


Article

Web Communication: A Content Analysis of Green Hosting Companies

Minos-Athanasios Karyotakis ^{1,*}  and Nikos Antonopoulos ^{2,3}¹ School of Communication, Hong Kong Baptist University, Hong Kong, China² Head of New Media Communication and Usability Lab, Department of Digital Media and Communication, Ionian University, 28100 Kefalonia, Greece; nikos@antonopoulos.info³ Department of Business Administration and Organization, Hellenic Open University, 26335 Patras, Greece

* Correspondence: minosathkar@yahoo.gr

Abstract: While many studies in the field of environmental communication have focused on exploring the environmental impact of social media, this research paper takes a different turn. It investigates, through a qualitative content analysis, 391 websites that support and provide green hosting services. This study is considered the first in the field that aims to examine in-depth how these green websites tend to communicate their green services. Therefore, its contribution is to enhance the relevant bibliography and present more insights regarding green websites and sustainability. The results showed that most of the websites were trying to highlight the positive impact their services will have on the environment. In addition, many websites tried to educate their consumers concerning sustainable development and make them part of a broader green cultural tradition. Nevertheless, on many websites, green hosting seemed a supplementary factor for choosing the company's services.

Keywords: big data; cultural heritage; data center; digital marketing; eco-friendly; environmental communication; green websites; green culture; green hosting; sustainability



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1. Introduction

In the last decade, there was a rapid development concerning new technologies. The daily use of services, such as websites, social media platforms, and phone applications, has led to an increase in power consumption. Despite not being highlighted usually, the new technologies are also to be blamed for crucial environmental phenomena such as climate change and the reduction of natural resources. In particular, it is estimated that around the globe exist more than almost two billion websites and almost eight million web-facing computers [1]. Furthermore, these impressive numbers are accompanied by the constant use of certain websites by a large scale of individuals, such as social media platforms. Facebook, YouTube, and Twitter had around 4.5 billion users in 2018 [2].

It should be taken into consideration that the aforementioned social media platforms are based in the Western world, where the majority of the Earth's population is not living. For instance, China is forbidding the use of these platforms, and, thus, it has its own social media scene with popular platforms such as Sina Weibo. Apart from this fact, China already in 2012 had the most Internet users in the world (513 million): more than double of the users in the United States of America and far more than the most populated European Union (EU) countries [3]. In addition, "China's social media users are more active than those of any other country but also, in more than 80% of all cases, have multiple social-media accounts" ([3] p. 2). It is also worth mentioning that the news industry has focused the last decade on data journalism for exposing the wrongdoings of powerful individuals, such as the Panama Papers. These revelations are based on an enormous number of data that usually are stored in electronic formats. Therefore, there is a need for more extensive hosting services [4,5].

To underline the problem with the power consumption concerning the services, as mentioned earlier, which seems to be unnoticed by the news industry, it is worth taking a closer look at some of the world's largest data centers. According to Energy Innovation [6], an average of the largest data centers in the world can exceed the power capacity of 100 MW (megawatts), as it accommodates thousands of devices. This power capacity can be enough for around 80,000 households in the United States of America (USA). In addition, the growing demand for more internet and information services will further influence the energy use regarding these services alongside the rapid growth of CO₂ (carbon dioxide) emissions. CO₂ emissions are associated with energy use. However, the actual number of CO₂ emissions coming from the data centers cannot be estimated, as there is a lack of data. Only a few companies in the world publicize such data. Since it is not possible to accurately estimate the energy consumption and the CO₂ emissions, it is worth highlighting that "between 2010 and 2018, global IP traffic—the quantity of data traversing the internet—increased more than ten-fold, while global data center storage capacity increased by a factor of 25 in parallel" [6].

The urgent need for data, accountability, and promotion of a green culture (e.g., the use of renewable resources and low power consumption solutions) concerning the growing IT services has resulted in the emergence of new terms, such as the concept of "green websites". "Green websites" presents the use of environmentally friendly operations and renewable resources [1,7,8]. In particular, that includes green Information Technology (IT) and green computing operations, such as energy-efficient computing, responsible recycling and disposal, design for environmental sustainability, and data centers that use renewable energy or have efficient power management. The main goal of green practices in IT services is to reduce carbon footprints and the waste of energy [8]. Green hosting is also a part of green computing and culture, as it "is the web hosting solution powered by environmentally friendly resources such as renewable energy" [9].

Despite the trend of green IT practices, there is a lack of research in this field, as there is a need for more public data and research concerning the understanding and the investigation of this phenomenon [10]. For instance, a recent study from Antonopoulos and his colleagues [1] provided alarming findings regarding green practices in news websites. The study explored whether the most prominent 500 websites of the globe were using and promoting green practices. Almost none of the websites were using environmentally friendly servers or organizing actions in favor of the environment. Furthermore, the majority of the news websites did not even have a unique news category regarding environmental news, despite the fact that the more news there is concerning environmental issues, such as climate change, the more public awareness is raised [11]. Therefore, it is believed that there is not adequate dissemination of the green tradition about the IT services and operations.

