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How Blockchain-Based Companies Can Raise Awareness Of The Climate Crisis: The Case Of Single.Earth

Blockzincir Tabanlı Şirketler İklim Krizine Dair Farkındalığı Nasil Artırabilir: Single.Earth Örneği

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ÖZ

Blokzincir teknolojisinin henüz dünya çapındaki ticari şirketler tarafından yaygın olarak benimsenmesi gerçekleşmemiştir. Ancak bu teknoloji, dijital işlemleri güvenli bir şekilde saklama ve doğrulama özellikleriyle ön plana çıkmaktadır. Bu nedenle birçok sektörde olduğu gibi doğanın korunmasına yönelik iş modellerine de entegre edilmektedir. Bu bağlamda, bu çalışmanın amacı blokzincir tabanlı şirketlerin iklim krizi konusunda farkındalık yaratmak amacıyla sosyal medya kullanımlarını değerlendirmektir. Bu çalışma nitel vaka çalışması yaklaşımı kullanılarak tasarlanmıştır.Bu amaçla, iklim değişikliğiyle mücadele etmeyi ve doğayı korumayı amaçlayan blokzincir tabanlı şirket Single Earth'ün 2022-3 yılları arasındaki 295 Twitter (artık X olarak bilinen) içeriği analiz edilmiştir. Veriler MAXQDA ve Microsoft Excel kullanılarak analiz edilmiştir. Twitter içeriğinin analizi, şirketin iklim konusunda bilginin desteklenmesi ve yeşil teknoloji çözümlerinin benimsenmesi konusuna güçlü bir vurgu yaptığını ortaya koymaktadır. Bu çalışma, blokzincir tabanlı şirketlerin iklim kriziyle mücadelede sosyal medya kullanımının daha iyi anlaşılmasına katkıda bulmaktadır.

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ABSTRACT

Blockchain technology has yet to be widely adopted by commercial companies worldwide. However, it stands out with its features of securely storing and verifying digital transactions. Therefore, as in many sectors, it is also being integrated into business models aiming at nature preservation. In this regard, the purpose of this study is to evaluate blockchain-based companies' use of social media to raise awareness about the climate crisis. This study was designed using the qualitative case study approach. For this purpose, 295 Twitter (now marketed as X) content of Single Earth, a blockchain-based company aiming to fight against climate change and to preserve nature, were analysed between 2022-3..Data were analysed using MAXQDA and Microsoft Excel. Analysis of Twitter content reveals the company's strong emphasis on promoting knowledge on climate and adopting green technology solutions. This study contributes to a better understanding of blockchain-based companies' use of social media in combating the climate crisis.

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Introduction

The term climate change is increasingly becoming a global issue in terms of economic, social, and ecological dimensions. The continuous rise in average temperatures to record levels each year, the simultaneous occurrence of droughts and floods, the melting of glaciers, the rise in sea levels, and the diverse effects of climate change are capturing public attention. The social, economic, and political consequences, such as extreme weather events and climate migration, represent the most severe aspects of this problem. Addressing these global concerns, which are a significant source of anxiety, has made the use of technology a critical research topic. In this context, while the use of blockchain has predominantly been highlighted in fintech over the past decade, interest in leveraging blockchain to combat the climate crisis is growing day by day. Blockchain can enhance corporate accountability, create networks involving all societal stakeholders, and track and report real-time ecological footprint data throughout supply chains. Steps can be taken to monitor and verify energy production, consumption, and carbon emissions (European Commission, 2022; Chen, 2018). Blockchain-based companies benefit from the security, transparency, and traceability advantages offered by blockchain technology. When examining the areas where blockchain-based companies are active, financial services, supply chain management, healthcare services, and voting systems are evident. Blockchain can expedite money transfers between banks in financial service delivery and increase the security of financial transactions, provide transparency and trust among all stakeholders at different stages of the supply chain, enhance the accuracy of patient data and facilitate information sharing among various healthcare institutions, and reduce election manipulation and vote theft (Ali, Ally, and Dwivedi, 2020). This blockchain technology, which finds application in various fields, is used in several ways to combat the climate crisis. Blockchain is utilized to monitor and verify energy production, consumption, and carbon emissions (Chen, 2018). This can help increase the sustainability of energy sources and reduce carbon emissions. The applications of blockchain technology and the pace of its adoption are still evolving. However, it is believed that blockchain can play a crucial role in addressing the climate crisis due to its potential benefits and various applications. The adoption and support of this technology in combating the climate crisis are also critical for issues such as social transformation and employment.

This study aims to explore how blockchain-based greentech companies use social media to raise awareness about climate change. Additionally, it discusses the types of content categories (educational, promotional, etc.) these companies use more frequently on social media, the specific goals of raising awareness, and the hashtags utilised to reach a wider audience. To gain a comprehensive understanding, this study reports on a content analysis of 295 tweets shared by Single Earth, a blockchain-based company that tokenises the ecological value of lands and aims to preserve biodiversity.

