total	Average	Most popular
like	9 070 937	70,17	22 359
retweet	7 102 949	54,94	7 554
reply	387 930	3,00	3 225
quote	800 245	6,19	4 654

Figure 2. Graph of WEF post frequencies, source: own elaboration, data: WEF Twitter Account
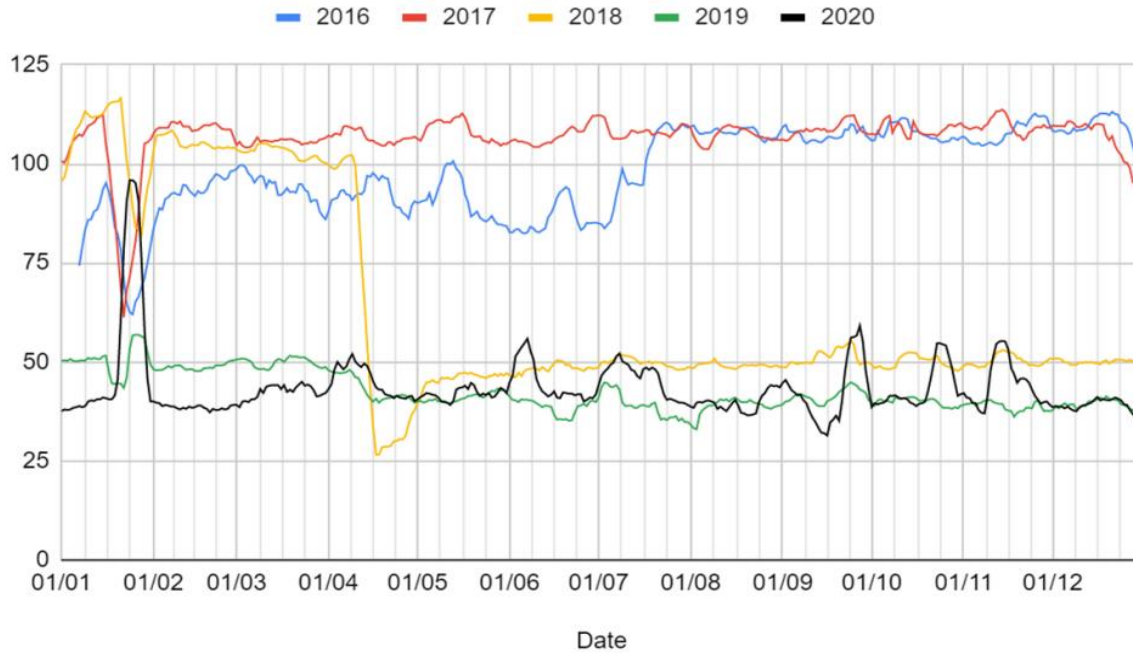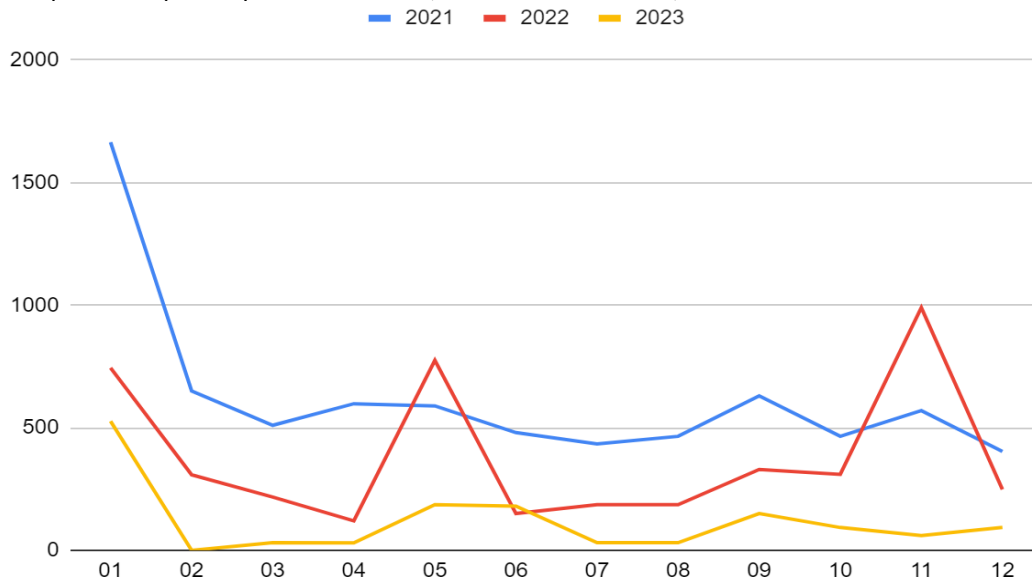

