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Beware of Bullshit – A Qualitative Study on Young Adults' Sustainability Awareness of Online Services

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Abstract

Since the surge of working in the 'home office' during the COVID-19 pandemic, information and communication technology has been seen as a problem solver for the global climate disruption, because it promises savings in emissions through digitalization. However, this is criticized for being a 'double-edged sword', as more use of ICT also means an increase in electricity consumption. This thesis poses the question if consumers using services fostering said digitalization are aware of this implication and can contribute to sustainable development by choosing wisely. Thus, this paper leads exploratory research on sustainability awareness of online services, from the perspective of both sustainably aware and technologically skilled individuals. This will be achieved by collecting qualitative data from interviews with two groups of university students from biology and computer science or information systems. The data will be evaluated using the approach of qualitative content analysis and will be investigated further with the help of the concept of bullshitting, to understand how consumers assess ambiguous and misleading sustainability claims about online services. One implication from the interviews is that both companies and consumers should strive to promote reliable knowledge on this topic, as there is a deficit in sustainability awareness of online services.

Keywords: bullshit; green IT; greenwashing; online services; sustainability

1. Introduction

Advances in information and communication technologies (ICT), as well as sustainable development, are two topics that are being actively discussed in today's society, politics, and economy. Through digitization, digitalization, and digital transformation, ICT is regularly presented as one of the possible solutions to the challenges of sustainable development. For instance, moving from analog to digital data formats with the help of *digitization* and supporting or automating processes through *digitalization*, omits filling out a transfer slip and driving to the next bank, leading to paper savings and reduced travel (Vrana & Singh, 2021, p. 4). Furthermore, Internet of Things (IoT) as an example for *digital transformation* technologies, can be used to change whole business models to optimize energy consumption (Ericsson, 2020, p. 9). Therefore ICT can be seen as an enabler, but its role as part of the problem should not be neglected (Ericsson, 2020, p. 9; Hofmann et al., 2021, p. 7). ICT can hurt environmental sustainability due to massive energy consumption as a result of increased use, toxic e-waste as a result of poor recycling, or general high demand for rare resources used in manufacturing.

A major example of how ICT can be a 'double-edged sword' is the recent rise in the implementation of home-

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based telework, better known as 'home office'. The ongoing COVID-19 pandemic has pushed companies to allow their employees to work from the safety of their homes, for example by hosting meetings online rather than in person, which has virtually established a further digital transformation by force. Working from home decreased the need for commuting and business travel and started the trend of a "considerable substitution of physical (professional) traffic by data traffic (digitalization)" (Kutani et al., 2021, pp. 21–22).

A study commissioned by Greenpeace estimates that 5.4 million tons of CO_2 emissions from transport could be cut per year if 40% of the employees had two home office days per week. This would be equivalent to 4% of total passenger transport emissions (Büttner & Breitkreuz, 2020, p. 14). However, as more and more people actually start to work from home and use their devices to communicate with colleagues and customers more frequently, data traffic is also increasing, which in turn requires more energy. This rebound effect is included in the estimate, but it is crucial to point out that it needs to be taken into account in the discussion of the potential for emission savings of ICT in general (Büttner & Breitkreuz, 2020, p. 5). Home office was by far not the only reason global internet traffic increased by about 40% in 2020 (Sandvine, 2020, p. 5). An increase in "video streaming, video conferencing, online gaming, and social networking" (Kamiya, 2021), as well as many other services contributed to that jump in numbers. The growth normalized to 29% in 2021 after the surge caused by the COVID-19 pandemic, but it is still almost a threefold increase in bandwidth since 2017 (TeleGeography, 2021, p. 1).

Since not everyone is an IT expert, many people seem to take it for granted that their preferred IT device (e.g. smartphone, tablet), as well as their favorite app, just work, without realizing how massive the IT infrastructure is that powers the services. They are unconsciously oblivious to the fact that one push of a button sets off 'lots of moving parts' on servers in the backend of an online service, requiring a lot more energy than their personal device does. The immense growth in usage and transmission rates accumulates to an energy demand of 1% and 1.1 – 1.4% of the total global electricity use in 2020 for data centers and data transmission networks respectively, which are magnitudes not comprehensible by the average consumer (Coroamă, 2021; ITU, 2020; Kamiya, 2021; Malmodin & Lundén, 2018; Masanet et al., 2020). This barrier to understanding could pose a threat to sustainable development driven and supported by consumers because the time for change is long overdue to mitigate the consequences of the climate disruption (Harvey, 2020).

Consumer practices, considered pro-environmental or Green-IT, that have been recommended so far include: double-sided printing, avoiding printing by using digital formats, turning off devices or features when not in use, and recycling or reusing old devices (Leung et al., 2018, p. 5; Molla et al., 2014, p. 133; Nash and Wakefield, 2021, p. 1). However, they all share a limitation, which becomes very apparent in a time when online services are omnipresent. All of these practices only allow users to take effect in their immediate sphere of influence, basically on or with their own devices. This means, that services that one does not maintain themself are out of reach. The ICT provider (Ericsson, 2020, p. 15) recommends that consumers make it clear to companies that they care about their carbon footprint and try to use online services that comply with science-based targets (SBTs) rather than net-zero claims. They state that SBTs are to be preferred as they are in line with the Paris Agreement's goals and do not allow to count carbon offsets toward SBTs (SBTi, 2020, p. 7; SBTi, 2021, p. 8). Net-zero targets however allow carbon offsetting to achieve 'zero' emissions. Buying carbon offsets or credits sparks a lot of controversy, especially because of its reputation as a "get out of jail free card" (Gilks & Watson, 2019). Renewable energy certificates (RECs) are not the same as carbon offsets but have a similar shady reputation amongst environmental activists. Especially unbundled RECs are criticized, because with those a company does not need to source the energy from the same grid as the origin specified in the certificate (Cook & Jardim, 2019; U.S. EPA, 2021). Which, with a bit of common sense, do not sound like directly contributing to sustainability.

Without knowing the difference between the aforementioned terms, sounding somewhat ambiguous, it can probably be difficult to follow the recommendations proposed by Ericsson. Not even "half of executives (43%) [...] are aware of their organization's IT [carbon] footprint" (Capgemini (Ed.), 2021, p. 10). This is likely attributable to the circumstance that greenhouse gas (GHG) assessment of the resources needed to run an online service are rather scarce, because the "IT-Services and underlying ICT infrastructures are complex constructs" (Grimm et al., 2013, p. 10). Knowing that, it might be even more difficult for consumers to make an educated environmentally aware decision before using online services. The point could be made that they run the risk of falling for the 'bullshit' produced by companies in the ICT industry.

The term *bullshit* is commonly known as a swear word and vulgar language but was introduced into the scientific discussion by philosopher Harry G. Frankfurt, who defined a concept behind the term and thus established the research on bullshit. The act of bullshitting can be described as a communication practice in which information is made up to hide one's ignorance. To Frankfurt (2005, pp. 33–34), the most salient feature of bullshitting is the "lack of connection to a concern with truth" (pp. 33 – 34). Frankfurt's idea of bullshit, however, is not the only one. The fellow philosopher Gerald A. Cohen (2002), describes bullshitting from a different point of view, concluding its essence to be 'the unclarifiable unclarity' – meaning utterances that are vague and unclear, so that in practice their truthfulness cannot be made out immediately. To Cohen (2002, p. 8), people that are exposed to bullshit are "mere victims", not being able to spot the truth. In a similar way, as people cannot verify the actual resource consumption and emissions of online services, regardless of whether the operators are transparent about it or not.

There is crucial evidence in the scientific literature that the concept of bullshitting is useful and demonstrates its legitimacy. It has been proven to be a "legitimate psychological phenomenon" (Pennycook et al., 2015, p. 566), a "managerial communication genre" (Christensen et al., 2019, p. 1594), and a helpful method to uncover deceptive and inconsistent claims (Stevenson, 2021, p. 90). Therefore, the concept of bullshitting promises to be a fruitful method to break down the issues surrounding the sustainability awareness of online services.

Research on sustainability awareness in ICT has so far only dealt with hardware and software in the users' sphere of influence (Molla et al., 2014; Nash & Wakefield, 2021) or has not specifically defined what is understood as an IT product for end-users (Kurkoon et al., 2016). In addition, other papers only looked at products and services where a sustainability effect is advertised as a key feature, such as time-switched smart home sockets (Koo et al., 2015), which obviates the question of awareness of 'hidden' sustainability concerns. In general, most of the aforementioned papers have collected their data quantitatively among several types of groups but failed by having a one-sided approach. Most of the people surveyed in the studies are professionally or educationally involved in the field of ICT, which does not represent the average consumer who has no knowledge about the technical details of ICT (Hernandez, 2019, p. 8; Molla et al., 2014; Nash and Wakefield, 2021, p. 2). Unfortunately, studies that asked consumers did not focus on the online service part of ICT (Kern et al., 2011; Kurkoon et al., 2016) or only focused on a specific type of service (Grimm et al., 2013).

Thus, this thesis aims to address the knowledge gap regarding awareness of 'invisible' sustainability concerns of online service use, from the perspective of both a sustainably aware and a technologically skilled individual. The aim is then to investigate said awareness with the help of the concept of bullshitting and lay the groundwork to understand how consumers assess offerings convoluted by bullshit claims. In order to achieve this research goal, the following leading research question and its sub-aspects need to be answered and discussed:

> **RQ:** *How do sustainably awareness and IT knowledge affect young adults' ability to spot bullshit claims made about the carbon footprint caused by online service usage?*

Since there is no sufficiently extensive body of research available yet on this particular topic, this work needs to build a foundation and "generate [...] initial ideas" (Bhattacherjee, 2012, p. 5), as is the case with exploratory research. The basis for answering the research question consists of qualitative data provided by interviews conducted with people from two specific groups. The groups consist of German university students, where one part of the interviewees has a background in computer science or information systems, representing individuals with IT knowledge, whereas the other part comes from the field of biology. Biology students have been chosen as the 'opposite' group because they are usually expected to have more knowledge about environmental awareness and sustainability than the average student (Arshad et al., 2020; Robinson & Crowther, 2001). In the context of the interviews, IT knowledge refers specifically to the basic understanding of the infrastructure needed to provide and use an online service. In order to limit the scope, this thesis only explores sustainability awareness in relation to so-called *digital* or *online services* for consumers. Services that fall under this umbrella term offer one or more of the following features: music and video streaming, messaging, social media, video conferencing, search engines, cloud storage and online games. The important point is that, for those services to function, most of the computation needs to be done by the service provider and not by the consumer locally. This is unavoidable, especially when content is provided to the consumer. Since services targeted at consumers are of the main interest for this thesis, IT services within a business context or hardware in general will not be considered. To include the business context, it would require interviewing people who use such services at work and add another set of questions, which would not necessarily help answering the specific research question but could be part of future research. Personal hardware does not have the problem that its operation is not controlled by the consumer. With hardware, production and recycling play a greater role, but the examination of this problem is also not within the scope of the research question. Still, its energy consumption should be kept in mind, because those devices are needed to access the online services in question.

2. Conceptual Foundation

2.1. Green IT and Green IS

When discussing the contributions and negative effects of ICT on the environment, one always stumbles across the terms *Sustainable* or *Green IT* and *IS*. Which can be either understood as the research field of sustainability in ICT, or its outcome of practices developed to minimize the environmental impact of ICT. However, sustainability can be achieved in many ways and is not only limited to ICT. Therefore, it is necessary to specify how the term sustainability is defined. In research, the concept of sustainability is frequently divided into three distinct main areas or 'pillars': *social, economic* and *environmental sustainability* (Purvis et al., 2019). Social sustainability is mainly concerned with human well-being and equality, whereas the focus of environmental sustainability is on the conservation and protection of the ecosystem (Garren & Brinkmann, 2018, p. 4). The goal of economic sustainability is to facilitate economic growth and development in accordance to the other pillars (Purvis et al., 2019, pp. 686–689). Despite the focus on different problem areas, all pillars share the core idea of sustainability, which dates back to the 17th and 18th centuries (Purvis et al., 2019, p. 682; Warde, 2011). Most notably the term was coined by the forestry pioneer Carlowitz from around that time (Warde, 2011). He described

the approach of cutting and planting enough wood to allow it to grow back in time as sustainable (Warde, 2011, p. 162). In theory sustainability then means: not taking more than is feasible, reaching a state in a system where consumption, regeneration and disposal are at an equilibrium (Ben-Eli, 2018, p. 1339).

The word 'green' in Green IT/IS aims at environmentally friendly technologies and practices, so it is primarily in line with the idea of environmental sustainability (Loeser, 2013, p. 5). Overall 'green' has been the more popular prefix than 'sustainable' in the past, but generelly they refer to the same idea. Therefore the Green IT/IS terminology will be adapted for this thesis (Loeser, 2013, p. 3). In its infancy Green IT/IS was not a precisely defined concept (Molla et al., 2009), but with a steadily growing body of research many endeavors have been undertaken to determine the important parts of the concept. As a means to summarize all this knowledge, Loeser (2013) has made it his task to combine all the important core aspects of the works published to date into one definition.

One of the main findings of this concretization is that the two terms Green IS and Green IT usually describe different partial aspects and must therefore be defined separately (Loeser, 2013). As a comprehensive concept, IS describes "the technology components and human activities related to the management and employment process of technology within the organization" (Chen et al., 2010, p. 237), whereas IT is understood as the technological fundament for IS which provides the necessary hard- and software artifacts (Ijab et al., 2010, p. 434). Following the example of the distinction between IT and IS, Green IT can be seen as a subfield of the more holistic concept of Green IS. The "cross-functional characteristics of Green IS" (p. 6) are especially emphasized by Loeser (2013), as it combines issues of technology and organization. The differences of Green IT/IS are also expressed in their range of effects, especially in terms of management. While Green IT practices are rather utilized at the operational and tactical level of IT departments, Green IS deals with far-reaching and long-term decisions at the strategic level that influence the direction of the business and the organization as such (Ijab et al., 2010, p. 441; Loeser, 2013, p. 6).