All in all, this study aims to enhance the relevant literature by examining how a significant number of websites around the globe support and communicate green hosting services to their users.

2. Communication, Cultural Heritage, and Green Hosting

Environmental communication was a narrow term initially, as it did not include a number of communication practices that are considered parts of this term nowadays [8]. The field has been developed to include several actions and practices that examine in depth, for instance, state or non-state actors and how cultural products can impact society concerning environmental problems. Furthermore, the worsening of environmental phenomena such as climate change has led even the UN (United Nations) to intervene and support the actions that aim to raise awareness and protect the environment [8]. These important changes in the field of environmental communication resulted in broader approaches and studies of those practices. According to Pezzullo and Cox [12], every actor who disseminates viewpoints and solutions for dealing with environmental issues is a part of the environmental communication, as these actions promote a certain consciousness for eco-friendly (green) solutions. In addition, this constant communication of that conscious-

ness influences society, as the older generations inherit its environmental concerns and solutions to the new one. This process can be considered the creation and preservation of a culture, or at least a tradition. That is one of the reasons why studying and understanding these processes and transformations is important.

Environmental communication includes different approaches and methods for exploring the processes of disseminating information concerning the environment. Part of those methods belongs to the critical approaches, such as discourse, textual, and rhetorical analysis for understanding how communication affects the ideas, perspectives, and feelings of the people regarding environmental issues. “These humanist and critical approaches are less concerned with unearthing environmental “facts”, but rather focus on understanding how communication functions pragmatically and constitutively” ([13] p. 39). These approaches are based on the thorough use of a theoretical and conceptual application of a methodology that includes textual evidence by the researchers for backing up their arguments [13]. In addition, in the last decade, there are calls for a need for studying topics in environmental communication that are associated with the traditional sociological issues, such as inequality, power, and the socio-political aspects (i.e., financial, sustainability, and cultural issues) that influence the dissemination of information about the environment significantly [14].

Moreover, the green/environmental approaches can be core components of sustainable development, which is also associated with the dissemination of CH (Cultural heritage) and societal traditions [15]. “Cultural Heritage is an expression of the ways of living developed by a community and passed on from generation to generation, including customs, practices, places, objects, artistic expressions, and values” [16]. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) has also pointed out that CH is not only the physical artifacts that are passed down from one generation to the other but also the process of preserving and improving these traditions that will benefit society in the future years. Although it may not seem significant, these traditions can positively influence employment, social cohesion, employment, and even new skills to promote sustainability and more sustainable societal and economic models [17].

The European Union (EU) and its countries have tried in the last years to connect more intensely the CH with the sustainable development that involves implementing green practices. That is why certain initiatives have taken place for reducing, for example, the air pollution that can damage CH products. Internet services contribute to the worsening of air pollution with CO₂ emissions [18]. The EU directives and conventions have been progressive regarding the CH when it was understood that nature is changing due to the human activity. Thus, it affects the environment, as “landscapes are characterised by a strong cultural stance” ([19] p. 617). The Netherlands is one of the most prominent examples in the EU regarding CH, as it has developed a CH management approach that includes green approaches and socioeconomic factors. Furthermore, it “recognises that Dutch cultural heritage provides invaluable traditional knowledge on managing water- and flood-related hazards and spatial and climate adaptation” ([20] p. 2). In addition, the Netherlands has recognized around five years ago that climate change can be a threat to the country’s CH, especially in the coming years as the weather events, such as floods, heatwaves, and droughts will be increased. Therefore, it must be tackled to protect the Netherlands’ CH. At this point, it should be mentioned that climate change has challenged the CH management approaches globally, as they seek to deal effectively with the threats caused by the environmental change by promoting sustainable models [21].

For instance, one prominent example of such a model is sustainable tourism, which promotes an alternative approach that goes against the negative phenomenon of over-tourism that harms the local population, the social order, and the environment of the destination with the excess number of tourists [22]. Sustainable tourism respects the destination as it tries to meet the local population’s needs, the tourists, and, of course, the environmental factors (e.g., biological and ecological diversity). In other words, sustainable tourism also wants the tourism destination’s infrastructure to be efficient enough in order

not to provoke excessive power and water (or energy) consumption [23]. The definition of sustainable development aligns with the tourism example, as it describes a model where everyone's wishes and demands are met, but with securing that the next generations will also have the ability to meet the same demands [24]. Regarding the definition of sustainability, it seems that it includes the same meanings as the term "green". Sustainability and green as definitions emerged due to the overconsumption of natural resources in favor of short-term economic development. Therefore, there was a need to communicate this urgent problem to the public. However, the overuse, mostly for marketing purposes, of the term sustainability and its variations has led to the public's confusion about their real meaning [25].