Figure 3. Graph of WEF post frequencies 2021-2023, source: own elaboration, data: Social Blade 2024

However, the high number of daily tweets is far from uniform, and we are further able to find local (short-term) differences in tweeting patterns and overall global (long-term) differences. As seen in Fig. 2, we may recognise two distinct periods on the long-term scale, with the 10th of April 2018 being the breaking point. Before that date, the average number of tweets daily was 102.57. After that date, the average number of tweets decreased to 44.21 daily. Our first explanation was the change of post length from 140 to 280 characters. However, that change occurred in November 2017 and is thus improbable. Fig. 3 shows that tweets continually fell in the following years to the daily average of 21 in 2021, 12 in 2022 and finally, only 4 in 2023. Our primary analysis of geographical, topical, and popularity contexts works with the primary dataset (2016-20); given the changes made to data

acquisition (see Methodology), we further extrapolate to 2023 in the topical category, with some summaries for COVID and post-COVID years in the Conclusions.

Further, we recognised some local extremes in their usual posting pattern, as seen in Fig. 2. We tracked some of the most prominent changes to the WEF's *Annual Meeting* in Davos in mid to late January. However, in 2016, 2017 and 2018, this pattern included a rise in the number of posts followed by a significant drop. 2019, we saw a minor change; in 2020, there was only a significant upward spike in the number of posts. One possible explanation may be deleting the meeting-related tweets after some time. A similar pattern, albeit harder to recognise due to time-precision, continues till 2023.

We further focus on the more concrete methods and results.

Results 1: Geographical context

The first method used is determining the geographical context of each tweet. For this purpose, we focused on connecting individual tweets with countries of the world. At first, we wanted to utilise the location data provided by Twitter. However, only 46 tweets had that information and could not be used for relevant analysis. Instead, we based our regionalisation on a group of keywords defined for each country. We utilised our custom software and a spreadsheet application to determine the country or countries each tweet belongs to.

A list of 190 countries and territories was used as a baseline. The results of searches were summarised and assigned to each country.

The total of 18 540 (14.34%) tweets included at least one country mentioned within; 60 countries from the list were not mentioned once. The average number of mentions for all countries is 93.3, with a median of 6. Those indicate, along with a skewness of 7.1, a high number of low-value occurrences with a low number of high-value occurrences. Further, only 85 (42.5%) countries were mentioned at least ten times, 32 (16%) were mentioned at least 100 times and 4 (2%) were mentioned at least 1000 times.