On a high level Green IT is a label for technologies and processes that have a reduced negative environmental impact compared to traditional ones, in short: they are environmentally friendly (Loeser, 2013, p. 5). This understanding can be manifested in three stages according to Loeser (2013, p. 5): First, environmental criteria should be taken into account when acquiring new IT equipment and services. Second, the operation of IT infrastructure in data centers and offices should be energy efficient. And finally, IT equipment passing the end of its life cycle should be disposed correctly or recycled. These rather operational practices can be categorized as the *1st degree environmental impact of IS (Loeser, 2013, p. 6)*. With Green IS, sustainability and environmental friendliness can be achieved through business process reengineering and environmental management systems. This is referred to as the *2nd degree*. Furthermore, the *3rd degree* is concerned with the innovation of end-user products and services, as well as tracking their emissions and resource demands.

1st and 3rd are of specific interest for this thesis, as the former is a black box to the end-user, because it involves making already established online services 'greener' in their operation. While the latter is directed toward the end-user by offering innovative services, claiming to contribute in an environmentally sustainable way. To reduce the 1st degree impact, big players of their respective service niche, like Google, Facebook, Netflix and Spotify, either source their energy from renewables, invest directly in renewable energy power plants, fund sustainability projects or offset emissions with RECs or carbon offsets (Facebook, 2020; Google, 2021a; Netflix, 2021; Spotify, 2021). Products and services reducing the 3rd degree impact for end consumers are for instance any smart home devices that promote to reduce energy consumption (Koo et al., 2015, p. 68; Loeser, 2013, p. 8). Furthermore, services can be enhanced with functions that should foster sustainable decisions, e.g. Google listing the carbon footprint next to the search results when searching for a flight (Google, 2021b). Another example can be services that completely market themselves as directly contributing to environmental sustainability, like the search engine Ecosia, which advertises to plant a tree for every search query on their site (Ecosia, 2022).

2.2. Awareness of Green IT and Green IS

The whole concept of Green IT/IS, with its strategic, tactical, and operational orientation, as well as its three degrees of impact feels very grand. But looking past the challenges regarding its implementation in organizations, it also has its influence on the level of an individual. To get an idea about research on the individual's awareness of Green IT/IS a brief literature review has been conducted. It has been noted by Dalvi-Esfahani et al. (2020, p. 2) that most of the earlier research was specific to an organizational context. Since the focus of this work is on the individual in the role of the end-user, papers with an organizational context were not specifically studied.

Kurkoon et al. (2018) conducted a survey among Thai people familiar with technology products regarding their intention to purchase Green IT products. Those products had aspects about "energy efficiency, reduced greenhouse gas emission, recycling and other eco-beneficial characteristics" (Kurkoon et al., 2018, p. 1). After evaluating 618 responses, they concluded that environmental concern is present, but knowledge about Green IT products is poor. However, they had no clear differentiation between a Green IT product and a service, despite using both terms. Hernandez (2019) investigated objective and perceived knowledge of Green IT among 288 Philippine computing students using a questionnaire. He assessed them to have average Green IT knowledge (e.g., reusing old devices, using power management, reduce paper and travelling by using digital alternatives, etc.) but are not very well informed about the

implication of resource use and energy efficiency of compute device in their development and production. Knowledge regarding online services was not part of the observation. Dalvi-Esfahani et al. (2020) looked at the individual Green IT practice of Malaysian students, who already had experience with Green IT. The result of analyzing 262 responses was that the intent to practice Green IT was found to be driven by attitude, perceived behavioral control, and personal norm. A link to online services was also not present in this study. Leung et al. (2018) surveyed students from multiple countries, regarding their Green IT knowledge and practice. In addition, unlike the studies mentioned above, question about music and video streaming services were also a part of the questionnaires. Analysis of the gathered data indicates that knowledge about sustainable ICT practices influences the individual confidence in the ability and controllability of a particular behavior, also referred to as personal behavior control, meaning an increase of Green IT information increases the perception that Green IT practice is not difficult and practicing Green IT is within reach.

Molla et al. (2014) and Nash and Wakefield (2021) investigated the Green IT beliefs and practices among Australian and mostly North American IT professionals respectively. The evaluation of 322 survey responses by Molla et al. (2014) showed that IT professional believe that IT can resolve environmental problems, but only commit to simple Green IT practices. After collecting results from 157 surveys, Nash and Wakefield (2021) further discovered that self-identity in a way motivates the intention to practice Green IT, to the extent that it is part of the identity.

Koo et al. (2015) focused their research on South Korean consumers perceived usefulness of smart green IT devices that are supposed to help reduce electricity consumption. After evaluating 100 questionnaire responses, they concluded that motivational values may influence perceived usefulness, in turn positively affecting consumers' green IT usage behavior. Nevertheless, the study only narrowly looked at people already using that specific device, leaving out other products and services. Kern et al. (2011) also directed their research at consumers by performing an experiment to check whether the energy consumption of software can be improved through user configuration. They found a measurable difference, but if consumers would translate this knowledge from theory into practice was left up to debate.

From the collected literature, it can be inferred that the main concern of most studies was the examination of the individuals' Green IT adoption behavior. The lesser of those studies focused on the context outside of organizations or people who have no connection to the field of IT, professionally or in studies. Moreover, the focus was rather on practicing Green IT as an individual in the direct sense, rather than practicing it through assessing the services by their environmental friendliness or 'hidden' sustainability concerns as said in the introduction. In that sense, the individual Green IT awareness was not discussed in the context of companies and their services that claim to be green. Interestingly, Kern et al. (2011, p. 208) assumed that users could contribute to a sustainable internet by gathering information about the energy consumption of accessed servers, but it is not specified how and where they get the information from.

2.3. Online Service

In scientific literature, the word 'online service' is used in many different contexts and varies slightly in the characteristics of its definition and what it actually describes. This chapter provides an overview of commonly used terms, their meaning, and finally a unified definition for use in this thesis. Terms that are often used together or synonymously are: web service, e-service, digital service, and of course online service.

The term 'web service' emerged from computer science, as a designation in software development for functions invokable over the Internet (Baida et al., 2004, p. 2). Most often, a web service can be a technical vehicle to provision an e-service (Baida et al., 2004, p. 2; Chaudhri, 2003, p. 70; Hull et al., 2003, p. 2). According to the Council of the European Union (2011, p. 5) an e-service or 'electronically supplied services' are "impossible to ensure in the absence of information technology" (p. 5) and "involve[s] minimal human intervention" (p. 5), which is due to the fact that they are only accessible via the Internet or other networks and usually have a high degree of automation. Kvasnicova et al. (2016, p. 193) further define aspects such as the non-physical nature of an e-service, the need for a provider, a recipient as well as information and communication devices. They also specify that the outcome of its use "can be a benefit, service or acquisition of property" (Kvasnicova et al., 2016, p. 193). The Definition of a digital service by Pakkala and Spohrer (2019, p. 1886) shares the feature of fully relying on a technical system similar to the previous ones. But they differentiate how a specific result for a recipient is created. Namely through "digital Information, Computing, Communication and Automation Technology (ICCAT) based system[s]" (Pakkala & Spohrer, 2019, p. 1886). However, they gave no specification on how digital service are typically accessed. Online service, as a designation, has not received a definition as the previous terms have (Meszaros & Buchalcevova, 2017, p. 301). It is probably due to the reason that it is usually used synonymously or as an umbrella term for the aforementioned terms (Baida et al., 2004; Kvasnicova et al., 2016). It is mostly used to group social media, communication (messaging and video conferencing), music and video streaming, search engines, online gaming, cloud storage, etc. (Cook et al., 2017, p. 18; Kutani et al., 2021, p. 10; Obringer et al., 2021, p. 1; Schmidt, 2011, p. 30).

To boil it all down in the most basic sense: an online service is a service served over the Internet. For the purposes of this thesis, however, a final distinction must be made. Following the definition of Kvasnicova et al. (2016), online-shops and online-marketplaces, like Amazon or eBay, are exempt from the idea of an online service, since they sell physical good, still requiring help of human workers. However, services providing digital goods to consumers, like iTunes (music) or Steam (games) do fall under the definition.

Following the review of the available definitions, an online service is defined as a service offered over the internet by a provider to a user, yielding a non-physical result, generated by a system based on "digital information, computing, communication and automation technology (ICCAT)" (Pakkala & Spohrer, 2019, p. 1886).

2.4. Measuring the Impact of ICT

After defining what constitutes an online service, the next step is to look at how this affects the world in practice, in terms of environmental sustainability. Since this thesis looks at online services from a consumer perspective of daily use, the development process and acquisition of resources for an online service are not explicitly considered. As explained in the previous chapter, providers use ICT systems to make the service available to users, so there is no doubt that at least one server and one client device are needed, which of course consume electricity. Yet, this does not exactly represent the journey that a request to an online service goes through when sent by a user. In order to calculate the energy consumption and estimate the resulting carbon footprint, the majority of researchers categorize the energy consuming components into three groups: data centers, data transmission and end-user devices (Ericsson, 2020, p. 7; Hintemann and Hinterholzer, 2020, p. 3; Kamiya, 2020; The Shift Project, 2019). The most prominent example used in recent times for calculating the energy usage of an online service has been video streaming, not only because of its popularity among consumers, but also because it is said to be a considerable contributor to global energy consumption (Marks et al., 2020, p. 2; Widdicks et al., 2019, pp. 1–2). Plenty of methods exist to quantify the energy use, not only because other scopes are set, but also because factors change over time (Coroamă, 2021, pp. 14–16; Marks et al., 2020, p. 3). For this very reason, a number of sources were compared to determine a plausible range of values for the energy impact of video streaming to use as a base for the interviews (see Chapter 3.3).

The calculations for the kW/h for one hour of streaming in Table 1 are based on the methods developed in each respective paper. The energy consumption for one hour of video streaming has been set into comparison with the time an LED bulb could be powered using the same amount of energy, i.e., the same number of kW/h. To get the time in minutes, the kW/h of the bulb is divided by the kW/h of the stream and then multiplied by 60. The LED light bulb was chosen as the tool of comparison because its energy consumption is easier to grasp and no knowledge of the interpretation of the unit kW/h is required. Therefore, more minutes for the bulb mean that the online service is less resource intensive. Values range from less than a minute to about half an hour. They vary considerably, not only because different end devices were taken into account for the calculation, but also between one and the same type of device due to different assumptions about their consumption. The variance of energy consumption is easily explained as bigger screens use up more energy, Ericsson (2020, p. 11) even goes as far as to say that the end-user device is the only variable having the biggest impact, labeling data transmission and data centers as constant. Kamiya (2020) however points out that the device itself is not the only factor, as the video resolution and the type of network connection (wired, wireless, mobile) also have an effect. This results in an opposite idea of the distribution of energy consumption, Hintemann and Hinterholzer (2020, p. 4) think that the data center and network infrastructure have the bigger influence, because their energy consumption scales with the resolution of the requested video stream, as it requires more computing resources.

On a higher level, the calculation is additionally influenced by three essential principles: Moore's Law, Koomey's Law and Jevons' Paradox. Moore's Law describes the doubling of the number of transistors on a microchip in about every two years (Moore, 1965, 1975). This effective doubling of processing power per chip, or improvement in efficiency, is by some stated as a potential driver of the decrease of energy consumption by compute devices (Coroamă, 2021, p. 12; Hintemann and Hinterholzer, 2019, p. 4; Lange et al., 2020, p. 5). Others argue that this only holds true if the number of compute units stays the same and no additional servers are deployed to serve the demand (Schiettekatte, 2021, pp. 24–25). In addition, too short a replacement cycle of more efficient hardware can also have a negative impact on the environment, because the old hardware needs to be disposed of (Ericsson, 2020, p. 6). Koomey's Law builds upon the implications of Moore's Law and describes that the energy consumption of a compute unit is halved roughly every one and a half years (Koomey et al., 2011). This is brought up by several researchers as an indicator for a declining trend in energy consumption (Kamiya, 2020; Lange et al., 2020, p. 4; Maxime and Jean-Noël, 2020, p. 25).

However, some researchers point out a rebound effect that mitigates the effect of Moore's and Koomey's Law (Cook et al., 2017, p. 18; Lange et al., 2020, p. 5; Marks et al., 2020, p. 2; Santarius et al., 2020). It is also known as Jevons' Paradox, which states that technological progress that enables more efficient use of a commodity ultimately leads to an increase in the use of that commodity, rather than a decrease (Jevons, 1866). A consumer centric example of that is the market for TVs. Display technology has become more energy efficient over time, but the screen size increased as well, meaning that consumers are inclined to buy bigger TVs, making energy savings negligible (Ericsson, 2020, p. 12). Similarly, an increase in resolution, with the move from HD to 4K, can make past savings obsolete (Hintemann & Hinterholzer, 2020). Thinking further, the 'smartification' of appliances, from the already established smart TV to the smart fridge, introduces more internet connected devices to the 'traditional' roaster of personal compute devices, like computers, smartphones and tablets (Ericsson, 2020, p. 8). Those may not be influential on the global electricity use now, but might be in the future (Andrae & Edler, 2015, p. 119).

Having looked at the concerns regarding the pure energy consumption of an online service, the actual carbon footprint resulting from said consumption is up next. Ericsson (2020) developed a term for it, the *digital carbon footprint*. With

Table 1: Streaming Comparison

Author	Author background	Device and video quality	kW/h for 1h of streaming	Minutes equiv. to hour of LED Bulb
Ericsson (2020, p. 11)	Swedish ICT Provider	Smartphone HD	0,0180	18,33
		Laptop HD	0,0450	7,33
Hintemann and Hinterholzer (2020, pp. 5–6)	Borderstep Institute for Innovation and Sustainability	Smartphone HD	0,2200	1,50
		65" TV HD	0,3200	1,03
Kamiya (2020)	International Energy Agency (IEA)	50" TV 4K	0,1521	2,17
		Laptop HD	0,0462	7,14
		Smartphone Auto	0,0102	32,35
The Shift Project Materials (2019)	French Thinktank	Smartphone HD	0,6786	0,49
		Laptop HD	0,6912	0,48

Note. Minutes of video streaming equivalent to lighting a LED Bulb with 5.5W for an hour.

that said, their presentation of the term is oddly similar to how the oil company BP (British Petroleum) popularized the *individual carbon footprint* in the first place (Kaufman, 2020). This is mainly the case because mentions of the digital carbon footprint in the original white paper by Ericsson (2020) predominantly come up with 'your', as in 'the consumer', in front of it. As it appears, BP's marketing campaign was intended to deflect responsibility from themselves and their oil business and place it on the shoulders of consumers (Kaufman, 2020). The digital carbon footprint feels like it tries to hold consumers accountable for their online service consumption in the same way. This must be looked at critically, because, as stated previously, researchers are not on the same page on whether end-user devices have the biggest contribution to the whole energy consumption.