That is one of the reasons why the public tends to forget that the green culture must also be applied in the field of big data and the Internet services if the actual goal is the sustainable development of the planet. Similar to the above-mentioned example of sustainable tourism, it is uncommon to hear the same terms for IT services. Nowadays, websites are an essential part of the individuals' daily routine. They are used to read news articles, promote, buy products, or communicate with other individuals daily. Thus, this paperless communication is thought not to be harmful to the environment. Nevertheless, all these webpages that belong to each website need to consume energy to function. If they host big data, unnecessary data, many different files (e.g., videos and photos), and programs, power consumption is usually increased. As a result, the goal is not only to reduce this unnecessary consumption but, firstly, to focus on operating the hosting services exclusively on renewable sources (green hosting). The second goal is to communicate efficiently this need to the public [1].

Sustainability of the Internet cannot be achieved without paying close attention to the data centers and their power consumption. For all the large companies, especially social media companies, they have to operate 24 h for 365 days yearly. Furthermore, if there is dysfunctionality with a server, a backup server is needed for keeping the company products and services online despite the problems. Some of these servers and data centers operate with diesel fuel. In 2013, the New York Times revealed that a data center is similar to a small town regarding electricity consumption [24]. Moreover, the data warehouses were consuming around 30 billion watts of electricity, which equals the power provided by 30 nuclear power plants. Another interesting fact is that the data centers have a high chance to waste about 90% of the power, as the data centers do not use more than 12% of electricity for the computational purposes and the servers. Lastly, many providers of the above-mentioned services claim that they offer green energy, but it is not clear enough if the energy comes from renewable resources or alternatively if there is any other way that makes the services green [24].

The analysis and understanding of the data centers based on specific metrics is not an easy task. Several vital dimensions define a data center's operation, such as performance, cooling, energy efficiency, air, thermal management, financial impact, energy efficiency, storage, and security [25]. The most prominent metric for assessing data centers is the Power Usage Effectiveness (PUE), which was proposed in 2006 by the non-profit institution called "Green Grid". PUE has become a standard practice in the field for assessing the energy efficiency of a data center [26]. Its importance lies in the fact that it presents "the proportion of energy which is actually used to operate the IT equipment with respect to the total power draw of a facility, and is defined in equation" ([26] p. 155). However, concerning the energy consumption, "it is not clear how to measure the total energy that goes into IT equipment accurately" ([25] p. 293), as "the precise values of such consumption and its future growth as projections are continuously revised and real data is difficult to acquire" ([27] p. 1015). In addition, the notion of performance seems to play a crucial role in consumers' choices regarding the usage of green products and services. The consumers tend to be skeptical about the advertising messages that promote environmental practices and the advertised company's actual green performance. A misleading communication

practice can damage the company's reputation because the public's concerns regarding sustainability are not met or understood fully [28].

Green technologies and services seem to be promoted as a notion even in large global events, such as the 2022 FIFA Men's World Cup in Qatar [29], but once again, it is not clear what exactly the term green includes. For instance, it is not clear enough if these services include green hosting and how much power consumption these green technologies save. According to Masanet and his colleagues [10], there was a growth of about 6% from 2010 to 2018 of the power consumption. Nevertheless, it is argued that there were important steps for reducing the energy consumption by the data centers, but it is unclear how long these approaches will last. In addition, the lack of transparency makes the future predictions uncertain. However, there is a consensus amongst the researchers that pursuing green approaches, such as green hosting, will eventually lead to a holistic sustainable approach for the IT services [30–33]. Finally, accepting the consensus of experts, the UN started promoting from 2015 the *2030 Agenda for Sustainable Development*, which was adopted by all the UN Member States. It incorporates some of the main objectives of green computing and culture, such as the energy consumption and that "economic, social and technological progress occurs in harmony with nature" [34].

The need for green practices and a future environmental and cultural heritage in the Internet sector was highlighted by scholars around a decade ago [30,35]. Environmental Heritage can be considered an actual part of the CH of society, and the dissemination of its traditions about protecting Earth's natural resources seems to come in contrast with the development of modern society [36]. Consequently, the last years' efforts, such as the *2030 Agenda for Sustainable Development*, want to change this unsustainable narrative and convince the coming generations that environmental heritage and sustainability must be essential components of CH. The dissemination of this new empowered narrative with the help of digital storytelling can create a new sustainable CH that will be common for several communities worldwide [34,37].