Figure 4. Map of most popular countries, source: own elaboration, data: WEF Twitter Account; ArcGIS library
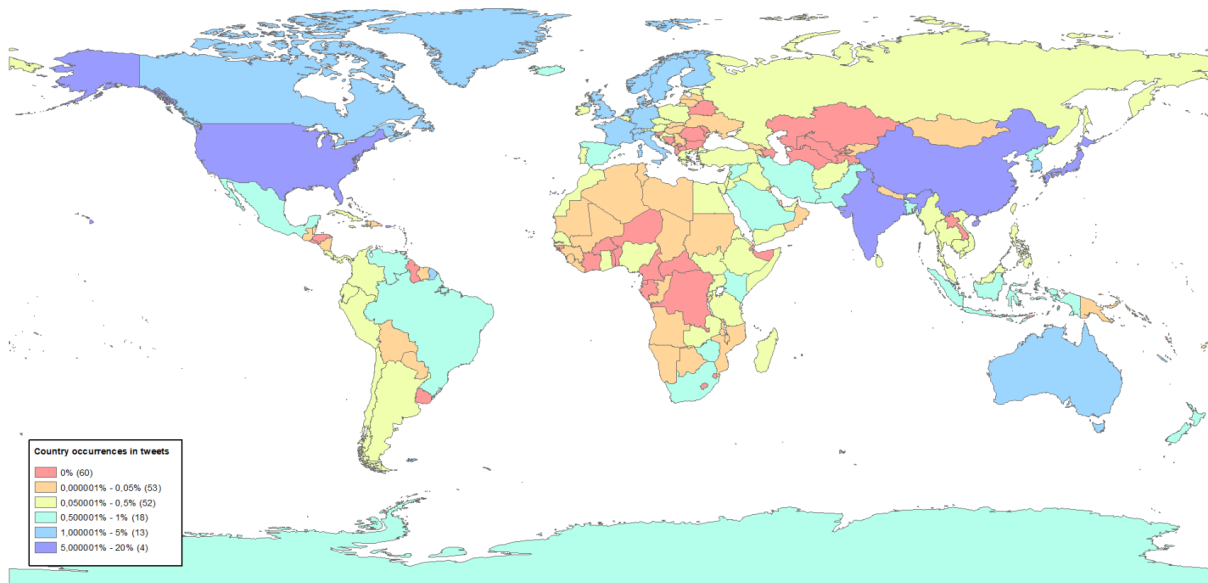
For the visual representation in Fig. 4, 6 groups were used based on the relative number of occurrences. The groups amount from blue to red to ~50%, ~75%, ~90%, 99% and 100% of all posts. The sixth group contains countries and territories with no mentions.

The list of most frequently used countries is in Tab. 4.

The numbers above reflect what is displayed in the map (Fig. 3). Further, one-third of all geographically oriented tweets made by the WEF were focused on three countries and current superpowers: China, India and the USA. Even though Twitter is officially banned in the country, China was most often mentioned, with only a handful of organisations having a government-sanctioned exception. Japan's position is not surprising, given Twitter's popularity in the country. Besides China and India, the rest are primarily Western, prosperous and technologically developed countries with a highly educated population, out of which about 20% or more are regular Twitter users; common connected topics include happiness and well-being, recycling and clean energy, and social inclusivity

and gender equality. On the other hand, the top 10 list misses low-income countries (categorisation according to the World Bank). The first country from the low-income group of countries is 20th North Korea (164, 0.88%), followed by the first African country, 23rd Kenya (152, 0.82%).

Table 4. Table of most popular countries, source: own elaboration, data: WEF Twitter Account

Country	# of tweets	% of tweets	# of users (mil.)	% of pop. on TW
China	3 430	18%	0	0%
India	2 466	13,29%	27,3	1,91%
USA	2 218	11,95%	95,4	28,06%
Japan	1 307	7,04%	67,5	54,75%
Sweden	564	3,04%	2,1	19,79%
United Kingdom	540	2,91%	23,1	34,10%
Germany	463	2,49%	14,1	17,13%
France	439	2,37%	13,7	21,16%
Finland	417	2,25%	1,5	27,05%
Netherlands	351	1,89%	7,5	42,58%

Given the change of approach to data acquisition and API, it was impossible to extrapolate this analysis with the further dataset on a broad enough scale.

Result 2: Topical Context

The second approach focused on tweets' overall topic and context based on Twitter's built-in functionality, which included using hashtags as topic labels and bearers. We determine the most popular hashtags based on the number of tweets they were mentioned in. We then connect selected hashtags to topics focusing on sustainability and the SDGs. After establishing the main topic-bearers in our initial, broader dataset, we focus on extrapolating the most popular trends further into the second time frame of 2021-2023.

From the total number of 129 276 tweets, 68.36% (88 378) include at least one hashtag. Overall, 2 002 different hashtags were used, a total of 126 078 times. The average number of uses was 62.98, with a median of 5. Along with the skewness of 13.8, this again shows a strong bias towards a smaller number of hashtags covering most topics. Thus, the 27 most popular hashtags were chosen, shown in Tab. 5, where the boundary was at least a thousand uses of that particular hashtag. Those contain 54.8% of all hashtags.