Nonetheless, discussing the concept of the digital carbon footprint has its relevance, namely in the way the actual energy consumption is converted into grams of emitted CO_2. Many researchers use the average global *energy/electricity mix* to model the carbon emissions of an online service. Sources for that can either be the International Energy Association (IEA) or national government institutions. The energy mix describes the blend of produced energy (e.g. energy from fossil fuels, nuclear, solar, wind, etc.), each having a different level of CO_2 emissions within a given electrical grid. Because of that, researchers emphasize that the actual carbon footprint is highly reliant on the source of the electrical energy and whether it is renewable or not (Cook and Jardim, 2019, p. 8; Maxime and Jean-Noël, 2020, p. 23; Obringer et al., 2021, p. 2). When an energy mix is claimed to be 'green', it also needs to be considered what the label means in that context, because some might count nuclear energy or natural gas as environmentally friendly while others might not (Cook et al., 2017, p. 38).

So for consumers to "use ICT services that help to reduce carbon emissions" (Ericsson, 2020, p. 15), they need to be aware and get reliable information about factors like screen size, resolution, energy mix, and the meaning of 'green' labels, to make an informed decision.

2.5. Bullshitting and Greenwashing

Both bullshitting and greenwashing seem to be words that are somewhat similar in their usage and meaning. One would intuitively use them to point out disbelieve in a statement or fact. With that said, 'calling out the bullshit' is a colloquial term used to criticize an opposing opinion in politics, journalism, and social media, that, through its frequent use, lost its rude and vulgar connotation in today's society (Christensen et al., 2019, p. 1588). The omnipresence of information, the constant bombardment of marketing, and the emergence of fake news could lead one to suggest that "[...] we live in an age of bullshit" (Stevenson, 2021, p. 86). By contrast, calling something greenwashing specifically refers to doubtful marketing strategies and dishonest advertisement campaigns in the context of environmental sustainability and environmental friendliness (Idowu et al., 2013, p. 1321). But greenwashing also appears in annual reports, sustainability reports, and on websites of corporations (Lyon & Maxwell, 2011, p. 9).

2.5.1. Greenwashing

The environmental activist Jay Westerveld first used the term when he tried to find a name for an issue he noticed while he stayed at a hotel (Orange & Cohen, 2010, p. 30). There were signs in every bathroom advising guests to reuse towels as a means to help save water. But when Westerveld investigated he was baffled, that the well-intentioned conservation of water, was a cost-saving measure to benefit the

business. A popular definition based on Westervelt's observation describes greenwashing as "the act of misleading consumers regarding the environmental practices of a company or the environmental benefits of a product or service" (TerraChoice, 2009, p. 1). Lyon and Maxwell (2011) put further emphasis on withholding information by defining it as "the selective disclosure of positive information about a company's environmental or social performance" (p. 9) resulting in an overly positive image of the company. Some companies are even willing to invest more money in the promotion of green practices than actual sustainability projects (Idowu et al., 2013, p. 1318).

Since a commitment to sustainability may require major changes to a company's business model, organization, or investments, greenwashing can be motivated by a company's fear of change while still meeting stakeholder expectations (Sands & Morison, 2020, p. 3). But concealing unsustainable or even dangerous practices comes with a tradeoff (Sands & Morison, 2020, p. 1). Companies can receive major backlash from the public or especially environmental activists (Jong et al., 2020, p. 68; Lyon and Maxwell, 2011, p. 4). Correspondingly, the act of accusation plays a major role in the exist-ence of greenwashing, otherwise, instances of greenwashing would be undetected (Seele & Gatti, 2017, p. 248). This introduces the risk that actions could be falsely ac-cused of being greenwashing, since full transparency cannot always be provided and unrealistic expectations can be made (Seele & Gatti, 2017, pp. 244–245). Nonetheless, information published by companies must always be critically reflected, for example, reports that are self-published are not trustworthy because they are not reviewed by independent third parties (Jones, 2019; Sands & Morison, 2020).

2.5.2. Bullshitting

When bullshit has been spotted, it is inherently seen as something bad (Luks, 2017, p. 86). Therefore, some say that uttering bullshit should always be avoided (Frankfurt, 2006; Spicer, 2018). In spite of the general 'avoiding' attitude toward bullshit, Luks (2017) points out that "without bullshit, there may be no discourse at all" (p. 90). In his view, the act of bullshitting can be utilized as a tool that contributes to discourse. Moreover, it can be used as a lubricant for stagnant discussions (Luks, 2017, p. 89).

Before discussing the concept of bullshitting in detail, it is important to know the four termini used to describe the bullshit process and its participants. First of we have the entity of the (1) *bullshitter*, they are the source for instances of bullshit (Frankfurt, 2005). Thus, (2) *bullshitting* is the name for the act of producing bullshit and (3) *bullshit* is correspondingly the product of bullshitting. During research on the reception of bullshit, the (4) *bullshitee* emerged as a later addition to the bullshit terminology (Čavojová et al., 2020; Pennycook et al., 2015). The bullshitee sits at the receiving end of the bullshitting act and is in a sense targeted by the bullshitter.

On a high level, bullshitting can be described as a communication practice with "the lack of connection to a concern with truth" (Frankfurt, 2005, pp. 33–34). However, a more in-depth look reveals, that there are two lines of research concerned with the concept of bullshitting, both having their origin in philosophy. Frankfurt (2005, p. 34) emphasized the utmost importance of the respect for truth in his definition of the concept of bullshitting. The fact that a bullshitter does not care for truth is more important than the fact that they do not speak the truth in the first place. In fact, in some situations, a bullshitter may be telling the truth because he may unwittingly report true information, not caring to verify its truthfulness (Frankfurt, 2005, p. 50). This is also what differentiates the bullshitter from a liar. In order to construct a lie, a liar needs to be well aware of the truth (Frankfurt, 2005, p. 51). They must be familiar with the true state of affairs to create an opposite set of facts, which in the best case do not contradict and compromise their position. Despite this important difference, the liar and the bullshitter have similar goals. They want to appear believable, represent their agenda credibly, or emerge as a winner from a dicey situation (Petrocelli, 2018, p. 250). Unfortunately, this makes it difficult to tell a liar and a bullshitter apart, given that one notices to be deceived at all. Frankfurt further specifies the motivation of the bullshitter: it is not about successful deception at the level of the communicated content, but about improving the bullshitter's self-presentation and the effectiveness of the manipulation (Frankfurt, 2006, p. 3).

That being said, the fact that the goal of bullshitting is to deceive others does not always have to be true (Carson, 2016). As the bullshitter is the center of Frankfurt's concept of bullshitting, he assumed that the bullshitter is always the communicator of bullshit. Cohen (2002) argues that bullshit can emerge without the intent of the bullshitter. People can unintentionally spread bullshit when they do not pay attention while sharing facts from third parties. Cohen (2002, p. 8) would describe these people as "mere victims" of bullshit, innocent and with no ill intent. In contrast to Frankfurt, Cohen (2002) tries to explain bullshit only as the product and not from the view of the bullshitters mindset. As a consequence, his definition does not refer to the motivation of the bullshitter. For Cohen (2002), bullshit in itself is characterized by vagueness and ambiguousness, its truthfulness is inherently difficult to determine. This is what he calls 'the unclarifiable unclarity', the essence of bullshit. This is different from Frankfurt's essence, which can be described as 'the indifference with truth'. Unclarity can be achieved by changing the structure of a sentence to a point where a clear meaning cannot be made out or by embedding it in a context where defining factors for its truthfulness are not present (Cohen, 2002, p. 6).

Given that there are two prevalent definitions of bullshitting, the question remains whether they are competing or even in some ways contradictory. When taking another look at the papers dealing with bullshit, it is apparent that the majority of researchers recognize both definitions and use them in combination (Christensen et al., 2019; Petrocelli, 2018; Spicer, 2018; Stevenson, 2021). To Cohen (2002, p. 1), Frankfurt's definition is seen "as bullshit of a different kind", with emphasis, that 'Frankfurt-bullshitters' can pro-

duce 'Cohen-bullshit' (Cohen, 2002, p. 8). It can be concluded that the concept of bullshitting and the concept of bullshit are complementary approaches, with Cohen's definition being the definition of bullshit and Frankfurt's definition being that of bullshitting.

2.5.3. Similar Characteristics of Bullshitting and Greenwashing

Having explained the defining characteristics of greenwashing and bullshitting in detail, the common features of both concepts will now be highlighted. Greenwashing can be categorized as a lie because it involves sharing „false[...] information" (Idowu et al., 2013, p. 1321), but lying is not seen as one of the core aspects of greenwashing (Jong et al., 2020, p. 40). Describing it as disinformation does not encompass the whole nature of greenwashing, it is more precise to say that it only takes the positive information away from the overall context to mislead the consumer, who lacks background knowledge (Lyon & Maxwell, 2011, p. 8). With that said, greenwashing as a practice is separate from lying, just as bullshitting is different from lying as stated by Frankfurt (2005, p. 46).

Sharing "deceptive information" (Idowu et al., 2013, p. 1318), "misleading consumers" (TerraChoice, 2009, p. 1), and "misleading [...] individuals who lack background information" (Lyon & Maxwell, 2011, p. 8) is regularly associated with greenwashing. Creating vague and non-transparent statements (Cook et al., 2017; Lyon & Montgomery, 2015; TerraChoice, 2009) and selectively disclosing information (Lyon & Maxwell, 2011, p. 5) are practices that coincide with Cohen's (2002, p. 6) essence of bullshit.

Lastly, greenwashing and bullshitting share a similar aspect in their motivation. Both try to hide unfavorable aspects, be it ignorance for bullshit or damaging the environment for greenwashing, to deceive their target audience into believing their manufactured self-presentation. With greenwashing, this is done by painting an "overly positive image" (Lyon & Maxwell, 2011, p. 9) about "an organization's environmental strategies, goals, motivations, and actions" (Idowu et al., 2013, p. 1318). While the bullshitter does it in any case, they want to come out on top without being held back by the lack of information. In summary, the concepts of bullshit and greenwashing can be used as a tool to critically analyze corporate claims and evaluate genuine commitment to sustainability.

3. Research Method

The following chapter explains and reasons the choice of data collection method used for this thesis. This is followed by an explanation of the selection of interview partners, the structure and composition of the interview guide and the methodology of transcription. Finally, to ensure "qualitative rigor" (p. 1) the choice of the analysis method is discussed, and it is outlined how the method is applied to the interview material (Gioia et al., 2013, p. 23).

3.1. Data Generation: Semi Structured Interviews

Given the existing research gap and the consequent small body of research, as well as the rather quantitative orientation of the thematically related papers, an explorative study is required. When problems or phenomena have not yet been examined, exploratory research is often the choice to enter the field, seeking to grasp the scope of that phenomenon or problem and to develop initial ideas and perhaps initial explanations about it (Bhattacherjee, 2012, p. 5). For qualitative research in general, interviews are a popular method to get access to "opinions, attitudes, experiences, processes, behaviors, or predictions" (Rowley, 2012, p. 261) from people in the role of a "citizen, user, consumer or employee" (Rowley, 2012, p. 260). As a specific type of interview, semi-structured interviews are often an appropriate means of data collection for the purpose of exploratory research (Alsaawi, 2014, p. 151; Gioia et al., 2013, p. 19). Being in-between a strictly predefined structured interview and an unstructured interview, sometimes only containing key topics instead of formulated questions, semi-structured interviews allow to ask follow up questions, change the order, skip parts, or ask new questions, to shape the interview around the interviewees' contributions to get the most out of them (Oates, 2006, p. 188). Interviews create a situation for people where they are able to "speak their minds" (Oates, 2006, p. 188) in a very nuanced way, which cannot be captured by a questionnaire with checkboxes or perhaps text input fields. There is no filter toward the researcher, as when a respondent cannot decide between answer choices and takes which fits best or has difficulty composing his answer in written text. An interview should be like a conversation, perhaps not as free-flowing as an informal one between friends, but it should give the interviewee room to elaborate their answers (Oates, 2006, p. 186). However, questionnaires have a significant advantage over interviews, it is much easier to gather a large number of participants, and therefore the data can be more reliably generalized (Rowley, 2012, p. 261). Nevertheless, generalization is not at the forefront of exploratory research when it first seeks to lay the groundwork. Last but not least, the opportunity to collect quantitative data should not be wasted when the decision to gather qualitative data has already been made (Bhattacherjee, 2012, p. 41). To take advantage of this opportunity, interview questions are posed in the form of *Likert* scaled questions. This allows to further contextualize the interviewees' answers with open-ended questions as well as responses by other interviewees (Frels & Onwuegbuzie, 2013, p. 188).

3.2. Selection of Interview Partners

As stated in the research question, the target group for the interviews is young adults. This group has been chosen because the proportion of internet users among young people is much higher than in all other age groups (ITU, 2021, p. 5). Thus, people in this group are more likely to engage with online services. For pragmatic reasons, as this is a bachelor's thesis, the group of possible interview partners is further

restricted to students. In order to answer the research question of whether the presence of sustainability awareness or IT knowledge changes the evaluation of sustainability of online services, the target group is divided into two sub-groups. In each case students with an IT background or students with a biology background. On one hand, this is following the assumption that students with an IT background can assess the sustainability of an online service by understanding the inner workings with the knowledge they acquire about IT infrastructure during their studies. On the other hand, it is generally assumed that biology students have a greater environmental awareness and a stronger sense of sustainability than the average student (Arshad et al., 2020; Robinson & Crowther, 2001).