The sustainable development of a company, including its communication practices, focuses on dealing with the current environmental problems by providing solutions that have a global impact considering the financial and environmental costs that these solutions would bring at a macroscopic level to society. The technological initiatives combined with the companies' relevant strategic decisions can emphasize their communication on the significance of not damaging the environment more. In other words, regardless of whether the company provides Internet services, it should manifest its will to protect the environment through green practices. That can be achieved by implementing a well-defined environmental plan and constant communication of its green practices to the users-consumers [38,39]. Nevertheless, the implementation and the communication of green practices through the web are also connected with the socio-political context. Some societies do not pay so much attention to sustainable development and green practices. There is a crucial difference in environmental web communication based on the company's audience. A website will have a different communication approach if it tries to reach a global audience compared to a web company, for example, that is located in a society where its members make a living by working on mining sites. Therefore, some web companies will not pay such a closer look at their green services and practices in their communication campaigns [40].

In conclusion, the communication process for promoting the green culture and technologies has not been studied extensively, although sustainable development seems to be one of the most important goals on a global scale. In order to achieve sustainability in Internet services, a closer look should be taken into the promotion of green operations in the data centers, such as green hosting. The next section explains how this study researches green hosting communication by examining prominent companies around the world.

3. Materials and Methods

The current study used the *Green Web Foundation's* directory, which contained 475 green hosting companies that operated in 56 different countries of the globe. According to the *Green Web Foundation* to register to its directory, the company has to provide evidence that the website is a real green provider and that a green provider hosts it. There are two options for proving that the websites-companies are an actual green user. The first one is the "Proof of using green energy", which collaborates with a data center that is run by renewable energy. The directory's companies have to provide to the foundation a certificate "stating the number of MWhs that are bought in green and a period" [41]. The second option is to the "Proof of accounting for the carbon emitted", which means that the services are run carbon neutral "by buying carbon offsets from projects that mitigate CO₂ in other projects". Similar to the first option, a certificate must be provided to the foundation for being included in the directory [41]. However, a search was conducted from 2 to 10 August 2020 to check if every website was still online or for duplicates in the list. The result was that 391 companies' websites were available in 47 countries (Figure 1). A few were removed as they were not operating or considered duplicates, because they belonged to the same company. The most prominent example of duplicates was "Amazon Web Services".

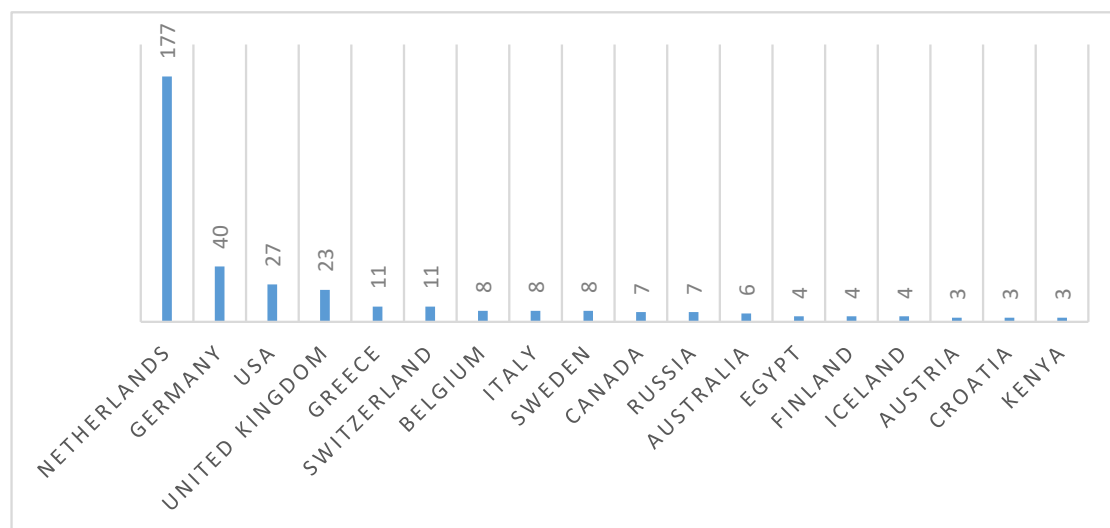


Figure 1. The top 18 countries in green hosting websites-companies according to the *Green Web Foundation*.

The study used qualitative content analysis to examine the following research question (RQ1): How do a significant number of websites around the globe support and communicate green hosting services to their users? Qualitative content analysis can be employed for analyzing all kinds of media texts. Its purpose is not just to present the content of the examined media texts but also to identify and explain the main ideas communicated in those media texts. Qualitative content analysis is considered a common method in communication studies, and it has been used several times for analyzing communication phenomena based mostly on media texts, such as websites [42–44]. "Qualitative content analysis goes beyond merely counting words to examining language intensely for the purpose of classifying large amounts of text into an efficient number of categories that represent similar meanings" ([45] p. 1278). As a research method, it focuses on the subjective explanation of data's content to spot shared patterns and themes [45] (Figure 2).