Litreature Review

Leveraging Blockchain Technology in Combating Climate Blockchain technology is commonly defined as a technology that enables secure and accessible digital transactions to take place through a peer-to-peer (P2P) distributed ledger without the need for approval or permission from a central authority. This technology has the potential to be utilised in various fields, ranging from healthcare to education, and can also be leveraged to address the challenges posed by the climate crisis.

Bada et al. (2021) argue that blockchain technology promotes the adoption of renewable (green) energy sources in power generation and distribution by facilitating peer-to-peer (P2P) energy trading between energy producers and consumers. In addition to energy production processes, blockchain is also utilised to monitor waste management processes and enhance transparency in waste flows. It is further employed to improve waste management efficiency and increase recycling rates. Furthermore, applying blockchain technology in forestry and other natural resource sectors for monitoring and verifying compliance with sustainability standards contributes to reducing illegal logging, species extinction, and illicit activities (Pal et al., 2022). Additionally, carbon credits can be recorded as assets on a blockchain network, enabling real-time and transparent tracking of carbon footprints.

Howson (2020) draws attention to the use of blockchain to monitor and manage energy production and consumption, promoting the efficient use of renewable energy sources by creating distributed energy networks. Blockchain-based solutions are being developed for traceability of natural resources, verification of compliance with sustainability standards, and supply chain management. In the study on trading objects with blockchain and smart contract methods conducted by Sadawi et al. (2021), attention was drawn to the negative and inevitable consequences of climate change on the environment and possible measures were mentioned. The study touched on the effects of not only carbon emissions but also other greenhouse gases and the Kyoto protocol was mentioned. It was stated that the measures taken by the 192 countries that signed the Kyoto protocol were insufficient and that there were problems in implementation. A blockchain technology-based approach was adopted due to its secure, transparent and traceable features to reduce carbon emissions. Thus, it was argued that a completely transparent trading framework and optimized carbon emission release would be achieved with smart contracts and trading mechanisms (Palta and Alsu, 2024).

The bandwagon effect, well-known in economic literature, may encourage more businesses to use blockchain technology to reduce their environmental impact (Avital et al., 2016). The bandwagon

effect, also known as herd behavior, is when everyone imitates what everyone else is doing, even if their conscience strongly opposes it (Banerjee, 1992). As more businesses and individuals use blockchain technologies for activities such as supply chain tracking, energy management, and carbon credit sales, others may experience pressure to follow suit (Munir et al., 2022; Aysan et al., 2021; Rajeb and Rajeb, 2020). This pressure may stem from a desire to be competitive or to be recognized as environmentally friendly. This may result in a positive feedback loop where the widespread use of blockchain technology reduces the overall carbon footprint of different businesses (Wang, Xuan, et al., 2021a, 2021b). Industries worldwide are trying to adapt to the trend and implement a blockchain solution, regardless of its applicability (Jhiang et al., 2020). Moreover, these industries have a strong desire to use the technology to solve problems such as environmental issues, supply chain management concerns, food insecurity, etc. or to replace existing trusted systems (Arshad et al., 2023). Blockchain technology can undoubtedly help find solutions to environmental challenges and increase sustainability in various ways (De Vries, 2018;Schulz and Feist, 2021). However, the use of blockchain technology in tackling the climate crisis is still under development. In addition to the positive practices in which blockchain is used, there are also concerns and limitations to this technology. For example, among the current challenges such as data storage and legitimacy, sustainability, which is frequently emphasised in the fight against the climate crisis, is a matter of debate due to the large energy consumption that results from the decentralisation feature of blockchain being processed by each element in the node (Hassani et al., 2019, pp. 30- 34).

In other words, transparency, reliability, traceability, verifiability, data sharing, collaboration, green finance, and innovation are seen as positive features in the use of blockchain technology (Di Pierro, 2017). On the other hand, high energy consumption, scalability problems, legal and regulatory issues, and technological compatibility raise questions about blockchain technology. These positive features and limitations reflect the potential of blockchain technology in tackling the climate crisis and the challenges to be considered (Parmentola et al., 2022; Schinckus, 2020; Aithal & Aithal, 2016; De Vries, 2018; Gupta et al., 2021; Jiang et al., 2021). With the development and improvements of technology, harmful practices can be reduced while positive practices can be further strengthened.

The Role of Blockchain-Based Companies on Climate Crisis Awereness

The fact that blockchain-based companies offer solutions for climate crisis awareness is closely related to the increasing popularity of blockchain technology through cryptocurrencies. Although the first blockchain application, Bitcoin, was developed in 2009, the emergence of blockchain-based companies for climate crisis awareness only took place a few years later. From 2015 onwards, there has been more significant discussion and awareness of the potential of blockchain technology in tackling the climate crisis. Some companies started offering blockchain-based solutions to the climate crisis during this period. Blockchain-based projects have been developed in carbon monitoring and trading, renewable energy, resource tracking, and sustainable supply chain management (Howson, 2020).

In the early days of blockchain technology, companies operating in this space often emerged as pioneering and innovative start-ups. However, over time, large organisations and industry leaders have also started to develop blockchain-based climate crisis solutions. In recent years, many companies have focused on raising awareness and providing sustainability solutions by using blockchain technology in the fight against the climate crisis (Iravani et al., 2017; Schulz & Feist, 2021).