The first approach to recruit participants for the interviews was to post announcements to social media and student forums, unfortunately no feedback at all came back from those attempts. In the same course the student representatives for each information systems and biology at the University Duisburg-Essen have been contacted to forward the announcement, both to no avail. Ultimately a mixture of snowball and convenience sampling was conducted by contacting fellow students that know other students that are interested in an interview (Oates, 2006, p. 98) This resulted in ten interested participants, eight of whom made an appointment.

The age of the interview partners ranges from 21 to 32 years. The IT group consists of students from computer science, information systems as well as teaching degree students in computer science and mathematics. The biology group has biology and applied life science students. All are between the 6th and 10th semesters, both in the bachelor's and master's degree programmes. Three quarters of the IT group are male (one quarter female), while three quarters of the biology group are female (one quarter male). The working title of the thesis was communicated to the interviewees during the initial contact.

3.3. Guideline and Conduct of Interviews

The interview guideline is designed in respect to answering the research question and is split up into five sections. The first section is used to gather demographic data, the second section includes questions regarding usage of online services, the third section has questions regarding sustainability. The main part includes the fourth section concerned with the perception of the energy usage of online services and lastly the fifth section presents a case of 'green' online services, with Google as an example. The original questionnaire in German can be found in appendix A.

In addition to collecting demographic data, the introductory questions also served to get the respondent in the mood for the following interview. The questions about the field of study and semester are intended to establish the academic background of the person, which sets an expectation to their knowledge. The living situation and workplace questions are supposed to give an indication of their financial dependence.

The online services section is intended to outline the interviewees' personal experience with online services and also ask about technical knowledge about them. The former is achieved by *Likert* scaled questions supported by ad hoc questions to deepen the insight, whereas the latter is an open-ended question. The *Likert Scale* is a method to rate or measure someone's attitude toward a defined topic (Likert, 1932) This is usually done by providing a scale of four or more points to let the respondent choose how strongly they agree or disagree with a particular statement (Croasmun & Ostrom, 2011, p. 19). Those kinds of rating scales are very popular among social scientists and are a regular part of most surveys (Allen and Seaman, 2007, p. 64; Croasmun and Ostrom, 2011, p. 19). The scales in the questionnaire are taken from Moosbrugger and Kelava (2020, p. 108). The decision fell on even scales to prevent the interviewees from assigning themselves to a neutral position, in order to rule out a *tendency toward the middle* if they have no strong opinions (Moosbrugger & Kelava, 2020, p. 109). The questions and scales are validated by presenting the interviewees with a version of the definition of online services from Chapter 2.3.

The aim of the third section is to identify the personal understanding of ecological sustainability and to follow up on how each interviewee acts sustainably. The connection to online services is drawn by directly asking the interviewees if they ever thought about sustainability in the context of online services. Similar to section two, the validity is given by supplementing their idea of sustainability with the definition from Chapter 2.1.

For the main part of the interview, the interviewees are introduced with an estimation question based on the calculations in Chapter 2.4. The question is intended to provide an overview of the extent to which the interviewees perceive the impact of streaming online video on the environment. However, the question about the reasons interviewees should give for their estimation is more important than the estimation question is, as it serves more as a vehicle. The question is intended to repeatedly check whether the respondents have ever thought about the sustainability of online services, but in contrast to the second section, not directly, but indirectly. It is also meant to give assess their IT knowledge.

Finalizing the main part and the overall interview is the section concerned with the interviewees' perception of bullshitting by companies using Google as an example. First off, respondents are asked about their knowledge of or experience with Google's actions toward a more environmentally sustainable business. After that, they are shown a commitment from one of Google's environmental reports. "Offer 1 billion people new ways to live more sustainably by 2022 via our core products." (Google, 2020). The commitment's focus is to enable customers to make decisions beneficial to the environment with the help of Google's services. The example given to the interviewees, to better understand the practical execution of the commitment, is listing the carbon footprint of a commercial flight next to the search results as mentioned in Chapter 2.4. The interviewees are then asked to give their opinion. Afterward, a statement from an interview from the Hessische Rundfunk with a press spokesperson of the German branch of Google is quoted to the interviewees. It states

that Google is not responsible for any carbon emissions that result from the transmission of their services over the global network to their customers (Rutsch, 2020, 16:48) (The original German quote can be found in the questionnaire in the appendix). The interviewees are then again asked to state their opinion. When conducting the interviews, an additional question was asked at the end that arose in the first interview and was not originally in the interview guide. The interviewees were asked whether they thought it would be useful for politicians to regulate sustainability claims.

The appointments for the interviews were assigned via Doodle and then conducted by video call via Zoom. The survey period extended from 03/31/2022 to 04/09/2022. The average duration of the interviews was 40 minutes. The interviewees were informed about the handling of their data in advance by mail and again before the interview. Consent for recording the conversation was given via a confirmation dialog within Zoom, otherwise, the recording would not start.

3.4. Transcription

In order to analyze the contents of the interviews, the audio files of the recordings have to be transformed into a written form by transcribing them. Transcription is a time-consuming but crucial step, as a good transcription builds the basis for conducting a thorough and transparent data analysis (Kuckartz, 2018, pp. 164–165). Transcribing one hour of recording can take up to five hours (Oates, 2006, p. 193). Luckily AI transcription tools, as provided by Word, exist, which take up the bulk of the work. Nonetheless, these tools are not 100% reliable and still require checking the transcript with the recording.

The recordings were transcribed verbatim according to the rules of the *einfaches Transkriptionssystem* [eng.: simple transcription system] developed by Dresing and Pehl (2015). Following their rules, sentence breaks, filler words, word repetitions, and stutterers are removed as far as possible. English terms are treated according to German spelling rules in upper and lower case. If necessary, statements are translated into standard German, when dialects or word slurring occur. However, grammatically incorrect sentence structures or other errors are left as such. Incomprehensible words are marked by 'unv.'. For better readability, the individual contributions are separated from each other by line breaks. Every beginning of a contribution is marked by the time stamp and the speaker. Indirect speech by the interviewee or statements in the third person are written in quotation marks or marked by a colon before the passage. Short voice dips or pitches that can be interpreted in a similar way are written as sentence endings and are therefore separated with a period instead of a comma. This serves to optimize the readability of the transcript. Statements made by the interviewee are designated by their group name (BIO or IT) and their assigned number (1 to 4). The interviewer is indicated by the initials of the author of the paper. However, some modifications have been made to the system of Dresing and Pehl (2015). Long breaks are not explicitly displayed, and short interjections are written in brackets with their respective speaker, to save space. The transcripts can be found in appendix B.

3.5. Evaluation According to Qualitative Content Analysis (Kuckartz)

Qualitative content analysis is an evaluation method that allows for systematically processing large amounts of texts (Mayring & Fenzl, 2019, p. 633). It is regularly used to analyze transcripts of interviews, where latent information is predominant. These subtle details can be found with qualitative content analysis through its primarily qualitative-interpretative approach. The procedure is strictly rule-based and thus intersubjectively verifiable, whereby the content-analytical rules are based on psychological and linguistic theory of everyday text comprehension (Mayring & Fenzl, 2019, p. 633). But as Schreier (2014, p. 2) points out, there is no 'one and only' qualitative content analysis.

After the consultation of recommended textbooks, the choice fell on the *inhaltlich strukturierende qualitative Inhaltsanalyse* [eng.: content structuring qualitative content analysis] by Kuckartz (2018). It was chosen because of its core approach of first identifying main codes deductively, and then refining them inductively into subcodes, which is ideal for guideline-oriented interviews (Kuckartz, 2018, pp. 97–98). The method has also been used in IS research, proving its usefulness in the domain (Diener & Špaček, 2021; Hacker & Bodendorf, 2017; Jost & Divitini, 2020; Wagner & Schramm-Klein, 2019) Finally, the method is supported by tools like MAXQDA, making the coding process and data management much easier.

The content structuring qualitative content analysis by Kuckartz (2018) is made up of seven phases guiding the process of the analysis. The first phase (1) is the initial reading of the text, which includes marking important passages and writing memos for salient statements. The first examination of the text prepares the basis for (2) the formation of the main codes. Usually, the main codes can be oriented by the thematic guideline of the interview. (3) Those main codes will be applied to the *unit of analysis*, which in this case is every transcript of each interview. This process of applying main codes and later subcodes is called coding (Kuckartz, 2018, pp. 35–36). When all of the material has been initially coded, (4) all text passages assigned to the same code need to be compiled together. (5) Then new subcodes are refined from those broad main codes. There can be many reasons to define a new code, but the deciding factor for refining or creating a code should ultimately always be the goal of answering the research question (Kuckartz, 2018, pp. 69–70). At this point of the process, it is also advised to start to write down the definition of each code in the *codebook* which can be found in appendix C. After the main codes have been differentiated into more specific topics, (6) a second coding of the material is carried out. It is not unusual to step back into phase five, if the is a need to define another subcode, this step of the process can be carried out many times until the material feels sufficiently coded to be analyzed (Kuckartz, 2018, pp. 110–111). It is also possible to merge codes that

were previously differentiated. The last phase (7) of the content structuring qualitative content analysis is the analysis. Kuckartz (2018) provides six different simple and complex analysis and visualization methods, but only the ones used here are discussed.

One of those would be the analysis of the correlations between codes (Kuckartz, 2018, p. 119). This can be achieved in two ways: within main codes and between main codes. Within a main code, the interrelationships that exist between subcodes are of particular interest. The main focus is on the simultaneous naming of subcodes. Here, special attention is paid to which codes are most often named together and which rarely or not at all, and, most importantly, how exactly the respondents' formulations differ within a given topic. The goal is to identify patterns or clusters of themes in the coded material. These relations can then be visualized with code relationship matrices.

Another method of analysis and visualization are crosstabs, which add a quantifying view to the qualitative data (Kuckartz, 2018, pp. 119–120). They are similar to code matrices but put more emphasis on the comparison of groups. They can be used to establish links between certain characteristics of groups, usually regarding sociodemographic data and the coded thematic statements. In the case of this thesis, the groupings are oriented by the field of study of the students. It is also possible to count and bundle the information so that a crosstab can also provide information on how frequently certain subcategories are mentioned by certain groups of respondents.

Finally, so-called summary tables can be created, in which all coded segments of a code are summarized to their core statement. All relationship matrices, crosstabs, and summary tables created in course of the analysis can be found in the results in Chapter 4.

4. Results

The evaluation of the interviews yielded three types of results: The response to items of the Likert scales, the numerical values of the estimation question, and lastly the crosstabs visualizing the coded segments according to the code system developed with the content structuring qualitative content analysis. Interesting and striking statements of interview partners are indicated by their respective ID and a timestamp referencing the transcripts in the appendix. The results will now be presented in the following chapters.

4.1. Results of Self Assessment Questions

At first glance, both groups seem quite similar in their response behavior. They are frequent users of online services and seem to be very supportive of sustainability. Many add that they use online services every day. Surprisingly, members of both groups were open to admit that they do not really pay attention to the sustainability of online services. Possible reasons for this which emerged from the interview material are presented in Chapter 4.3.

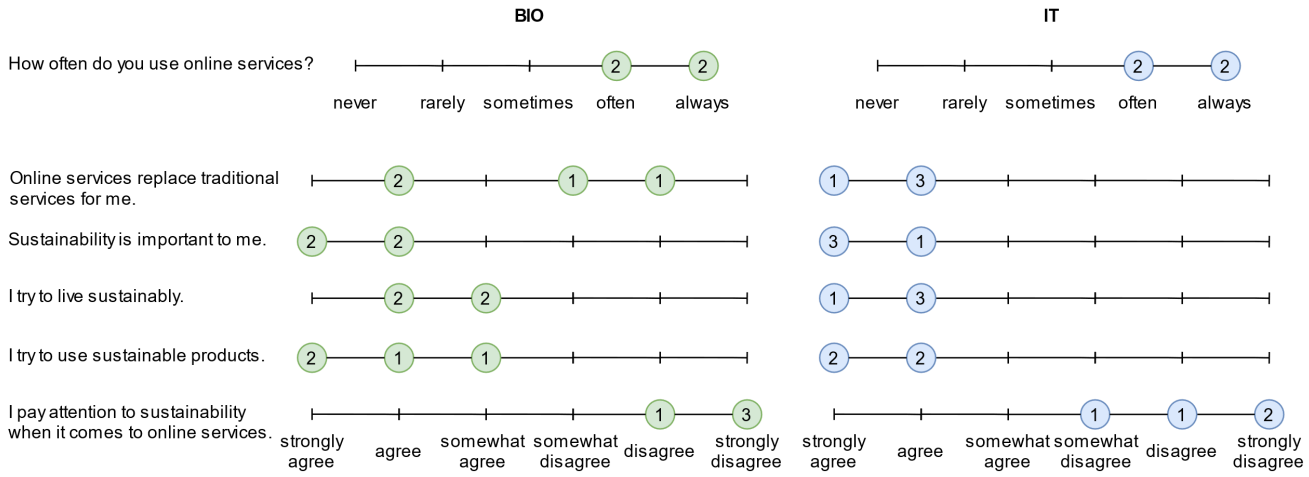
But upon taking a closer look at the results, it becomes clear that there are indeed differences in the response behavior. In the BIO group, the spread of answers to the second item is greater than in the IT group. While the members of the IT group generally agree that online services are replacing traditional services from their perspective (e.g., online banking replaces transfer slip), some BIO people disagree, although they have the same tendency to use online services regularly. It is stated that personal contact is very important and thus preferred for some types of services (BIO3, 06:59). It is also noted that some services cannot (yet) be easily implemented in a digital form (IT2, 05:36).

The members of the BIO group also seem to be more conservative in their self-assessment of being sustainable. Their item expressions do not lean as much toward 'strongly agree' as those of the IT group do. Whether the high self-evaluation of the members of the IT group compared to the rather self-critical evaluation of the BIO group is reasonable, can be judged based on their statements further looked at in Chapter 4.3.