These websites were chosen as there is an intermediate foundation that guarantees and checks that these websites-companies indeed use and provide green hosting services. *The Green Web Foundation* is located in The Netherlands, and, thus, it is not surprising that the majority of the entries in the directory are companies located in The Netherlands. In addition, the aforementioned directory includes some of the most prominent green

hosting companies in the world, such as “A2 Hosting”, “DreamHost”, “GreenGeeks”, and “HostPapa”, to name a few [46–48]. As a result, the data collection was evaluated and focused on the study’s research question, considering that it is not easy to identify a similar directory or if the websites–companies use green hosting [24,49].

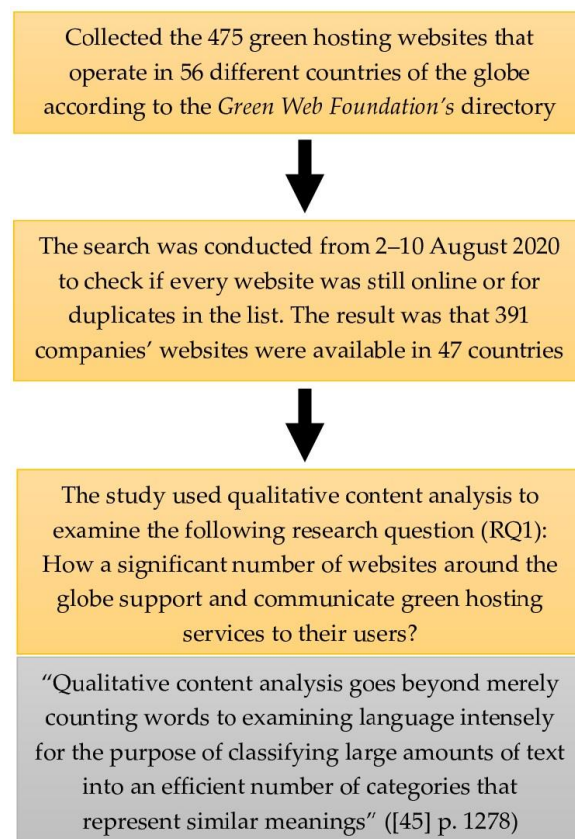


Figure 2. The summary of the methodology.

The current study is inspired by previous papers [1,10,33,50] that are related to sustainability studies and employed content analysis [51–53]. The current research is highlighting the need for a better understanding of the green practices and how this green tradition is communicated through the green hosting companies in the era of big data, during which there is an urgent need for sustainable development and a reduction of the energy consumption used for the IT services. The next section presents how the websites’ media texts were communicating the green hosting services to the users.

4. Results

4.1. Green Hosting as an Important Part of the Services

Among the examined websites–companies, many considered green hosting as an essential factor in choosing the services. These websites were highlighting that the services were not only eco-friendly but could also have a severe impact in favor of the environment. In order to explain these arguments, different sections, or even blog posts, were focusing on presenting how the green hosting is being implemented. For example, GreenGeeks, one of the most popular companies providing green hosting, explained that it is a “green web hosting provider putting back 3 times the power we consume into the grid in the form of renewable energy” [54]. Furthermore, it was underlined that there is no waste of power and that the customers–users will be able to make a difference in the world by choosing these kinds of services. The company’s website is promoting through different ways how the company is implementing the 300% renewable energy by different sections on the website about this issue. For example, one was exclusively about the data center

of the company, and another one about how Internet services are actually polluting the environment. The latter section was titled as “Did You Know The Internet Is One of the World’s Largest Polluters?” and, amongst many arguments, it claimed that:

“Today, data centers account for 2% of the world’s carbon emissions, that is as much as the AIRLINE INDUSTRY! But it doesn’t stop there. Data Center pollution is expected to grow to 14% of the world’s carbon emissions, as much as the United States of America, by 2040” [54].

Moreover, some websites go beyond highlighting the importance of green hosting; they tried to connect the two terms of green and sustainability, providing an in-depth analysis of the company’s initiatives toward this path. The primary goal seemed to convince the customer that although the company has not succeeded in the 100% usage of renewable resources, it is about to achieve this goal in the coming years. Therefore, some websites—companies such as Amazon Web Services (AWS) had several sections on the relevant web page, showing what renewable resources are used for power consumption (e.g., wind and solar power). It presented the company’s farms with reports and more data for the user to search more if needed [55]. Meanwhile, the company’s commitment to 100% renewable energy was being highlighted on several occasions. For example, AWS chose on its website to thoroughly explain the next steps of this commitment by presenting the overall power consumption by the hour that will be achieved using renewable sources. AWS services will open in the coming years, one new solar farm and four wind farms. “Once complete, these wind and solar farms, combined with AWS’s nine previous renewable energy projects, are expected to generate more than 2,900,000 MWh of renewable energy annually” [55].