The activities and solutions of blockchain-based companies for climate crisis awareness are accepted as a process that develops in parallel with technology (Ali et al., 2020). In this context, the concept of green technology is a crucial issue. The primary purpose of green technology is to make environmentally friendly innovations to protect people's interests. Therefore, green technology aims to meet society's needs in a way that causes no toxic or adverse effects on the environment. However, there are many criticisms of green technology. The most common is greenwashing (Torelli et al., 2020). Greenwashing is defined as presenting a product, brand or institution as if it is environmentalist, making misleading advertisements with unfounded environmental claims, and including these claims in marketing communication activities and even on product packaging. At this point, it is essential to understand what it means to be greentech. Greentech covers all sub-titles, such as integration with the natural environment, competence, efficiency, fairness, full cost calculation, communication, participation, common sense and flexibility in connection with sustainability. The most well-known blockchain-based greentech companies for climate crisis awareness are companies such as Power Ledger, CarbonX, Climatecoin, Provenance, WePower and Single.Earth (Aktas, 2022). It works with a system connecting nature and economy using big data and artificial intelligence-based methods (Single Earth, 2023).

Single.Earth, the company that serves as the case study of this research, addresses one of the most critical challenges of today's world, the destruction of life-supporting ecosystems. Single.Earth is an organization that seeks to help preserve existing biodiverse ecosystems and rebalance the planet. Its immediate goals include preventing deforestation and increasing protected areas of mature forests that are under threat globally. To do this, Single.Earth is using big data and AI-based methods to develop a new green currency called MERIT, linking nature to the economy. Single. Earth's Ecosystem Integrity Index (EII) offers an innovative

approach to account for other aspects of nature beyond carbon. The EII helps assess and measure ecosystem health and integrity, and their resilience to natural and human-induced disruptions. Single.Earth has become one of the fastest-growing startups in the GreenTech space. The research and science teams consist of 15 interdisciplinary scientists, including experts in natural climate solutions for carbon and biodiversity, data scientists and geospatial data analysts (Single. Earth, 2024).

The Role of Social Media in Promoting Climate Crisis Awareness

Considering the role of social media in raising awareness about the climate crisis, news, reports, and information regarding the climate crisis are rapidly disseminated to a large number of users through social media. Social media tools facilitate the organisation of climate crisis awareness campaigns and events, effectively increasing awareness through hashtag campaigns, content sharing, videos, and visuals. Social media platforms effectively depict the impacts of climate change, fostering emotional connections through compelling infographics and documentaries. Through activism, individuals can voice their concerns to governments, international business owners, and political actors, advocating against the climate crisis, establishing anti-eco-massacre communities, and fostering collective action (Kunelius & Roosvall, 2021; Becken et al., 2021; Parry & Poland, 2019). In this context, we can list the roles of social media as follows: engagement, different content types, themes, audience segmentation, advertising, collaboration, and social media analytics.

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Engagement and Social Media

Social media is a communication tool that provides numerous benefits for fostering engagement and building relationships by employing various techniques to enhance interaction. As a real-time instant communication tool, social media allows for more intense participation and feelings of connection and response on both individual and institutional levels (Demirbilek et al., 2024). Various methods such as favourites (fav), retweets (rt), mentions, and media tagging are used to interact on social media. Since social media platforms offer access to a vast user base, they facilitate the creation and dissemination of large-scale content, such as the Global Climate Crisis, and enable engagement with diverse groups of people on such topics (Kocabay-Şener & Öymen, 2023).

Different Content Types and Social Media

The creation of different content types on social media and the effective use of these contents are connected to the capabilities offered by the platform, the characteristics of the target audience, and the goals of the created content. Various contents produced in individual and institutional contexts can resonate differently with the target audience depending on the nature of the message (Hoffman and Novak, 2012). Text-based content, such as tweets published on X, articles and posts on LinkedIn, status updates and notes on Facebook, perform well due to the suitability provided by these platforms. Similarly, visual appeal is paramount on visually oriented platforms like Instagram and Pinterest, with high levels of likes, shares, and comments serving as performance indicators. Video-based platforms with high interaction levels, such as Facebook, Instagram (Reels), YouTube, and TikTok, have multifaceted objectives. These platforms are used for videos, tutorials, product introductions, testimonials, vlogs, live broadcasts, and more, aiming to reach different target audiences with various content types and to establish an emotional connection (Şenlik, 2021). Originality, trust, and expertise are crucial for this content to reach broad audiences and increase engagement (Shahbaznezhad et al., 2021; Kim et al., 2015; Agichtein et al., 2008).

Themes and Social Media

Today, social media is used by individuals and companies as a marketing tool. Creating diverse and attention-grabbing content with social media as a marketing tool is considered a fundamental principle of competitiveness. Facebook, Twitter, Instagram, and LinkedIn have the highest number of users worldwide and are channels where effective shares and content are created. Users of these channels gather their content around specific themes to maintain consistency and appeal to their target audience (Akyol & Atabey, 2023). For example, an animal rights activist can use thematic hashtags and trending topics to attract the interest and engagement of followers, facilitating support gathering and awareness-raising.