4.2. Results of the Estimation Question

The results of the estimation question can be seen in Table 2. It should be noted that the respondents were explicitly told that they could make assumptions and express them. Most of the answers are close to the range of the realistic values previously researched (0,48 to 18,33 Minutes). BIO4, IT3, and IT4 had a very low estimate, even below the comparison range. In stark contrast, BIO3 initially estimated 80 hours but corrected its estimate to eight hours (480 minutes) because the interviewer could not suppress a surprised reaction as the estimate was far from the values researched for the interview. Nevertheless, the estimate of eight hours is still far from a reasonable estimate.

None of the BIO group members made any assumptions before giving a value. Most stated openly that they have no idea prior to guessing or when asked to elaborate (BIO1, 19:13; BIO2, 17:24; BIO3, 19:05; BIO4, 19:21). Others said that they are taking a wild guess (BIO1, 17:58) and even some are overloaded by the question (BIO3, 21:44). BIO4 guessed ten minutes at first but went down to five seconds (0,084 minutes) immediately after it was clarified that the comparison is to a LED bulb and not an incandescent light bulb. While not everyone made assumptions before giving a value, all explanations were valid in their own right. IT1 (19:48) stated that one-third (of the hour of the bulb) seems reasonable as an estimate but later added that the video resolution must influence the energy consumption (IT1, 20:26). IT3 (18:01) and IT4 (26:40) mentioned the resolution as a factor as well, while the former interviewee assumed 4K video specifically for his estimate. (IT2, 14:24) roughly outlined the IT infrastructure needed for an online service before giving his estimate. When asked to elaborate, IT3 (18:22) and IT4 (27:54) further mentioned load balancing, network bandwidth, and cooling as influencing factors for their estimation.



Note. Distribution of interviewees' responses to the question items divided by group. Numbers in dots represent frequency of the response.

Figure 1: Results of Self-Assessment Questions

Table 2: Estimated Energy Consumption of Streaming Online Videos

Interviewees	BIO1	BIO2	BIO3	BIO4	IT1	IT2	IT3	IT4
Time in min.	3 to 5	10	480	0,084	20	10	0,167	0,167 to 0,25

Comparing the two groups based on the estimated values only, they are relatively similar if the outliers are excluded. Taking a look beyond the numbers, the statements of the IT group suggest a better technological understanding. Yet, excluding the outlier, the BIO group does not guess considerably worse without the proper IT knowledge.

4.3. Results of Qualitative Content Analysis

After using the Likert scales and the assessment question to gain a rough impression of the respondents' sustainability awareness and IT knowledge, the following chapters will focus on the qualitative data that emerged from the content analysis based on the code system created. These chapters will follow the main codes of the code system, which in turn are oriented after the interview guideline.

4.3.1. IT-Knowledge

In order to assess the interviewees' IT knowledge, they were first asked to explain what an online service is to them. As shown in Table 3 on the righthand side, the majority of interviewees pointed out the most crucial aspect of online services: the need for an internet connection. Only BIO3 (01:25) opted to explain it with the help of an example instead of defining it in one sentence. Nonetheless, they named the key feature as well. In addition, all interviewees were able to give examples of online services that fall under the definition of the present work. When online shopping services such as Amazon were mentioned, it was pointed out by the interviewer that, strictly speaking, these do not fall under the understanding of online services as used in the course of the interview (BIO1, 02:57; BIO4, 02:11; IT4, 01:54). It was asked by IT1 (03:50) if Steam is also exempt from the definition but, since this service sells games as digital copies only, it also counts. All in all, however, there were no particularly unusual mentions.

Further investigation of the interviewees' IT knowledge reveals significant differences in the groups' responses. While everyone mentioned servers and end devices such as smartphones or computers in some form or another as a prerequisite for the provision and use, the members of the IT group usually went into more detail about the relationships of the components and also mentioned technical terms that are relevant in the context. Some examples can be seen on the left-hand side of the table. It has to be noted that some interviewees did not immediately start naming technical components (IT2, 08:52), as the question was not very precise in that regard, but when they were later asked to elaborate on their estimation regarding the energy consumption of video streaming, they were able to explain it precisely (IT2, 14:24).

Other prerequisites of interest were also collected as seen in the table. The interviewees with an IT background tended to mention other aspects related to the development of an online service, while the interviewees with a biology-background stated broader aspects like personnel or time, as in time available to spend using the service, as prerequisites.

Besides not naming a large number of technical components relevant to an online service, the members of the biology group tended to state openly that they are unsure (BIO4, 08:39) or simply do not have any idea (BIO2, 06:12). "Keine Ahnung" (BIO1, 09:25; BIO2, 17:24; BIO3, 10:21; BIO4, 19:21) [eng.: no idea] was a phrase used several times by interviewees with a biology background when talking about IT

Table 3: IT Knowledge Summary Table

Codes / Interviewees	IT Infrastructure	Other Prerequisites	No Knowledge	Online Service Definition
BIO1	Server, computer (as end-user device)	Time	Says to have no knowledge	Online offers, offers that have recently moved to the Internet
BIO2	Server	Personnel	Says to have no knowledge	Services that can be accessed via the Internet
BIO3	End-user device	Personnel, advertising (marketing), Time	Says to have no knowledge	Example: make an appointment online
BIO4	Server	Cooling	Says to have no knowledge	Make use of services online
IT1	Server, IT infrastructure (but does not name concrete components)	Customer service, Graphic Design	Explanation not as detailed	Service that can be accessed via the Internet
IT2	Backend server, transmission (network infrastructure), end-user device	Continuous deployment, connection to payment service (i.e., external APIs), user-friendliness		Services available via the Internet
IT3	End-user device, server capacity, load balancing, network infrastructure	User Story/user experience (requirements), platform for client application, encryption of communication, user interaction		Services provided online for different use cases
IT4	Server capacity, end-user device, internet node DE-CIX Frankfurt, private internet connection (network infrastructure)	Cooling		The main business (service) takes place via an online connection

Note. 'Other Prerequisites' refers to other prerequisites named other than those, which can be categorized as IT infrastructure.

knowledge, which in no way means that their lack of knowledge is seen negatively. They were not expected to name the same details as the IT group.

The coded segments show that the interviewees with an IT background have in fact better knowledge of IT, but as observed earlier in Chapter 4.2, the difference in knowledge among the interviewees does not indicate an obvious advantage or disadvantage in estimating the energy use on the example of video streaming.

4.3.2. Sustainability Awareness

Looking at Table 4, each interviewee was able to explain what sustainability means to them. Not all 'definitions' are exactly the same, but they all share common aspects, characterized as a practical understanding of ecological sustainability. Notably, the use of resources is often described in terms of either using them carefully or responsibly, or using resources that are described as regenerative or renewable. Reuse and recycling were also mentioned by both groups as practical expressions of sustainability. Reduction of emissions only came up within the IT group as a means to achieve sustainability, while members of the BIO group mentioned more specific aspects like animal welfare, fighting against the exploitation of people, and taking future generations into account, in terms of leaving them a healthy planet. Expressions like 'environmentally friendly' were also used to describe sustainability, which underpins the general understanding that no harm is to be done to the environment.

Table 4: Sustainability Awareness

Codes / Interviewees	Sustainability Definition	Act Sustainably
BIO1	Careful use of resources, environmental friendliness	Practices: sustainable food, sustainable clothing Perceived as difficult: has to drive a lot, for some things the time investment is too high
BIO2	Careful use of resources, mentions economic sustainability - but no further explanation, respect for future generations	Practices: sustainable food, secondhand clothing, saving electricity at home, cosmetics: shower gel and shampoo Perceived as difficult: fair trade clothing is expensive
BIO3	Responsible use of resources in manufacturing and use of products, animal welfare, no exploitation of people	Practice: buys regional products
BIO4	Recycling, environmental friendliness, conserving resources	Practices: secondhand clothing, food without plastic packaging Perceived as difficult: has guilty pleasures - not explained in detail
IT1	Use of ecologically good (renewable) resources in the manufacturing and use of products, reuse (recycling), environmental friendliness	Practices: cosmetics: packaging-free shower gel, shampoo and conditioner, toothbrush pastilles, bamboo toothbrushes, and washable cotton pads Perceived as difficult: Food with plastic packaging
IT2	Climate neutrality, environmental friendliness	
IT3	Use of regenerative (renewable) resources in the manufacturing and use of products, reuse (recycling), environmental friendliness	Practices: does not buy unsustainable food, public transport instead of car Perceived as difficult: emission compensation for parcel services, green labels
IT4	Renewable resources/energies in the manufacturing and use of products, recycling, reduce CO_2 emissions	Practices: recycled paper, wears clothes for a long time, flexitarian diet, sustainable food Perceived as difficult: buying used books

Although none of the respondents' definitions attempt to explain the concept at a high level, like scientific definitions such as the one by Ben-Eli (2018, p. 1339) in Chapter 2.1 do, everyone has a basic understanding of what is meant by sustainability and, more importantly, how to achieve it.

In order to further validate the understanding of sustainability as a concept, but more importantly, capture the awareness of sustainability, the interviewees were asked how exactly they implement sustainability in their own everyday lives. Unfortunately, the chance was missed to ask IT2 how they practice sustainability for themselves, which is why data is missing for this interviewee in the column 'Act Sustainably'. The most popular practice among the interviewees is trying to buy sustainable food whenever possible. Some are guided by labels that indicate fair trade or organic farming (BIO2, 13:24; IT1, 16:53; IT4, 23:39), others understand this to include purchasing regional products (BIO3, 16:15), and again others explicitly avoid products that have a bad reputation, for example the hazelnut spread 'Nutella', because palm oil is used in its production (IT3, 13:25). Some of the interviewees have mentioned that labels should not be blindly trusted and that it is better to pay attention to recognized labels (BIO2, 13:24; IT3, 13:25; IT4, 23:39). Others also pay attention to sustainability in cosmetics (BIO2, 13:34; IT1, 16:18). The second most popular act is buying secondhand or sustainable clothes and getting the most use out of them before buying new ones (BIO1, 15:02; BIO2, 12:49; BIO4, 10:48; IT4, 21:43). However, a hurdle was also mentioned here, relating to the fact that sustainably produced clothing is often more expensive (BIO2, 14:26). Similarly, sustainable foods were rated as more expensive, but worth spending the extra money (IT1, 39:18; IT4, 23:39). Public transport was also mentioned as a means to increase sustainability in mobility (IT3, 12:55), but some of the interviewees also admitted

that they have difficulties getting along without a car (BIO1, 12:45). In general, it was also addressed that the time required for some actions does not do justice to the preservation of sustainability (BIO1, 12:45).

All in all, respondents convey a credible commitment to the practice of sustainability in their everyday lives, however, none mentioned concrete Green IT practices, such as using secondhand smartphones or power-saving on devices at home. On top of that the lack of awareness toward online services in a direct sense, was already apparent as seen in Chapter 4.1, because everyone stated that they do not actively pay attention to sustainability in online services. A look at the sustainable activities collected indicates a lack of active efforts to achieve sustainability in the use of technology.

4.3.3. Reasons for the Lack of Sustainability Awareness of Online Services

So far, the results paint the picture that the young adults who participated in the interviews have a lack of sustainability awareness for online services. Since this is rather alarming, possible reasons and factors were collected from the interviews, which were either mentioned directly by the interviewees or emerged from the context. Table 5 groups individual reasons and factors into three groups of main codes. The first group of codes summarizes aspects that directly relate to the lack of awareness. The second group's codes collect incentives to use online services. And lastly, reasons against the use of online services were listed in the third group of codes.

With the most coded segments in both groups in total, 'Not thinking about it' is not a reason per se, but it shows that the interviewees are open to admit their shortcomings when asked. It could translate to them not having enough occasions where they are confronted with the topic. 'Powerlessness' directly refers to the belief that acting sustainably does not have an impact on the big picture, possibly lowering the intention to take action. For example, some would not feel any achievement by using an online service claiming to be green (IT2, 23:22; IT3, 25:33) because it would not make any difference (BIO1, 32:10). Segments coded with 'Unapplied Knowledge' include expressions of concern related to sustainability of online services, like cooling or energy consumption, but ultimately do not seem to have a lasting impression on the assessment, as they are followed by statements coded with 'Not thinking about it' (BIO4, 09:21; IT3, 16:56). Notably, some of this 'Unapplied knowledge' is sometimes prone to technical errors, as the assumption that the coolant used by data centers has to be 'dumped somewhere' (BIO1, 35:23), is not exactly right. In fact, most liquid cooling systems use closed-loop systems where coolant is circulated, having no need to dispose of it regularly (Ebrahimi et al., 2014, p. 627; Iyengar et al., 2012, p. 213). A very interesting reason given by the interviewees with an IT background is the fact that online services have no physical appearance and might therefore be more difficult to assess, as explained in an example by IT1 (39:18), where the quality of an organic chicken (as food) can be better judged than a service claiming to be green. Some of the members of the IT group simply stated that, as the code says, 'Privacy is preferred' to sustainability, which influences the choice of services. This will later be relevant when presenting the data for the Google example, as the same interviewees are not users of Google services, but it also indicates a clear prioritization when it comes to features of online services. While the codes 'Small User Base' and 'No Alternative' have been only coded once each, their specific problematization justify their existence. The former refers to the problem that alternative (sustainable) platforms are not attractive to new users because the initial user base is very small, which, for example, in the case of a messenger, limits the number of people with whom one can communicate on that platform (IT1, 41:55). The latter refers to the hurdle that some services might not have a sustainable alternative available. To express that there are no usable alternatives for certain online services, IT2 (26:07) uses an analogy. From the point of view of utility and energy consumption, a bicycle is a better alternative for a car than an encyclopedia for a search engine.