For some websites—companies, the promotion of the term green was significant. It was used exclusively as a term throughout the website. These websites tried to educate the users and make them choose green products that consume green energy in every aspect of the company, such as the energy for the company’s offices. In that way, the consumers could be ensured that they contributed to a healthier and cleaner planet by choosing these services. In the meantime, through their choices, they were supporting the best practices in the field of IT services that promote holistic, sustainable business practices, and corporate responsibility. Apart from these facts, some websites also chose to underline the notion of carbon footprints and carbon-neutral in association with their employees’ green life-office. For instance, HostPapa, a UK-based company, argued that it “has taken the initiative of going green by purchasing 100% green renewable energy to power our data centers, web servers, office computers, laptops, and office space” [56]. Another example is DreamHost’s website, which was making several innovative claims, such as that there were “recycling bins in every office as far as the eye can see, even for single-serving coffee pods!”, “ceramic cups, plates, and real silverware in every office. No disposables here!” and “generous work-from-home policies keep people off the roads and in their happy places” [57].

Adding to all these, some green hosting companies connected green and sustainable practices with an ethical aspect of the business model. For several companies, it seemed that going green was a must if the company cared about the nature and the well-being of individuals. Thus, the customers must know the harmful impact that the hosting services have on the environment. Probably, that can be one of the reasons why alarming facts for the environment are linked with the services of the company. One example could be the company greneIT, which used the following paragraph on its website:

“The internet industry emissions are currently level with aviation traffic but the consumption at data centres is expected to double by 2025, producing more emissions than air transport” [58].

There seemed to be no significant differences between the promotion of those websites—companies’ green services in relation to where they were headquartered. Other companies—websites based in Greece, the Netherlands, Austria, Germany, the United Kingdom, the USA, and so forth did not seem to use highly different content from the one presented above. The majority of the websites were located in the Europe (Figure 3).

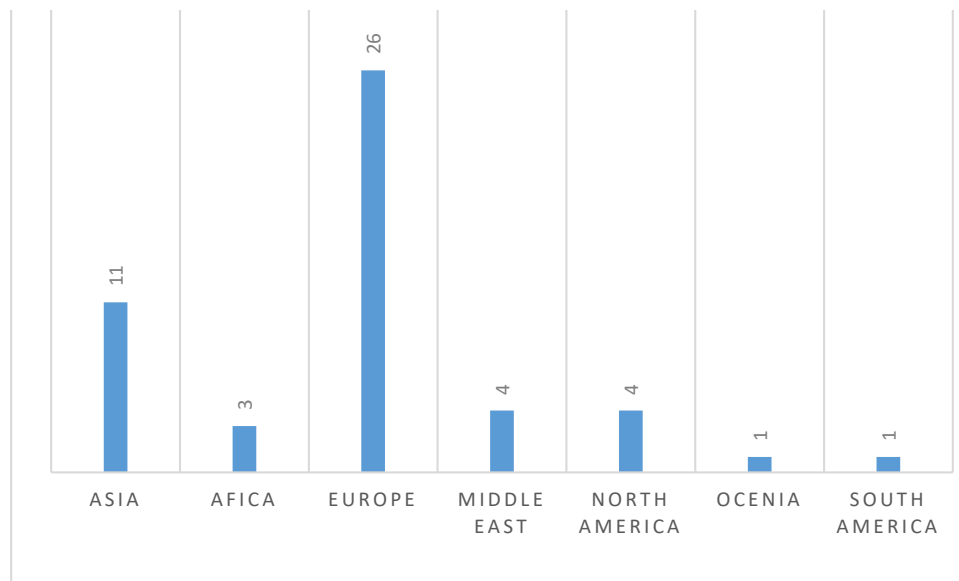


Figure 3. The number of countries green hosting websites-companies, according to the study’s sample based on the world’s continents (Turkey was included in the Middle East and Russia was included in Asia).

4.2. Green Hosting as a Non-Important Part of the Services

Despite several websites-companies considering green hosting as a significant aspect, there was also a large number from the *Green Web Foundation’s* directory that did not include information about that kind of sustainable approach. These websites-companies paid attention to the detailed explanation of their services, such as security issues, the servers’ performance regarding time, cloud applications, email, and domain services. In some cases, traces of green services could be identified by searching the websites thoroughly. There might be hints about the use of efficient data services and partners that were known for their commitment to go green, such as the Amazon Web Services (Figure 4). Nevertheless, it could not be identified if those websites-companies were using green hosting, or according to the guidelines for being in the *Green Web Foundation’s* directory, to demonstrate actions that justify the “Proof of accounting for the carbon emitted”. To put it differently, several websites-companies, even if they were participating in the green initiatives, did not want to highlight it, such as the above websites-companies.



Figure 4. A screenshot of a relevant website-company that had as a partner Amazon Web Services (AWS).