Audience Segmentation and Social Media

Target audience segmentation is the process of dividing a broad market into groups based on specific characteristics. These segmen-

tation types include demographic, behavioural, cultural, geographic, and psychographic segmentation (Süar, 2017). In social media marketing, target audience segmentation is a critical strategy that involves dividing a broad audience into smaller, more manageable groups based on common characteristics (Kocabaş, 2016). This approach allows for more targeted and effective communication, leading to better engagement and results. Social media platforms offer personalized experiences using algorithms to tailor content to users' interests and behaviours (Keskin, 2018). Social media algorithms are sets of mathematical rules that help organize content and rank search results and ads based on user behaviour (Dilmen & Tokgöz Şahoğlu, 2022). This personalization increases engagement by providing users with relevant and interesting content. Social media algorithms work with artificial intelligence, tracking the posts users interact with, their likes on the platforms, and the sites they visit, creating data. These algorithms calculate what users like, pay attention to, and how long they stay on specific content. Based on this data and calculations, they suggest social media accounts that may interest users (Çetiner & Özer, 2021; Nalçakan et al., 2015; Özaksoy, 2023).

Advertising and Social Media

Social media advertising is a type of internet advertising that facilitates businesses' access to consumers. These ads quickly reach the target audience by categorizing consumers based on personal information such as age, gender, occupation, interests, and geographic location. The primary goal of advertising on social media is to contribute to communication and sales. Social media advertisements offer several advantages, including the absence of time and location limitations, easy accessibility, the ability to present creative and dynamic content, low cost, and the quick measurement of advertising effectiveness (Efendioğlu & Durmaz, 2022).

Collaboration with Other Organizations

Collaborating with other organizations through social media increases impact individually and organizationally and helps reach new audiences (Gedik, 2020). Activities such as organizing joint campaigns and events, including webinars, live broadcasts, panels, fairs, and tech events, can be announced on social media to reach a wider audience. This not only creates brand awareness but also increases the visibility of the campaign conducted under a common hashtag by the collaborating organizations. While establishing cooperation through social media is more effortless, social media also has limitations. For example, information pollution, the spread of misinformation, and activism being limited to the online environment can affect the effectiveness of social media. Therefore, when using social media, it is crucial to verify sources, strive to access reliable information, and take action in the real world.

According to Kurnaz (2024), the global nature of social media can cause misinformation about the climate crisis to spread rapidly worldwide, weakening international cooperation. Additionally, varying levels of understanding about climate change among people in different countries can make reaching a consensus in international agreements more difficult. For instance, misinformation in key countries like the United States can reduce the effectiveness of agreements like the Paris Agreement. Developing countries may also face difficulties in increasing resilience and securing international support due to misinformation. To address these issues, social media platforms need to take more responsibility, implement robust verification systems, and promote accurate information.

Social Media Analytics

Various data formats are created by sharing music, text, photos, and videos on social media platforms. The data generated on social media accumulate into large volumes, and the collection, compilation, and analysis of these accumulated data are crucial for different fields (Akın & Şimşek, 2018). The process of transforming these data into information using various algorithms based on the data collected through social media channels is referred to as social media analytics. By extracting meaningful information from the collected data through social media analytics, it can be used in advertising campaigns, marketing, tourism, education, the economy, social life, and political event analyses, thereby creating value in many other areas as well (Başbayram, Tosun, and Turan, 2019).

Methodology

This study was designed using the qualitative case study approach. As stated by Creswell (2013: 98), case studies are an approach in which the researcher investigates cases by collecting in-depth data and analyzing the themes within those cases. In selecting cases for study, the researcher chooses those that best illuminate the research problem, drawing on their familiarity with the topic. To ensure the validity and reliability of the research, it is essential for the researcher to enhance interaction time with the case, diversify data sources, seek feedback from individuals knowledgeable about the topic, and consult other researchers' opinions (Meriam, 1990, as cited in Yıldırım & Şimşek, 2011: 288). In this regard, the researchers followed Single Earth's Twitter account to deepen their interaction with the case. Additionally, to gain an understanding on the data diversification, they tracked hashtags commonly used by Single Earth related to ecology and sustainability over a period of six months. The researchers also consulted colleagues working in the fields of climate justice and ecology during both the data collection and results evaluation stages. Data collected through content analysis can organize certain concepts and themes while also emerging new concepts and categories (Akbulut, 2012). The study utilized the content analysis method to examine Single Earth's social media content related to sustainability. This study examines the content (tweets, retweets, replies) shared on Twitter by Single Earth, a company using blockchain technology, to assess the blockchain-based companies' efforts to raise awareness about

the climate crisis on social media. It employs content analysis techniques that provide replicable and valid inferences to generate new insights and acquire information about practical actions (Krippendorff, 2018).