Table 5. Table of most popular hashtags, source: own elaboration, data: WEF Twitter Account

Rank	Name	Count	R.	Name	Count	R.	Name	Count
1	*leadership*	8 585	10	*gender*	2 430	19	*Climate*	1 291
2	*technology*	6 233	11	*cities*	1 979	20	*best of*	1 238
3	*environment*	5 952	12	*energy*	1 827	21	*Africa*	1 232
4	*health*	5 404	13	*ai*	1 824	22	*Ageing*	1 110
5	*economics*	5 180	14	*China*	1 622	23	*innovation*	1 093
6	*education*	3 612	15	*society*	1 521	24	*wef17*	1 088
7	*covid19*	3 166	16	*europe*	1 443	25	*Space*	1 031
8	*work*	2 823	17	*us*	1 430	26	*India*	1 028
9	*coronavirus*	2 617	18	*climate change*	1 328	27	*Edchat*	1 026

There is quite a noticeable trend among the most popular hashtags towards geographical names or words related to current megatrends (pandemic, climate change, economic and gender equality, sustainable energy). The most popular hashtags, *leadership*, *technology* and *environment,* indicate an interest in WEF's prevailing management-related topics. The presence of #africa may support the idea of the trend to generalise the whole diverse continent for the *western minds*.

The further connections between the most used hashtags and the individual SDGs can be seen in Fig. 6. Those were assigned to individual SDGs based on the context of hashtag usage. The SDG 17, *Partnership for the Goals*, was omitted as it permeated through all the topics inherent to the WEF's global scope of operations. Thus, many tweets focus on a more specific topic's international or global aspect.

Table 6. Table of SDGs connected to hashtags, source: own elaboration, data: WEF Twitter Account

SDG	Related hashtags
1 No poverty	(2) economics, work
2 Zero hunger	(0) -
3 Good health and well-being	(3) health, covid19, coronavirus
4 Quality education	(3) education, society, edchat
5 Gender equality	(4) education, work, gender, society
6 Clean water and sanitation	(2) health, cities
7 Affordable and clean Energy	(3) cities, energy, innovation
8 Decent work and economic growth	(6) leadership, economics, work, cities, society, space
9 Industry, innovation and infrastructure	(7) leadership, technology, economics, cities, ai, ageing, innovation, space
10 Reduced inequalities	(4) technology, economics, society, ageing
11 Sustainable cities and communities	(4) cities, climate change, climate, innovation
12 Responsible consumption and Production	(7) leadership, economics, cities, energy, ai, climate change, climate
13 Climate action	(4) environment, cities, climate change, climate
14 Life below water	(3) environment, climate change, climate
15 Life on land	(3) environment, climate change, climate
16 Peace, justice and strong inst.	(1) society
17 Partnership for the goals	*- not rated / all -*

From our list of the most popular hashtags, we can see a clear connection between all three pillars of sustainability (economics, environment, society) and more general topics of management, development, and especially technology. SDGs 8, 9, and 12 are the topics most commonly communicated in WEF tweets through hashtags. The least often mentioned topics are 1, 2, 6, and 16, with SDG 2 not explicitly connected once.

Result 3: Popularity Context

The third approach focuses on the most popular tweets.

Table 7. Table of most liked tweets, source: own elaboration, data: WEF Twitter Account

Keywords	Date	Media	SDGs	Likes
Donald Trump, speech, Davos 2020, economy, USA	21/01/2020	Link, Video	8, 9, 17	22 359
GDP, economy report, India	22/02/2020	Link, Image	8	17 184
BTS, South Korea, music, globalisation	18/12/2018	Link, Image	9, 17	14 945
Greta Thunberg, speech, activism, climate change, Davos 2020	21/01/2020	Link, Video	12, 13	11 759
BTS, South Korea, music, globalisation	01/03/2019	Link, Image	9, 17	11 383
Technology, innovation, reforestation, 1t.org	20/11/2020	Link, Video	9, 13, 15	10 191
Imran Khan, speech, Davos 2020, justice, Pakistan	22/01/2020	Link, Video	16, 17	8 380
Imran Khan, climate action, Pakistan	25/11/2020	Link, Image	13	8 122
BTS, South Korea, music, globalisation	21/12/2018	Link, Image	9, 17	7 919
Top 10, tech industry, USA, Canada, Australia	28/11/2017	Link, Image	8, 9	7 229