Furthermore, there were several other websites that, although they were offering green hosting and other green services, downplayed that feature, as it was not considered essential for choosing the company. Sometimes, with small banners, icons, and sentences, those websites–companies were showing to the potential customer their commitment about the green approaches, but they were not trying to explain in detail the actual meaning of the green hosting, the sustainable approaches, or the ethical and efficient support of the services (Figure 5).

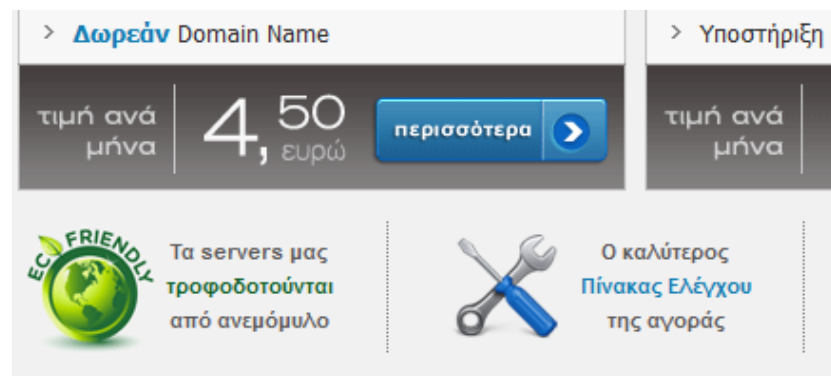


Figure 5. A screenshot of a relevant website–company in Greek with an eco-friendly banner.

Lastly, these companies did not exploit the use of renewable resources, such as solar or wind energy, to differentiate themselves from the other competitors in the industry. Similar to the website’s text, the website’s design also did not try to present the green approaches as an advantage for choosing those companies. It was just a supplementary reason for choosing secured, quick, cheap, and reliable hosting services.

5. Discussion

Green hosting is an important phenomenon concerning the actual impact that it can have on the environment, as it is a sustainable model. One of its aims is to reduce the power consumption that is spent on IT and Internet services mainly through the use of renewable resources, such as solar or wind power. However, despite its significance, as there is considerable power consumption for those services, studies focusing on green hosting are on the margins of the research, especially in communication studies. In addition, until now, no research has focused on investigating how the websites and companies communicate information regarding their green hosting services to the consumers. Thus, this study situated itself in that gap to provide more evidence for understanding the process of communicating the green hosting services and the overall green tradition. It has practical implications for the fields of sustainability and environmental studies.

The findings proved that several green hosting services focused on explaining the green, ethical, and sustainable services and the beneficial impact they could have on the environment to the consumers. As a result, since they were disseminating viewpoints and solutions in favor of the environment, they were participating as actors in environmental communication [12]. That also shows that several companies try to convince the consumers–users that they have a well-defined environmental plan that includes green practices [38,39]. In addition, one of the primary purposes of the websites–companies was to differentiate themselves from the other hosting providers and communicate a green culture to the consumer. That trend has been observed in other studies of the field, in which some websites were trying to educate the users and initiate further participation of the individuals for environmental initiatives [1,50]. Apart from this communication process, it was observed that the most crucial point of the green hosting websites was the issue of power consumption, as, despite the standard PUE metric for assessing the energy efficiency of a data center, there is still uncertainty concerning the overall power consumption [26,27]. Thus, some highlighted the use of data centers that secure a low consumption or even

surpass the 100% consumption by renewable resources, such as GreenGeeks that claimed that its data centers match 300% of renewable energy [54].

Moreover, several websites–companies alongside power consumption underlined CO₂, carbon emissions, or carbon footprints to raise awareness for their services' benefits. Adding to these, some of the websites–companies went a step further, presenting a different working style, a green life-office that goes beyond providing services. These companies, contrary to those that considered green hosting as a supplementary service, promoted a different culture that included some of the components of sustainable development, which is also associated with the dissemination of CH (Cultural heritage) and societal traditions [15]. Furthermore, this research seems to support the arguments that eventually, the preservation or the improvement of traditions could benefit society in the future years, changing even the working conditions in a company [17]. Lastly, the promotion of green hosting seems to be an efficient digital marketing approach, as the Millennials prefer “buying from companies that help people, communities, and the environment” ([59] p. 87).

At this point though, it should also be highlighted that there seemed to be a different communication approach concerning the promotion of the green practices from the most influential websites–companies that were included in the sample [46–48]. These companies probably due to their global audience and impact have chosen to highlight their green services and practices, in comparison to smaller companies whose revenue is based on a local market, in which the green practices might not be strongly supported by the local socio-political context [40].