The research is limited to the company's Twitter profile as it allows both ecological and political content in agenda setting (Erben, 2019) and the public interaction of Single Earth with its stakeholders. Between August 16, 2022, and February 23, 2023, 295 tweets providing comprehensive data regarding the company's activities and agenda were collected from @SingleEarth1 through vicinitas.io. The collected data were subsequently analysed using MAXQDA and Microsoft Excel.

The tweets (content) coding was conducted by two researchers working together, and any coding differences were resolved through consensus reached through discussions. Initially, draft themes were created, and the tweets were coded based on the media type and primary content type using keywords, target URL, cross-posting, call to action, hashtags, and the type of tweets that received responses. The themes were then reorganised considering the research questions, and some sub-themes were created to establish relationships between the themes (e.g., the relationship between target URLs and cross-posting codes). Each tweet was coded to include at least one theme and multiple themes could be assigned. Therefore, there may be a discrepancy between the total number of tweets in the frequency tables and the total number of tweets coded (295). Table 1 illustrates the process of determining themes and sub-themes, providing an example of how data analysis is conducted within the context of environmental communication. A systematic approach identifies themes based on recurring topics or concepts in the data, while sub-themes further categorise and refine these overarching themes into more specific components. This table visually depicts the hierarchical structure of themes and sub-themes, showcasing how they are organised and interconnected. By following this methodology, researchers and practitioners can comprehensively understand the underlying patterns and trends in environmental discourse, facilitating more informed decision-making and targeted communication strategies. The table was created based on the thematic flowchart from the study conducted by Cavazos-Rehg et al. (2019) on tweet content analysis.

Table 1: Example Of Determining Themes and Sub-Themes

Does the tweet raise awareness about ecological issues and/or solutions for ecological matters?		
↓		↓
Yes		
↓		No
Which of the following fields does the tweet refer to? (Select all that apply)		
↓	↓	↓
Ecological	Economic	Psychological
Specifically, what does it raise awareness about?		
Overconsumption	Green economy	Climate anxiety
Biodiversity	Sustainability	
Climate change		
Forest protection		
Plastic waste		

Findings

Grouping the content shared by blockchain-based companies that prioritise nature preservation on their social media accounts helps facilitate understanding their purpose of social media usage. Six main themes were obtained by coding the tweets, as shown in Table 2 for Single Earth's content.

Table 2: Definitions of Content Themes

Theme	Definition	Sample Tweet
Educational content about technology	This category includes educational content that enables the audience to understand and embrace the technologies used and developed by the company.	Company representatives, are you ready to take your company's ESG strategy to the next level? "Fighting biodiversity loss as part of your company ESG strategy" 📅 18.01 2-3pm CET 📍 register for the link: https://t.co/cTk84IpnCk #ESG #Sustainability

Theme	Definition	Sample Tweet
Events	This category includes announcements, information, and updates related to the company's involvement in diverse online/offline events. These events cover a broad spectrum, including AMAs, webinars, conferences, technology events, competitions, competition nominations, and tech summits.	Now is a great time for a refresher! Take a look at our AMA recap and find answers to all sorts of questions regarding MERIT tokens 🤠 #SingleEarth #MERITtoken #TechForGood #ActOnClimate https://t.co/GVKCleiuOc
Cross-posting	The content in this category is created to enhance engagement and attract more followers to the company's other social media accounts.	In @NatureBacked podcast episode "Death of the Client" @virki speaks with @mrmacleod on why it is critical for the environment, #sustainability and the #CircularEconomy to design the end of the consumer experience. https://t.co/FGqXDbhUuS #Engineering #climatechange https://t.co/OpsViBM52t
Raising awareness	This category encompasses the content shared by the company on topics such as the climate crisis, climate change, forest conservation, and nature preservation.	Humanity lives off 1.75 Earths. We need to cap our consumption to how much nature can handle. Without nature, we can't survive. Share it. Let's raise awareness. 🌎Let's take action. #climateaction #climateactionnow #biodiversity #greeneconomy https://t.co/BbzozVppT5
Increasing engagement	These are the contents created by the company to increase engagement with its followers, business partners, and affiliated organisations and promote its team. They include content related to special occasions and job postings and aim to foster interaction.	Thanks for featuring us in the article @AccelerationEc1, we're happy to see more talks of climate protection in the web3 space! 🧩 https://t.co/xX1yeGpoMO #Sustainability #forest
Promoting company token (MERIT)	This category includes tweets the company shares to promote, popularise, and market its own token called MERIT. It encompasses content to increase MERIT's awareness and adoption, including MERIT giveaway events.	MERIT is a possibility for individuals to create (and drive!) societal and economic change — if enough people take action, companies, and governments need to follow. Let's turn climate change and biodiversity loss around: https://t.co/0aUABU8XcX https://t.co/d5PpZRZKE6

Table 3 presents an analysis of the various frames the Single Earth company utilised to raise awareness about environmental issues. Frames refer to the specific perspectives or angles through which information is presented to shape public understanding and perception. In this table, different frames employed by Single Earth, such as scientific evidence, human impact narratives, solutions-oriented approaches, and urgency messaging, are outlined and categorised. This analysis provides valuable insights into the company's communication strategies aimed at effectively conveying the importance of environmental awareness and action to its audience. By examining different frames, stakeholders can better understand how Single Earth seeks to engage and mobilise individuals towards addressing ecological challenges.