A big reason why the interviewees tend to prefer online services is convenience. Examples of online services creating convenience include online banking (IT1, 07:21), food delivery (IT4, 08:41), booking trips online (BIO3, 06:59), and music or video streaming (IT4, 09:14) because these offer a large selection to choose from, flexibility, and a low effort to use (BIO1, 08:46; BIO3, 02:20; IT3, 05:46). Another reason to use online services coded as 'No choice' is that sometimes one is simply forced to use them. A prominent example by the interviewees is that university documents or learning material can only be obtained via the university's online portals (BIO2, 03:44; BIO3, 07:46; IT4, 05:43). Interestingly, the interviewees do not express if they see this circumstance as a bad thing, which thematically fits in with thecode 'Ubiquity'. The interviewees say, that online services have already become part of their everyday life and that a lot can only be done via the Internet, which makes online services quietly and steadily omnipresent (BIO2, 15:24; IT2, 05:36; IT3, 04:15).

Finally, some concerns were raised about the use of online services, outside of sustainability. As already noted, online services have no physical form and, according to the definition used in this thesis, require as little human intervention as possible. BIO3 (06:59) stresses this as a downside, as they would prefer personal contact, as in face-to-face consultation, where guidance or advice is valued by the customer. They also would not like to have everything provided as an online service because to them these have the potential to replace jobs of the people, who would have performed this service previously (BIO3, 06:59). Interestingly, the convenience of an online service is also mentioned in the same paragraph, suggesting that it is seen as a trade-off.

4.3.4. Attitude Toward Google

During the interview, it has already become clear that it cannot be assumed that every participant uses Google as their preferred search engine. Therefore, it was also surveyed

Table 5: Reasons for Poor Awareness

Group	**BIO**		**IT**	
Mentions	Once per int.	Total	Once per int.	Total
Reasons to Disregard Sustainability of Online Services				
Not thinking about it	4	10	4	8
Powerlessness	3	4	3	3
Unapplied Knowledge	2	4	2	2
Immateriality	0	0	2	3
Privacy is preferred	0	0	2	2
Small User Base	0	0	1	1
No Alternative	0	0	1	1
Reasons to Use Online Services				
Convenience	3	5	3	8
No Choice	2	3	1	1
Ubiquity	1	1	2	2
Reasons to Not Use Online Services				
No Personal Contact	1	1	0	0
Replacing Jobs	1	1	0	0

Note. 'Once per Int.' shows the appearance of the code counted once per interview. 'Total' counts every instance of a coded segment in all interviews.

which search engine was used and why. This resulted in the following data, which can be seen in Table 6.

Among all interview participants, the majority of interviewees use Google as the preffered search engine. It has to be pointed out, that two of these people were not exactly sure at first if they use Google as a search provider. BIO3 (26:01) said that they are using Safari on a Mac and therefore not using Google Search, it was made clear to them that they are probably using Google because it is the default option in Safari. Similarly, IT1 (41:30) stated that they directly type the search query into the address bar. They realized soon after that, that Google would probably be the default search provider in that case too. BIO2 (19:58) and IT3 (23:09) did not explicitly state that they do not use Google by the time the interview section has been introduced. (BIO4, 15:23) stated they use Google, but should use Ecosia, as the 'sustainable alternative' to Google. Nevertheless, they stay with Google out of convenience and shy away from switching.

The two that have specified to use DuckDuckGo, said that they want to protect their privacy which in this case is more important to them than sustainability (IT2, 17:56; IT4, 25:11). However, IT4 (25:55) added that they occasionally use the Google Drive cloud storage service with a throwaway account.

Out of the four people who know Ecosia as a sustainable search engine, there is only one person who actually uses it. Those who know about it did not seem particularly convinced of it either. Ecosia was described as a search engine that 'supposedly' plants trees for each search query (IT3, 25:33). IT1 (39:18) said they know Ecosia but are not familiar enough with it to declare if the company behind the search engine really plants the trees as they claim. Even the one that uses Ecosia expressed, that Ecosia at least advertises that they act sustainably (BIO1, 21:28). They knew about the rough number of trees that have been planted so far but disclosed that they did not research it themselves, but got the information from their professor (BIO1, 27:40).

After clarifying which search engine they prefer, the interviewees were asked, what they knew about Google's sustainability efforts. Most of those interviewed said they did not know anything about it (BIO2, 19:52; BIO3, 25:47; BIO4, 26:45; IT1, 25:29; IT4, 30:40). Hardly anyone was aware of the slogan "CO_2-neutral seit 2007" [eng.: carbon neutral since 2007] at the bottom of the German desktop version of Google Search. Some were even surprised that Google is committed to sustainability (BIO4, 27:10). Others said that they only know negative headlines about Amazon and their data centers and therefore assume that Google, as a big tech company, cannot be any better (IT1, 26:06).

The opposing code to 'No Knowledge [...]' is called 'Some Knowledge about Google's Efforts' with emphasis on 'some', because the statements were very broad or not exactly correct. Of course, comprehensive knowledge on the subject cannot be demanded, but only one example would

Table 6: Preferred Search Engine

Interviewee / Preferred Search Engine	BIO1	BIO2	BIO3	BIO4	IT1	IT2	IT3	IT4
Google		X		X			X	
DuckDuckGo						X		X
Ecosia	X							
Aware of Ecosia				X	X	X	X	
Unsure			X		X			

Table 7: Knowledge about Google's Sustainability Efforts

Interviewee / Knowledge	BIO1	BIO2	BIO3	BIO4	IT1	IT2	IT3	IT4
No Knowledge	X	X	X	X	X			X
Some Knowledge						X	X	

not suffice for basic knowledge if one presents oneself as particularly committed to sustainability. As an example, IT2 (17:07) heard that Google has started to build data centers in the sea to reduce electricity costs for cooling. After asking a follow-up question, it was specified that Google submerged tanks with servers inside, which were presumably deposited off the coast of Scotland. But it turns out this was not Google after all. The venture was a pilot project by Microsoft (Cellan-Jones, 2020) therefore it must be a mix-up.

Now that the interviewees' 'basic attitude' towards the company has been presented, their statements on Google's commitment and the spokesperson's statement can be addressed. This was achieved by looking at the relationships between the codes describing the attitude toward Google and the 'basic attitude' from before the commitment and the statement were presented to the interviewees. A relationship exists if a code from the y-axis and the x-axis of the table occurs in the same transcript, i.e., they were mentioned by the same interviewee. The four tables 8 to 11 have the codes for the 'Attitude toward Google' on the left and the codes indicating their preferred search engine and knowledge about Google's sustainability effort on the top. It is important to add that the codes on the left differ between the context of the commitment and the statement, as new aspects were added by the interviewees when the statement was disclosed. The results for the BIO group and the IT group are displayed in separate tables because of size constraints. The maximum value in the top line indicates the maximum number of relations a code can have, since there can only be as many relations as there is people coded with the code in the top row (see Table 6 and Table 7).

Looking at the tables 8 and 9, it is apparent that the most common code is 'Better than nothing' with no definite affiliation to a group or a 'basic attitude'. For example, the participants say that the commitment is well-intentioned, but the effect of it needs to be proven (IT2, 21:53; IT3, 24:42). The option for choice is welcomed, but it is speculated whether the implementation of the commitment has only a small effect or any effect at all (BIO2, 22:53; BIO4, 28:23). All in all, none seem particularly enthusiastic about the commitment and see the exemplary implementation of it (see Chapter 2.1) as a 'nice to have' rather than a game-changer. The overall skepticism against Google and its actions toward sustainability seems to be more apparent within the IT group. As in 'we need to question this' (IT3, 13:58), 'is it really like that' (IT1, 32:12), or 'what do the numbers actually mean' (IT4, 31:59). Concrete criticism however is comparable in number between both groups.

'Carbon Offsets' were only mentioned by one interviewee in the IT group out of all participants. They assumed that Google achieves its carbon neutral status by using those instead of actively reducing its emissions (IT1, 35:10). 'Conflicting Interests' were also mentioned by only one respondent from the BIO group. What they saw as a conflict of interest in Google's implementation of the commitment is, that the carbon rating and advertisements by third parties on their platform could compete, potentially impacting the revenue stream for Google (BIO1, 24:05). To them, this would compromise the implementation of the commitment. Both IT1 (39:18) and BIO4 (10:48) call Google's slogan and their implementation of the commitment greenwashing, and even bullshit. They describe it as misleading advertisement and as a scam [ger.: "Masche"] alike (BIO4, 28:23). Although not

Table 8: Attitude toward Google (Commitment/BIO group)

Attitude toward Google	Aware of Ecosia (max. 1)	Google (max. 2)	Unsure (max. 1)	Ecosia (max. 1)	No Knowledge (max. 4)	Total mentions
Better than nothing	1	2	1	1	4	7
Carbon Offsets	-	-	-	-	-	0
Conflicting Interests	-	-	-	1	1	1
Greenwashing	1	1	-	-	1	3
Lack of Transparency	-	-	-	1	1	1
Offloading to Consumers	1	2	-	-	2	3
Skepticism	-	-	-	1	1	1

Table 9: Attitude toward Google (Commitment/IT group)

Attitude toward Google	Aware of Ecosia (max. 3)	Google (max. 1)	Unsure (max. 1)	DuckDuckGo (max. 2)	No Knowledge (max. 2)	Some Knowledge (max. 2)	Total mentions
Better than nothing	3	1	1	2	2	2	5
Carbon Offsets	1	-	1	-	1	-	1
Conflicting Interests	-	-	-	-	-	-	0
Greenwashing	1	-	1	-	1	-	2
Lack of Transparency	2	-	1	1	1	1	3
Offloading to Consumers	2	-	1	2	2	1	3
Skepticism	2	1	1	1	2	1	5

directly related to Google, it was noted under 'Lack of Transparency' that BIO1 (26:48) does not think that the information from Ecosia, on how many trees they planted, is realistic. They said that they could 'theoretically' get information on that, but the wording makes it sound more like they have not done so yet. The information released by companies is generally seen as ambiguous (IT1, 39:18; IT2, 20:14). The code 'Offloading to Consumers' is present in both groups again. Some interviewees expressed outrage, because the commitment seemed like Google was trying to transfer its responsibility to the customer while taking credit for the sustainability efforts (IT1, 30:06; IT4, 33:26). IT2 (21:53) even links it directly to the 'scandal' about BP's individual carbon footprint discussed in Chapter 2.2. Members of the BIO group call the commitment an excuse for Google to call itself sustainable or wishful thinking that people do make the more sustainable decision thanks to a Google service (BIO2, 24:35; BIO4, 31:50).

As already mentioned, the codes in the following tables (Table 10 and Table 11) are slightly different from the ones before. 'Better than Nothing' and 'Carbon Offsets' did not come up again in the context of the statement by the Google spokesperson. However, the codes 'Intolerable Behavior', 'Statement is Understandable', and 'Company has the power to change' needed to be defined to capture statements concerned with these aspects. Since 'Better than Nothing' is one of the few codes that can be associated positively, the overall mood shifts to the negative after the statement is presented. From all of the newly emerged codes, 'Intolerable Behavior' has the most negative connotation. The initial reaction to the statement of the spokesperson is that the image of Google is 'weak' and 'wrong', as they are not carbon neutral on all accounts (IT1, 44:09). Most interviewees agree that the route traveled via the Internet should also be factored in. Others say that since this statement is true, carbon neutrality should not be advertised in this way because it is dishonest (BIO3, 33:28, 38:14). Some even go so far as to say that this is consumer fraud, as the statement is disguised by the general public portrayal of Google (BIO2, 33:46). The code 'Company has the power to change' has two slightly different variants: on one hand it is assumed that Google, as a major player in the market, could use its power to enforce regulation in its supply chain (IT3, 30:32; IT4, 39:14). On the other hand, it is demanded that they just do so (BIO4, 37:27). While the first assertion, appeals to Google's drive, the second skips this and demands direct action. Going fur-

Table 10: Attitude toward Google (Statement/BIO group)

Attitude toward Google	Aware of Ecosia (max. 1)	Google (max. 2)	Unsure (max. 1)	Ecosia (max. 1)	No Knowledge (max. 4)	Total mentions
Company has the power to change	1	1	-	-	1	1
Conflicting Interests	-	-	-	1	1	1
Greenwashing	1	2	1	-	3	5
Intolerable Behavior	-	1	1	-	2	3
Lack of Transparency	-	1	1	1	3	5
Offloading to Consumers	-	-	-	-	-	0
Skepticism	-	-	-	1	1	1
Statement is Understandable	1	1	1	-	2	2

Table 11: Attitude toward Google (Statement/IT group)

Attitude toward Google	Aware of Ecosia (max. 3)	Google (max. 1)	Unsure (max. 1)	Duck-DuckGo (max. 2)	No Knowledge (max. 2)	Some Knowledge (max. 2)	Total mentions*
Company has the power to change	1	1	-	1	1	1	2
Conflicting Interests	-	-	-	-	-	-	0
Greenwashing	1	-	1	-	1	-	1
Intolerable Behavior	1	-	1	-	1	-	1
Lack of Transparency	-	-	-	-	-	-	0
Offloading to Consumers	-	-	-	1	1	-	1
Skepticism	-	-	-	-	-	-	0
Statement is Understandable	1	1	-	2	1	2	3

ther, 'Statement is Understandable', while not overly positive, shows some interviewees to be in part considerate of Google. It is accepted that Google does not have control over the entire route that their online services take over the network (IT3, 31:58). For most, however, this consideration does not last long.

This 'truth' is then contrasted with the fact that one then cannot advertise with complete carbon neutrality (BIO3, 38:14). Wich in part leads back to the idea of 'Offloading to Consumers' (IT4, 39:14). To preserve its legitimacy it should then be Google's obligation to stop such misleading practices (BIO4, 37:27). Some said they had already guessed that there would be a catch, and they did not expect to be surprised (BIO1, 34:32; IT2, 28:03).