We measured the popularity by the four basic types of reactions – liking, retweeting, replying, and quote retweeting. In each category, the top 10 most popular tweets were considered. However, for our final analysis, only the most-liked and most-replied-to were chosen, as the category of likes and retweets showed major overlap, along with replies and quoted retweets. Similar to topics, we focus on identifying further context – keywords, media included, individuals and organisations mentioned and the related SDGs. As with the Geography context, it was harder to extrapolate these trends into the new timeframe, as the WEF disabled comments on all of their posts sometime through 2021, which meant we could no longer measure replies and quote retweets.

The most liked tweets corresponded to the most popular SDG topics by hashtag (SDGs 8 and 9). We have found tweets about WEF's Davos conference, politicians, and personalities. Surprisingly, however, three of the most popular tweets relate to the popular South Korean boy band BTS, which is among the most popular among the young.

Unlike with the most liked tweets, here we could identify a group of topics which, by the users' reactions, seemed polarising in one way or another. The most popular topics among the tweets are climate change, the COVID pandemic, inclusivity and diversity, and some polarising personalities. The most popular was SDG 13, followed by the broader group of SDGs 8, 9, 12, and 17.

Table 8. Table of most replied-to tweets, source: own elaboration, data: WEF Twitter Account

Keywords	Date	Media	SDGs	Replies
Venus, climate change, sustainability	18/12/2020	Link, Image	12, 13	4 654
Donald Trump, speech, Davos 2020, economy, USA	21/01/2020	Link, Video	8, 9, 17	4 478
Covid, pandemic, health, travel	30/07/2020	Link, Video	3, 13, 17	2 486
Rhiane Fatinikun, travel, hiking, inclusivity, diversity	06/10/2020	Link, Image	5, 10	2 404
Food, technology, sustainability, plant-based meat	27/12/2020	Link, Video	2, 12, 13, 15	1 900
Covid, economy, sustainability, Great Reset project, Prince Charles, Klaus Schwab, stakeholder economy	17/11/2020	Link, Image	3, 8, 9, 11, 13, 16, 17	1 462
Young Global Leaders, human rights, equality, economy, society, youth	13/03/2019	Link, Image	4, 5, 8, 9	1 394
Food, technology, sustainability, plant-based meat	22/11/2020	Link, Video	2, 12, 13, 15	1 106
Technology, digital ID, social security	25/12/2020	Link, Image	3, 5, 8, 9	1 042
Climate change, carbon emissions, Bill Gates, Gates Foundation	12/11/2020	Link, Video	12, 13, 17	951

Conclusions and Limitations of the Research

Our research showed that the most popular and mentioned WEF tweets are about countries that should be the driving force of implementing many SDGs rather than those that need to implement many of the SDGs themselves. The amount of data we were able to obtain through the utilisation of web scraping and further data processing is quite vast. As such, we could adequately analyse and process our dataset only partially; further possibilities include different regionalisations with more thorough indexing of tweets based on keywords or deeper data cleaning, focusing on repeating and reposted tweets - ideally by grouping those under one.

As mentioned and explained in the Methodology, the availability of data in both datasets (2016-2020; 2021-2023) was qualitatively different. Thus, a significant limitation of our research during the COVID-19 pandemic and shortly after the global infection subsided was that the API had been changed, and it was not quite possible to monitore the geographical context in the years 2021-2023 on the required scale. Second, WEF disabled the *reply* function in 2021. Thus, it is almost impossible to observe and analyse the broader interaction of the audience, including the popularity or engagement, as done in Result 3. Thus, our follow-up analysis focused on the most frequent hashtags, which in those years were strongly related to the global pandemics: *health*, *coronavirus* or *COVID-19*. However, their frequency slowed down, too, as much as the number of tweets was less and less

published. In 2023, we end up in single digits per year for all but one hashtag in top-15: *energy* (23 uses), followed by *ai* and *economics* (both 7).

Finally, we hope that this paper shows that the data contained and available on social media can be utilised as input for academic work across non-informatics fields as well.

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