Table 3: Raising Awareness Frames

Theme	Definition	Sample Tweet
Climate anxiety (Emotional/psychological)	Tweets aimed at raising awareness about concerns related to the climate crisis.	🌱How do handle climate anxiety 🌱What to expect of COP27 🌱Beehero's unique insight into hives & much more on the new NatureBacked episode with Itamar Weizman of Firstime https://t.co/jKS9wxncFi
Green economy (Economic)	Tweets that raise awareness by focusing on nature preservation or ecological issues rather than economic benefits in relation to the green economy.	It's a start, a strong one. Now, more than ever, all parts have to work together to halt biodiversity loss. Join us in transforming into a green economy. 🌎 @CBD_COP15 @UNbiodiversity #COP15 #COP15Announcement #GBFAdoption https://t.co/TEdjo1SaAT

Theme	Definition	Sample Tweet
Sustainability (Ecological/Economic)	Tweets posted to create and increase awareness about sustainable living and the economy.	Are you taking daily actions to be more sustainable?
Overconsumptio (Ecological)	Tweets aimed at raising awareness about overconsumption within the framework of eco-destruction.	Saving up to cover one's needs is reasonable. Yet massive sales campaigns, like Black Friday, can lead to overconsumption and impulsive buying. It shows the refusal to understand that natural resources are limited. ⚠️ #GreenFriday #BlackFriday https://t.co/6gxkn6ly5e
Biodiversity (Ecological)	Tweets aim to raise awareness about the decrease in biodiversity, one of the company's main areas of interest and business.	Humankind is finally acknowledging that nature loss poses direct and immediate risks to the global economy and financial system while also magnifying climate risks. Climate change and biodiversity loss are deeply interrelated, not separate problems. #COP15 #biodiversity
Climate change (Ecological)	Tweets aimed at raising awareness about the climate crisis and climate change.	Did you know about the Yale Climate Opinion Maps 2021? Recommend taking a look! "how Americans' climate change beliefs, risk perceptions, and policy support vary at the state, congressional district, metro area, and county levels" @Yale #ClimateCrisis https://t.co/RO7x2VVeuY
Forest protection (Ecological)	Tweets explicitly raising awareness about deforestation and forest conservation.	👎Protecting forests to allow companies to emit CO2 👍Protecting forests to protect forests
Plastics (Ecological)	Tweets specifically raising awareness about the damage caused by plastic waste to nature.	More on #PlasticWaste in our @NatureBacked podcast - Check out new episode where @virki talks with John Felts from @CruzFoam #startups #innovation #environment #savingoceans https://t.co/y0N2zdrF7G https://t.co/bmeWFhoDRQ

Table 4 presents an analysis of posts categorised by content types. Each post shared by the Single Earth company is classified into different content categories: awareness-raising, promotional, educational, and engagement-focused. This table provides insights into the distribution of content types within the company's social media activities, shedding light on its strategic focus areas and communication objectives. By examining the distribution of posts across these categories, stakeholders can better understand the company's efforts in addressing climate issues, promoting sustainability, and engaging with its audience effectively.

Table 4: Posts by Content Categories

Theme	N	%
Educational content about technology	36	12
Events	46	16
Cross-posting	51 (Single Earth blog n: 22, Discord channel n: 2, Nature-backed podcast n: 13, Company LinkedIn profile n: 7, Spotify n: 5, YouTube channel n: 2)	17
Raising awareness	161	55
Increasing engagement	17 (Replies n: 16, job posting n: 1)	6
Promoting company token (MERIT)	37 (Promotional MERIT tweets n: 31, MERIT giveaway posts n: 6)	13

More than half (55%) of the 295 posts (including own tweets, retweets, and replies) shared by Single Earth are dedicated to raising awareness about climate change and related issues (refer to Table 5). This is followed by cross-posting tweets, accounting for 17%, and tweets about events, comprising 16%.