The tables show that the code 'Greenwashing' occurs more frequently in the BIO group after the statement has been presented, while it remains unchanged in the IT group. IT1 (45:35) consolidated their point of view by reiterating their greenwashing accusation. BIO4 (36:02) also reinstated the point, that the slogan is 'bullshit' and felt vindicated. Google's image is now described as 'contradictory', 'fake', and 'different behind the scenes' (BIO2, 30:07, 31:38; BIO3, 33:28). 'Lack of Transparency' came up more frequently in the BIO group as well, by contrast, the aspect was not repeated in the IT group. BIO1 (29:57) used the example of Amazon to explain that it is tricky to understand what actually happens when an order is placed. They criticized that those orders show up in multiple packages even though it was chosen to deliver them all at once. BIO2 (33:46) followed suit to admit that it is difficult to assess such claims, they also added that the statement allows Google to use it as an excuse if they are accused of lying. More transparent handling of the matter was demanded by BIO3 (34:42). Lastly, the codes 'Conflicting Interests' and 'Offloading to Consumers' appeared only once again each. The former was repeated in a slight variation (BIO1, 35:23) and the latter was mentioned again to underpin the point that the commitment is dishonest (IT4, 39:14).

4.3.5. Opinions on the Responsibility for Sustainability

Between the commitment and the statement part of the interview, the interviewees were asked which side, i.e., consumer or company, should take more responsibility for sustainability. This and the emergent question about political intervention provide the data for Table 12. The table clearly shows that there is no permanently assignable opinion, neither to a group nor to specific interviewees, as they sometimes express several viewpoints.

From left to right, BIO1 has the most varied opinion. To them, the main responsibility was first with the companies (28:12), then it was added that the customer is also in part responsible (28:12). After that, it was noted that companies cannot be responsible for everything (29:57) and at last it was stated that no one wants to take full responsibility (32:45). BIO2 (25:35) took a clearer stand, to them the responsibility is of equal parts. BIO3 (31:27) shared the same opinion and emphasized that everyone must do their part. BIO4 (34:01) takes the stance that companies should be made responsible, as they have not cared in the past. To them, relying on the consumers" initiative yields little to nothing. IT1 (36:27) would see the responsibility on the company's side because they are in the position of power. They added that the purchasing power of the consumer could influence a company's actions if an alternative product is available, but they still think that the contribution of the consumer is important (45:35). IT2 (24:25) argued that it is not easy to decide who should bear the responsibility, but they stressed that companies who call themselves sustainable should be held liable for it (30:52). IT3 (27:41) is the only one among the interviewees who thinks that the responsibility is with the consumer, they justify it by market mechanisms. To them, companies would move toward sustainability through supply and demand (27:58). Lastly, IT4 (35:44) would not distinguish between 'either-or' but would attribute significantly more to companies because they are the main polluters.

5. Discussion

The research question aims to address two sub-aspects, firstly the effect of sustainability awareness and IT knowledge in assessing the sustainability of online services, and secondly whether bullshit claims about the sustainability of these online services can be detected. To evaluate if the collected qualitative data contribute to answering the research question, the results are discussed in the respective chapters with regard to the two sub-aspects. Subsequently, the theoretical contribution and practical implications, as well as the limitations of the work, are addressed.

5.1. Influence of Sustainability Awareness and IT Knowledge

The results strongly suggest that it does not matter whether a higher level of sustainability awareness or IT knowledge influence the awareness of the sustainability of online services, as all participants effectively say that they do not consciously pay attention to whether an online service is sustainable or not. With that said, the sustainability awareness is similar between groups, so no direct link can be made to IT knowledge. A more detailed survey of personal sustainable practices based on the *Pro-Environmental Behavior Scale* (PEBS) by Markle (2013) might have allowed for a finer distinction, but would also have taken time away from other important parts of the interview. The PEBS would enable to measure the 'performance' of the environmental behavior rather than describing it as basic, as in the case of this thesis (Markle, 2013, p. 912). The assessment of IT knowledge was clearer, as the IT students were able to explain the background of online services more convincingly and in much greater detail. Accordingly, the statements were also technically correct when compared to the conceptual foundation of this thesis.

As previous research projects have shown, it cannot generally be concluded that Green IT will be practiced more just because sustainability awareness is increasing among the population as a whole (Koo et al., 2015, p. 75; Kurkoon et al., 2018, p. 9; Leung et al., 2018, pp. 2–3). This is also confirmed by this thesis in the context of online services, which have not yet been studied in such detail. Likewise, the interviews uncovered reasons responsible for the low awareness of sustainability concerning online services. These will now be discussed and compared to existing literature to see if the same or similar findings have already been made or if other barriers exist exclusively for online services.

The most prominent issue is the lack of knowledge that came up with the code 'Not thinking about it'. It is not to be understood as a lack of interest, but as a lack of education, as the interviewees made the impression that they were eager to know how online services can be sustainable (BIO3, 17:37). The fact that the interviewees do not practice sustainability in terms of online services, because they do not know where to start, coincides with the findings of Leung et al. (2018, p. 9), who conclude that a good understanding of Green IT increases the confidence in practicing Green IT. Kurkoon et al. (2018, p. 4) point out that 'noticeability' is also an important factor influencing the intention to use Green IT products. Noticeability is understood as the ability to recognize green products as such, based on the observation that consumers would like to use sustainable products, but most of the time do not know what qualifies as a sustainable product. This is reminiscent of how the interviewees initially did not know what a sustainable online service could be, with the exception that only a few named Ecosia as an example.

The idea of the 'Perceived Green Benefit' by Kurkoon et al. (2018, p. 4), goes a step further, as it partially requires knowledge about Green IT. The perceived green benefit describes the added value of a sustainable product that a consumer expects individually. The added value, i.e., the advantages of a Green IT product, are also crucial for the intention to use them. Besides partly relating to the code 'Not thinking about it', it is comparable to the statements coded as 'Powerlessness', as it summarizes the feeling that acting sustainably does not have an impact, thus not creating any value in

Table 12: Opinion on who has Responsibility for Sustainability

	BIO1	BIO2	BIO3	BIO4	IT1	IT2	IT3	IT4
Equal Responsibility	X	X	X		X	X		
Responsibility of Consumers/Users	X						X	
Responsibility of Companies	X			X	X	X		X

choosing a particular green service. An extreme example of that would be the statement of IT3 (25:20), who does not think that Google's services provide any sustainable benefit to them. Despite that, they still use Google for searching the web, which from the sustainability perspective goes against the point of Koo et al. (2015, p. 71), who argue that the perceived usefulness prolongs the use of green products. However, it is apparent that the reason for using Google is not primarily sustainability, but convenience.

To be swayed by convenience is another important aspect that came up in the interviews and has been discussed in previous research. Kurkoon et al. (2018, p. 4) address this with the idea of 'Resource Sacrifice', meaning that green products or services tend to be less feature-rich and lack performance in comparison to non-sustainable ones. While the interviewees did not draw a direct comparison between a sustainable and a non-sustainable service, it was very evident that they value the convenience of online services over regular services, as listed in Chapter 4.3.3, and conversely would rather not return to the 'old' way. The issues labeled as 'Small User Base' and 'No alternative' also share the sentiment of not wanting to give up something in turn for sustainability.

For the example of video streaming, Leung et al. (2018, p. 8) found that people would choose streaming providers based on cost and quality rather than sustainability when they indicated that they found it difficult to practice Green IT. Although it is not about the same properties, this finding is similar to the preference for privacy of some interviewees.

One aspect that is only briefly touched upon by previous research is the immateriality of online services. It is mentioned that "green products and services are likely to be abstract objects" (Kurkoon et al., 2016, p. 599) from the perspective of consumers, making it difficult to assess them. But given the context, which further explains the idea of noticeability mentioned earlier, the word abstract is referring to green products and services being difficult to grasp and not the abstraction of a service from the material to the digital world. Koo et al. (2015, p. 68) argue that the effects of Green IT and Green IS can actually be seen by consumers across products and services. However, the results of this thesis contradict this assertion, because the interviewees state that sustainability is not immediately apparent to them in online services. Koo et al. (2015, p. 68) further note that the usefulness perceived by the consumer depends on whether the effects of sustainability are obvious to the consumer. This might be true for the power monitoring devices looked at in their study, but online services seem to act differently in that regard. Since the interviewees struggled to make sense of the sustainability of online services, the effects are not obvious or perhaps not made obvious enough.

One last observation worth mentioning is that the interview partner who uses Ecosia does it based on a recommendation and does not really seem convinced either (BIO1, 22:03). However, Kurkoon et al. (2018, p. 9) described the influence of the social environment as insignificant, which contrasts with previous studies that assumed the opposite, as they themselves affirm. Even if this is only a single case, it is still interesting to note that this usage decision is motivated more by extrinsic than intrinsic motivation. Since all other sustainability practices seemed to be done out of conviction. Thus, social influence is credited with having some degree of impact.

Looking at the discussed aspects, it can be concluded that some influencing factors of Green IT products can be transferred to online services, but hurdles have also been identified that have not been considered so far in research. In the end, it does not matter whether sustainability awareness or IT knowledge is more strongly developed, in the end, Green IT knowledge must be promoted directly to the consumer as already concluded by Leung et al. (2018, p. 9).

5.2. Ability to Spot Bullshit Claims

The question of whether the interviewees were able to debunk Google's bullshit claims is difficult to answer. Overall, it is clear that the interviewees generally had doubts about the feasibility or usefulness of the commitment that Google has made, even though the commitment is considered good in principle. Moreover, this critical attitude develops and is confirmed or even strengthened with the unveiling of the statement of the press spokesperson. Now, this stands however in strong contrast to the conclusion that as good as nobody pays attention to the sustainability of online services and beyond that nobody really knew what Google does for sustainability at all. There is no discernible connection between the coded critical statements, and the preferred search engine and knowledge about Google's activities to promote sustainability.

This raises the question of whether this criticism and skepticism are justified at all when no one really knows what Google contributes to sustainability in practice. But it also seems obvious that this is precisely the problem. Many interview partners have mentioned the lack of transparency and

difficult comprehensibility as a point of criticism. This could explain the aforementioned lack of knowledge. However, it is unclear whether it is the lack of transparency on the part of the company or the ignorance of consumers who regularly use Google. There is a hint of this kind of ignorance because at one point it was subliminally admitted that someone could look it up if they wanted to (BIO1, 26:48). The others have not expressed themselves in this way, but it cannot be ruled out that they too act this way. This is, again, difficult to determine from the interview material ex-post. It would have required asking questions regarding the gathering of information, which was not considered beforehand.

However, it would generally be wrong to completely doubt the basic skepticism of the interviewees toward Google because critical questioning is right and important. But one can ask whether the interviewees might not be bullshitting themselves. It does not fit: they do not know what Google is doing at all, criticize them, and partly use their services anyway. It almost seems like a form of 'meta-bullshit'. Accusing Google of bullshitting for downplaying important details in marketing is one thing, but doing so on a basis of unawareness, which fits the practice of bullshitting, makes the accusation seem less genuine. Still, the bullshit was recognized, so the assessment of the interviewees is correct. Yet, as stated in the conceptual foundation, the produced bullshit can still be 'true' despite the lack of knowledge about the 'truth'.

However, it can be ruled out that the kind of bullshit in which the interviewees are interwoven is Frankfurt bullshit. This is the case because the interviewees are presumably not pursuing the motive of appearing particularly critical and environmentally aware in the interview. Otherwise, they would have claimed from the start to pay attention to sustainability in online services. The interviewees rather fell for Cohen bullshit. That is justified in the fact that many of the interview partners came back to the assumption that large companies, including Google, can only be up to no good (BIO1, 32:45; BIO4, 34:01; IT1, 26:06). This is an assertion that is often said about large companies in the vernacular, which is also confirmed by scandals from time to time, see the example of BP in Chapter 2.4. The skepticism is therefore based mostly on the assumption that large companies are bad, instead of having concrete information. Since the interviewees have no concrete knowledge about Google's sustainability efforts, it has to be said that Google does not do a good job of being convincing and trustworthy when it comes to sustainability, provided that they really do what they say. It remains surprising that the direct accusations of bullshit and greenwashing also tended to come from those who even use Google, although with such a small number of respondents this could also be a coincidence. If the previous interpretations are summarized, it can be stated that there is a discrepancy between what is done and what is said. Without the interviews, this discrepancy might not have become visible at all, because the interviewees would not have been asked about it.

It is surprising that among all the critical comments, there were also concessions to Google, some of which expressed agreement that Google has no influence. This is in contrast to the fact that Google is credited with having the power to change something. What is particularly striking here is that in some cases one and the same person expressed these points, which in itself sounds contradictory (BIO4, IT3, IT4). Yet whether this is an inconsistency in the interviewees' opinions or a misfortune in formulation lies within the scope of interpretation of the material and cannot be answered unequivocally.

Lastly, the question about responsibility for sustainability did reveal the positions of individual interviewees. However, it did not help to identify patterns in the interview material. The opinions of the interviewees on this topic are varied, as are their reasons. What can be inferred, however, is that most of them do not see the responsibility entirely in the hands of one party. Which partly reflects the obligation of the companies to publish information [ger.: 'Bringschuld'] and the obligation to collect information of the consumers [ger.: 'Holschuld'], as a result of the transparency dilemma mentioned earlier.

6. Conclusion

In conclusion, neither the level of sustainability awareness nor the IT knowledge of young adults contribute to the assessment of the sustainability of online services , as the results of the of the interview show. It has been found that interviewees have few clues about the issue of sustainability in online services. Reasons contributing to this lack of knowledge were identified and discussed. The latter part of the research question, regarding the ability to spot bullshit claims, can be partially answered but not fully explained. While the interviewees did point out issues with Google's portrayal of being sustainable, those callouts of 'bullshit' were rather based on general assumptions than on concrete knowledge. It could not be finally answered how there can be a connection that the interviewees know almost nothing about Google in the context of sustainability but are nevertheless aware of the possible bullshit. In addition, it remains unclear why some still use Google altogether.

6.1. Theoretical Contribution

On the one hand, this thesis contributes through theory building as new observations were made. Most notably, the immateriality of online services as a reason for the difficulty in evaluating their sustainability or the discrepancy between the attitude toward Google and the use of its services. From these phenomena, new hypotheses can be derived that can in turn become the basis for a theoretical explanation.