Apart from these facts, it was startling that some the world's most populated countries, such as China, India, and Indonesia, had almost no websites–companies in the *Green Web Foundation's* directory. In particular, China had no website, and the other two countries had one each. This finding was alarming, considering that these countries will have more Internet users in the coming years, meaning more power consumption. For example, China already has the most Internet users in the world, far more than other Western countries [3]. It seemed that some European countries had adopted green hosting as a practice more than other nations. The most significant example was the Netherlands with 177 websites–companies in the directory followed by Switzerland and Greece (11 websites–companies for each country), considering the low population of these countries compared to the other countries of the directory. In addition, with 40 websites–companies, Germany seemed to play an important role in disseminating green hosting around Europe. Even though *Green Web Foundation* is located in the Netherlands, the number of 177 websites–companies was high, considering its population (Figure 6).

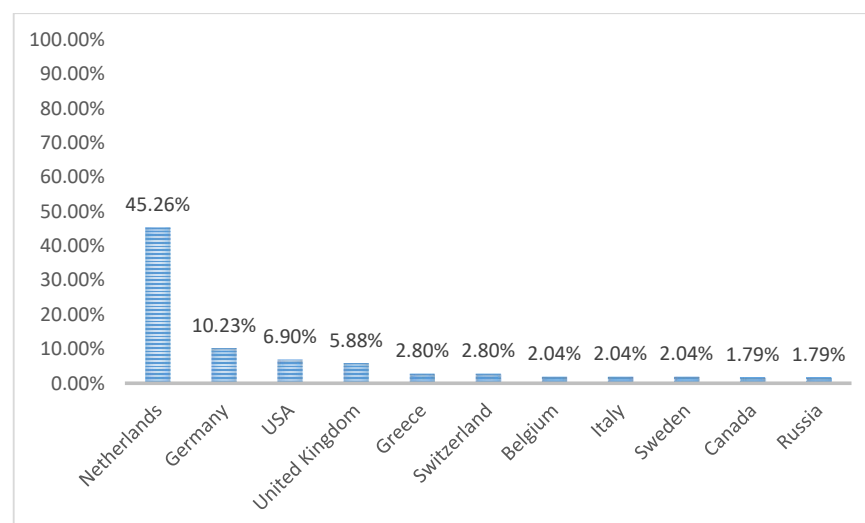


Figure 6. The percentage of the most prominent countries in green hosting websites–companies, according to the study's sample.

These findings might be associated with the Netherlands' efforts for realizing its ambitious Sustainability Agenda that included, for instance, "the Dutch Dairy Organisation and the Dutch Agricultural and Horticultural organisation to have zero-carbon emissions in dairy chains by 2020" through green practices [60]. The Netherlands is one of the most prominent examples of European countries recognizing the urgent need for the implementation of green practices in order to protect also the CH of the country [19–21]. It is not surprising that 26 countries in Europe (see Figure 3) are represented in the study's sample. Due to the conventions and directions promoted by the EU, European countries have supported green practices, such as green hosting [18]. However, it is interesting that despite the study's straightforward findings, no other research until today has investigated the communication process of the green practices (i.e., green hosting) of these websites–companies.

6. Conclusions

The current study is considered the first in the field that provides evidence about how the green websites–companies communicate their green services through a novel methodology that can be replicated by other scholars in the field to study more in-depth environmental aspects of the websites' services. These services will be a prominent global issue in the coming years that has to be tackled, as they affect citizens' everyday lives worldwide. In addition, the use of the *Green Web Foundation's* directory offers a database and an organization that actually tries to assess the green practices of the websites and the Internet services, highlighting the need for more systematic analysis of more websites–companies around the globe, especially in Asia, where the number of the users are about to be increased and, thus, the relevant energy consumption and pollution will be raised significantly if the green practices are not followed.

Apart from these findings, the research reveals the connection between CH and green practices. It shows that the EU countries, such as the Netherlands, follow sustainable strategic decisions to promote environmental solutions concerning several aspects of everyday life, such as green hosting and data centers. Surprisingly, countries such as Greece, which is not known for its environmental initiatives, seem to follow the sustainable practices of other influential nations such as Germany and the Netherlands. Furthermore, despite their small population, the EU countries seem to take the lead in dealing with the negative environmental issues provoked by the Internet and website services. To attract the customers' interest, many companies are highlighting different aspects of their green practices, such as a green life-office, which does not seem to be strictly connected with the problems of power consumption and CO₂ emissions. That is a finding that underlines again the need for a more systematic assessment of the overall operations of the websites around the globe and the need for the companies to become more accountable by providing more relevant data to the public, instead of relying on other initiatives and organizations to evaluate if their services are actually following the known green practices.

Finally, future studies can take a closer look at other aspects of green practices and culture (i.e., if the green websites choose to use solar, wave, or wind power and how this usage is connected with each country's culture). That can be done by focusing more on the Asian countries (especially India and China), which due to their large population and the development of their Internet services, seem to be perceived as future global powerhouses. Therefore, a similar qualitative content analysis of such websites will enhance the relevant bibliography of green practices and culture.

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