Table 5: Raising Awereness Frames

Theme	N (%)	Sample Tweet
Climate anxiety (Emotional/psychological)	2 (0.67%)	🌱 How do handle climate anxiety 🌱 What to expect of COP27 🌱 Beehero's unique insight into hives & much more on the new NatureBacked episode with Itamar Weizman of Firstime https://t.co/jKS9wxncFi
Green economy (Economic)	29 (10%)	Do you know what nature-backed economy is? #economy #TechForGood
Sustainability (Economic+ecological)	6 (2%)	Are you taking daily actions to be more sustainable?
Overconsumption (Ecological)	11 (4%)	⚫Black Friday? I'm not buying it. ⚫ This is a list of tips we made for Black Friday to raise awareness of conscious consumerism, but it's really credible all year round. Share it. Use the tips. Let's make a difference. & do you have any more tips? #GreenFriday #sustainable https://t.co/vqpDhs95jm
Biodiversity (Ecological)	39 (13%)	Climate change is a known threat, but #BiodiversityLoss is much less talked about. Yet they both threaten humankind's survival on Earth. We're thrilled to introduce the excellent work (in progress) of our science team: https://t.co/pRrORebLBb @VanShaya @arildodias_eco
Nature preservation (Ecological)	18 (6%)	🌲Our interview #1 of 2022 🎉 "Listen to how @MeritValdsalu and her team are creating an economy that rewards landowners for preserving nature." https://t.co/xruTyrweYA #NordicFintechMagazine #ClimateAction #Sustainability https://t.co/keGD8QddVx
Climate change (Ecological)	33 (11%)	"There is no waste in nature - that's a manmade construct," says Joanne Rodriguez, founder of @mycocycle "And so, looking for solutions in nature to solve these problems is critical to how we battle this climate change." New ep of @Naturebacked: https://t.co/qxDeY92kbU @virki
Forest protection (Ecological)	19 (6%)	➡️Just 28% of forests globally are in very good health. Source: Ecosystem Integrity Index by @SingleEarth1 https://t.co/d3NgImGq3X
Plastics (Ecological)	3 (1%)	More on #PlasticWaste in our @NatureBacked podcast - Check out new episode where @virki talks with John Felts from @CruzFoam #startups #innovation #environment #savingoceans https://t.co/y0N2zdrF7G https://t.co/bmeWFhoDRQ

The analysed tweets of Single Earth aimed at raising awareness in three specific areas: economic, ecological, and psychological. Although there is some overlap in these three areas in specific tweets, as evidenced in Table 5, there are distinct domains where each framework prominently emerges. Biodiversity and climate change themes are the most prominent areas for raising awareness. However, it is worth noting that climate anxiety is the issue addressed the least, with only two posts dedicated to this particular topic.

Table 6 reveals that Single Earth generated 77% of the 295 analysed tweets. This significant portion includes tweets shared from the company's public profile. Additionally, 10% of the tweets analysed were responses to other user profiles.

Table 6: Tweet Type

Theme	N (%)
Tweet	189 (64%)
Reply to others	29 (10%)
Reply to self	9 (3%)
Retweet	68 (23%)
Text	85 (29%)

Hashtags play a crucial role in classifying the topics and events that Twitter users are interested in, thus enhancing the accessibility of relevant content. While coding the tweets, at least one code was created for the hashtags in all 295 examined posts. However, it is essential to note that only the hashtags within the content produced by Single Earth (tweets and replies) are included in the hashtag cloud. Thus, a more specific frame was obtained regarding the interests of the audience targeted by the company. Figure 2 highlights several prominent hashtags related to climate issues, namely #climateaction, #climateactionnow, #sustainability, #actonclimate, and #climatecrisis.

Table 7: Content Type

Content and Media Type	N (%)
Photo or static image	179 (61%)
Animated GIF	10 (3%)
Video	21 (7%)
Text	85 (29%)

Content and media types are examined in four categories: photo or static image, animated GIF, video, and text. Most of the content (61%) consists of static images. This large proportion is followed by text-only content (29%). While only 7% of the posts contain videos, a tiny portion (3%) contain animated GIFs. However, each post includes a textual caption.

Figure 1 is a word cloud depicting the frequency of all words used in tweets. This visualisation includes captions, hashtags, web addresses, and mentions. "Biodiversity" and "climate" are the most frequently used words, followed by "change," "merit," and "sustainability." Additionally, words like "climateaction," "cop15," "action," "loss" and "can" also stand out due to their frequent use.

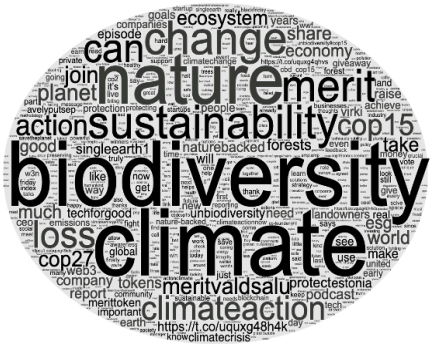

Figure 1:Word Cloud

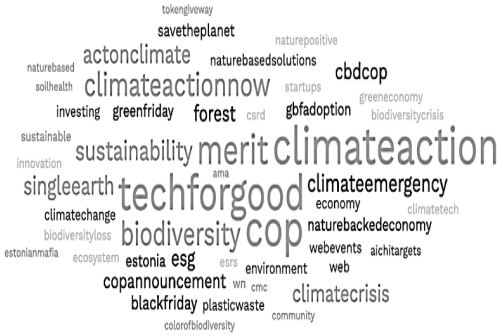

Figure 2: Hashtag Cloud

Figure 2 shows the hashtag cloud visualising the frequency of hashtags in tweets; more frequently used hashtags appear in larger font sizes. Accordingly, #climateaction, #techforgood, and #cop are the most frequently used hashtags. #biodiversity, #merit, #climate-actionnow, and #actonclimate hashtags attract attention with their frequency of use. A total of 482 hashtags, including 153 unique ones, were used in all tweets, averaging 1.6 hashtags per tweet.

Discussion and Conclusions

This study examines how blockchain-based companies use social media to raise awareness about the climate crisis and its impacts. It focuses on analysing the Twitter activity of Single Earth, a block-chain-based company, including tweets, retweets, and replies. The goal is to evaluate their use of social media to increase awareness about the climate crisis within the blockchain industry. The research has uncovered some notable findings:

- Themes: As social media platforms allow the creation of thematic content, content produced within the climate change and crisis framework enables Single Earth to have a consistent social media presence, as stated by Akyol & Atabey (2023). Thus, users can access the company's social media account in line with specific purposes and motivations.

- In addition, content consistency meets the user's expectations when visiting the relevant profile or social media feed. Single Earth company primarily focuses its posts (tweets, retweets, and replies) on raising awareness about climate issues. This observation aligns with the statement found on the company's website: "On a mission to incorporate nature conservation into everyday life to tackle climate change and biodiversity loss" (Single Earth, 2023).

- Furthermore, educational content regarding greentech is a crucial aspect. The adoption of greentech by stakeholders not only enhances the profitability of companies like Single Earth but also strategically positions them at an advantage.

- Biodiversity and climate change are key focal points in the company's mission, as they prioritise raising awareness about these issues. While not being a non-governmental organisation, the company also endeavours to raise awareness about the green economy. However, it is worth noting that they have relatively minimal engagement with topics such as climate migration and climate anxiety, which are prominent discussions within the context of the climate crisis.

- Content types: Twitter is a widely used social media platform where people can share their opinions through short messages as a microblog (Ali & Malik, 2023). Twitter's 140-character limit in its first public use is an essential factor in the emergence of a unique content type of Twitter, as in every social network, which is textual content. Although features such as increased character count or easy sharing of other types of content have been rapidly adopted by users over time, reverse chronological flow and rapid content dissemination - unlike social media platforms such as Pinterest or Instagram, where visual content comes to the fore - textual content remains at the forefront.

- Single Earth's tweets have included podcasts, articles supported by scientific data from various news websites, and blog posts to increase awareness. Scientific studies are frequently referenced, indicating a scientific and educational approach towards nature preservation and raising awareness. Visual content is generally used to support textual content and attract attention. In addition, instead of videos, tweets include hyperlinks that direct users to video content platforms.

- Engagement: The company's direct interaction with its followers appears limited. It focuses more on event organisers and company executives engaging with international organisations through retweets. This approach may be considered business-friendly, as it fosters collaboration with farmers.

- On the other hand, social media's synchronous and asynchronous interaction opportunities are limited due to gamification or promotional content scarcity. Direct interaction-enhancing prompts such as call-to-action for engagement are also used very rarely. This can be seen as a barrier to accessing a broader audience in terms of content and context.

- The company's primary focus seems to engage users interested in the climate crisis and sustainability, particularly in achieving climate action objectives. In its social media efforts, the company frequently employs hashtags to attract individuals interested in the intersection of technology and climate action. Additionally, the company actively promotes its product, the MERIT token, utilising the hashtag #merit through various promotional activities.

- Collaboration with other organisations: Direct stakeholders regarding events such as AMAs, webinars, conferences, technology events and competitions are mentioned in the tweets. As Gedik (2020) states, collaboration with different organisations provides access to more audiences and offers the opportunity to increase brand awareness. In these contents, based on the findings in the word cloud, it is concluded that fintech comes to the fore as a topic in addition to raising awareness of the climate crisis.

- Audience segmentation: Just as there is a relationship between social media algorithms and the propagation of hashtags (Kim & Sea, 2020), hashtags help social media algorithms better understand the content, making it possible to reach a wider audience (Klok, 2024). This study shows that a company can use hashtags related to biodiversity and climate crisis more frequently than blockchain-based financial and business topics. In other words, attention is drawn to the climate crisis and ecocide with relevant hashtags, and a company maintains its social media presence almost like an NGO.

In addition to all this, the company's sponsored content is not on Twitter. The company occasionally promotes its token and raises awareness of the biodiversity sub-theme in its content.

In light of these results, suggestions for blockchain-based companies' use of social media and similar research while raising awareness about the climate crisis can be listed as follows:

- As Peng (2022) states, despite the close relationship between consistency and repetition in social media, repetition in content type and context can tire the audience. Therefore, companies can diversify their visual content and produce more eye-catching content according to audience segmentation.

- It's crucial for companies to use social media as a platform to communicate their purpose, work, and stance on the climate crisis. This transparency helps the audience better understand the company and its business model, particularly in the context of blockchain technology, which is still relatively new and not widely understood.

- Understanding each social media platform's algorithm, facilities, and analytics can help companies update their content production processes and reach wider audiences.

- It's important to note that this study is limited to a single company's social media account. To gain a more comprehensive understanding of how blockchain-based companies can use social media to raise awareness of the climate crisis, future research could compare the activities of different companies on different social media platforms or consider their practices in different countries.

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