On the other hand, this thesis also contributes by theory testing to some extent. Previous hypotheses and theories from the literature that are originally applied to the quantitative approach of questionnaires, were field-tested with the qualitative approach of interviews. Both theory testing and theory building are of utmost importance to create good theories and enable "advancements in science" (Bhattacherjee,

2012, p. 4). Since the approach to answering the research question in two sub-aspects provided both expected and unexpected results, it allows for progress in both areas. Furthermore, this study adds to the existing literature on the reception of green IT products and practices by more specifically looking at the research subject of online services.

6.2. Practical Implication

The main implication of this thesis is that users of online services should be made more aware of the factors that influence the energy consumption of such a service or ICT in general. Consumers should be empowered, to look beyond the general criticism of ICT-providing companies and engage with what they claim to be doing for sustainability. In addition, they should also obtain concrete third-party information on that if possible, to separate the bullshit from the facts.

Companies can also learn from the results of the interviews. They should take care to provide information in a more accessible way to have a more convincing effect on consumers. Efforts to promote sustainability should not be misunderstood as mere marketing when it is in fact genuine.

Nevertheless, the information problem, as discussed, comes from both sides, so the information must be accessible enough to be accepted in order to reach the masses. Only in this way can sustainable development, driven and supported by consumers, achieve its full potential.

6.3. Limitations

As with any interview with pre-structured questions, it cannot be ruled out that other factors or topics not asked in the interviews may influence the results of the research. For example, a missed question remains: Would those who use Google's services continue to use them after critically discussing them in the interview, or would they perhaps refrain from doing so? It could be hypothesized that they ignore the criticism they have voiced at the next opportunity, a la 'Ignorance is Bliss'. What speaks for this is the 'convenience', as described in Chapter 5.1 but since the interviews did not cover this point in-depth, this cannot be answered with what was learned from the results. In the same vein, the phrase "guilty pleasure" (BIO4, 16:38) is also interesting but was unfortunately not discussed further in the interview. Furthermore, it was wrong to assume that everyone who could participate in the interviews is familiar with Google. Although the opportunity to gain insights from other search engine users was embraced, it could have been better integrated into the interviews if this had been considered from the beginning.

The generalizability of the results from young adults to consumers is limited due to the sample size. Simply said every student is a consumer, but not every consumer is a student. The target group only represents a section of all possible types of consumers. In addition, the interviews could very well lead to different results, if other interview partners were acquired, let alone if the age group of the field of studies were defined differently. In turn for gaining deeper insight, the individual nature of the interviewees' responses further limits the generalizability of the results.

Furthermore, the study is limited by the objectivity of the researcher, as they might have an influence on the interview (Alsaawi, 2014, p. 155). Because of that, the results could be unconsciously biased in a favorable direction. This bias was mitigated to the best of the researcher's knowledge by using the method of semi-structured interviews in which the interview guideline was reviewed by third parties to avoid leading questions. Nevertheless, this study advances the research on the topic and contributes to closing the research gap.

6.4. Future Research

Since this work has encountered some limitations in its execution, these should be taken into account in further research. Among those limitations were, as explained, missed aspects, questions, and the general issue of generalizability. To address these, researchers could design a survey based on the interview guideline and the code system to see if the same results occur in a large group of people. Especially the codes for the reasons for the lack of sustainability should be verified with a more representative group of respondents.

In addition, two hypotheses can be derived from the discussion that should be considered in particular in the future. First, immateriality affects the assessment of online services in terms of sustainability. And second, convenience influences the willingness to change the current online service usage behavior. Furthermore, the discrepancy between factual knowledge and broad criticism toward Google should be further investigated, as it is unclear whether this behavior is limited to the interview participants and how it can be explained.

The research could also be conducted from a different perspective. Instead of looking at the reception of consumers, exclusively, it could also be investigated what companies can do to be more genuine and trustworthy when actively contributing to sustainability.

Finally, it should be considered which measures can be developed to help consumers become more aware of sustainability when choosing their online services. As the present thesis exposes the shortcomings in the handling of the topic by companies and consumers alike.

References

Allen, I. E., & Seaman, C. A. (2007). Likert scales and data analyses. *Quality Progress*, *40*, "Article 7", 64–65.

Alsaawi, A. (2014). A Critical Review of Qualitative Interviews. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2819536

Andrae, A., & Edler, T. (2015). On Global Electricity Usage of Communication Technology: Trends to 2030. *Challenges*, *6*(1), 117–157. https://doi.org/10.3390/challe6010117

Arshad, H., Saleem, K., Shafi, S., Ahmad, T., & Kanwal, S. (2020). Environmental Awareness, Concern, Attitude and Behavior of University Students: A Comparison Across Academic Disciplines. *Polish Journal of Environmental Studies*, *30*(1), 561–570. https://doi.org/10.15244/pjoes/122617

Baida, Z., Gordijn, J., & Omelayenko, B. (2004). A shared service terminology for online service provisioning. In M. Janssen, H. G. Sol, & R. W. Wagenaar (Eds.), *Proceedings of the 6th International Conference on Electronic Commerce - ICEC '04* (p. 1). https://doi.org/10.1145/1052220.1052222

Ben-Eli, M. U. (2018). Sustainability: definition and five core principles, a systems perspective. *Sustainability Science*, *13*(5), 1337–1343. https://doi.org/10.1007/s11625-018-0564-3

Bhattacherjee, A. (2012). *Social Science Research: Principles, Methods, and Practices* (Second edition). Anol Bhattacherjee.

Büttner, L., & Breitkreuz, A. (2020). Arbeiten Nach Corona: warum Homeoffice gut fürs Klima ist. https://nbn-resolving.de/urn:nbn:de:kobv:109-1-15435504

Capgemini (Ed.) (2021). Sustainable IT Report. https://www.capgemini.com/de-de/news/sustainable-it-nachhaltigkeit-studie-2021/

Carson, T. L. (2016). Frankfurt and Cohen on bullshit, bullshiting, deception, lying, and concern with the truth of what one says. *Pragmatics & Cognition*, *23*(1), 53–67. https://doi.org/10.1075/pc.23.1.03car

Čavojová, V., Brezina, I., & Jurkovič, M. (2020). Expanding the bullshit research out of pseudo-transcendental domain. *Current Psychology*. https://doi.org/10.1007/s12144-020-00617-3

Cellan-Jones, R. (2020). Microsoft's underwater data centre resurfaces after two years. *BBC News*. https://www.bbc.com/news/technology-54146718

Chaudhri, A. B. (2003). *Web, Web-services, and database systems: NODe 2002 Web- and database-related workshops, Erfurt, Germany, October 7-10, 2002 revised papers* (Vol. 2593). Springer.

Chen, M., Preston, & Teubner. (2010). Information Systems Strategy: Reconceptualization, Measurement, and Implications. *MIS Quarterly*, *34*(2), 233–259. https://doi.org/10.2307/20721426

Christensen, L. T., Kärreman, D., & Rasche, A. (2019). Bullshit and Organization Studies. *Organization Studies*, *40*(10), 1587–1600. https://doi.org/10.1177/0170840618820072

Cohen, G. A. (2002). Deeper into Bullshit. In S. Buss & L. Overton (Eds.), *The Contours of Agency*. The MIT Press. https://doi.org/10.7551/mitpress/2143.003.0015

Cook, G., & Jardim, E. (2019). *Clicking Clean Virginia: The Dirty Energy Powering Data Center Alley*. Greenpeace Inc. https://www.greenpeace.org/usa/reports/click-clean-virginia/

Cook, G., Lee, J., Tsai, T., Kong, A., Johnson, B., & Jardim, E. (2017). Clicking Clean: Who is winning the race to build a green Internet? http://www.clickclean.org/international/en/

Coroamă, V. (2021). *Investigating the Inconsistencies Among Energy and Energy Intensity Estimates of the Internet: Metrics and Harmonising Values* (tech. rep.). Bern. https://www.aramis.admin.ch/Default?DocumentID=67656

Council of the European Union. (2011). Council Implementing Regulation (EU) No 282/2011 of 15 March 2011 laying down implementing measures for Directive 2006/112/EC on the common system of value added tax. https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32011R0282

Croasmun, J. T., & Ostrom, L. (2011). Using Likert-Type Scales in the Social Sciences. *Journal of Adult Education*, *40*, "Article 1", 19–22.

Dalvi-Esfahani, M., Alaedini, Z., Nilashi, M., Samad, S., Asadi, S., & Mohammadi, M. (2020). Students' green information technology behavior: Beliefs and personality traits. *Journal of Cleaner Production*, *257*. https://doi.org/10.1016/j.jclepro.2020.120406

Diener, F., & Špaček, M. (2021). Digital Transformation in Banking: A Managerial Perspective on Barriers to Change. *Sustainability*, *13*(4), 2032. https://doi.org/10.3390/su13042032

Dresing, T., & Pehl, T. (Eds.). (2015). *Praxisbuch Transkription: Regelsysteme, Software und praktische Anleitungen für qualitative ForscherInnen* (6. Aufl.). Dr. Dresing und Pehl GmbH.

Ebrahimi, K., Jones, G. F., & Fleischer, A. S. (2014). A review of data center cooling technology, operating conditions and the corresponding low-grade waste heat recovery opportunities. *Renewable and Sustainable Energy Reviews*, *31*, 622–638. https://doi.org/10.1016/j.rser.2013.12.007

Ecosia. (2022). Ecosia is the search engine that plants trees. https://info.ecosia.org/what

Ericsson. (2020). A quick guide to your digital carbon footprint. https://www.ericsson.com/en/reports-and-papers/industrylab/reports/a-quick-guide-to-your-digital-carbon-footprint

Facebook. (2020). Sustainability Report 2020. https://sustainability.fb.com/report/2020-sustainability-report/

Frankfurt, H. G. (2005). *On Bullshit*. Princeton University Press. http://www.loc.gov/catdir/enhancements/fy0654/2004058963-d.html

Frankfurt, H. G. (2006). *On Truth*. Vintage Digital.

Frels, R. K., & Onwuegbuzie, A. J. (2013). Administering Quantitative Instruments With Qualitative Interviews: A Mixed Research Approach. *Journal of Counseling & Development*, *91*(2), 184–194. https://doi.org/10.1002/j.1556-6676.2013.00085.x

Garren, S. J., & Brinkmann, R. (2018). Sustainability Definitions, Historical Context, and Frameworks. In R. Brinkmann & S. J. Garren (Eds.), *The Palgrave Handbook of Sustainability* (pp. 1–18). Springer International Publishing. https://doi.org/10.1007/978-3-319-71389-2_1

Gilks, H., & Watson, E. (2019). Science Based Targets vs. Net Zero: what's the difference? Why do they matter? https://gresb.com/nl-en/science-based-targets-vs-net-zero-whats-the-difference-why-do-they-matter/

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking Qualitative Rigor in Inductive Research. *Organizational Research Methods*, *16*(1), 15–31. https://doi.org/10.1177/1094428112452151

Google. (2020). Realizing a carbon-free future: Google's Third Decade of Climate Action. Retrieved March 22, 2022, from https://www.gstatic.com/gumdrop/sustainability/carbon-free-by-2030.pdf

Google. (2021a). Environmental Report 2021. Retrieved April 25, 2022, from https://sustainability.google/reports/

Google. (2021b). Giving you more sustainable choices with Google. Retrieved March 28, 2022, from https://blog.google/outreach-initiatives/sustainability/sustainability-2021/

Grimm, D., Erek, K., & Zarnekow, R. (2013). Carbon Footprint of IT-Services - A comparative Study of energy consumption for Offline and Online Storage Usage.

Hacker, J., & Bodendorf, F. (2017). Conceptualising and Understanding User Behaviour in Enterprise Social Networks: A Qualitative Analysis. *ACIS 2017 Proceedings*, Article 41. https://aisel.aisnet.org/acis2017/41

Harvey, F. (2020). UN secretary general urges all countries to declare climate emergencies. *The Guardian*. https://www.theguardian.com/environment/2020/dec/12/un-secretary-general-all-countries-declare-climate-emergencies-antonio-guterres-climate-ambition-summit

Hernandez, A. A. (2019). An Empirical Investigation on the Awareness and Practices of Higher Education Students in Green Information Technology. *International Journal of Social Ecology and Sustainable Development*, *10*(2), 1–13. https://doi.org/10.4018/IJSESD.2019040101

Hintemann, R., & Hinterholzer, S. (2019). Energy Consumption of Data Centers Worldwide – How will the Internet become Green? *ICT4S*.

Hintemann, R., & Hinterholzer, S. (2020). *Videostreaming: Energiebedarf und CO2-Emissionen* (tech. rep.). Borderstep Institut für Innovation und Nachhaltigkeit. Berlin. https://www.borderstep.de/wp-content/uploads/2020/06/Videostreaming_2020.pdf

Hofmann, J., Ricci, C., & Ansu-Holz, D. (2021). IT und Nachhaltigkeit – eine Einführung. *HMD Praxis Der Wirtschaftsinformatik*, *58*(1), 6–23. https://doi.org/10.1365/s40702-020-00692-x

Hull, R., Benedikt, M., Christophides, V., & Su, J. (2003). E-services: A Look Behind the Curtain. *ACM Conferences, Proceedings of the twenty-second ACM SIGMOD-SIGACT-SIGART Symposium on Principles of Database Systems*, 1–14. https://doi.org/10.1145/773153.773154

Idowu, S. O., Capaldi, N., Zu, L., & Gupta, A. D. (2013). *Encyclopedia of Corporate Social Responsibility*. Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-28036-8

Ijab, M. T., Molla, A., Kassahun, A. E., & Teoh, S. Y. (2010). Seeking the Green in Green IS: A Spirit, Practice and Impact Perspective. *PACIS 2010 Proceedings*, Article 46. http://aisel.aisnet.org/pacis2010/46

ITU. (2020). *Greenhouse gas emissions trajectories for the information and communication technology sector compatible with the UNFCCC Paris Agreement* (tech. rep.). Geneva, Switzerland. Retrieved December 2, 2021, from https://handle.itu.int/11.1002/1000/14084

ITU. (2021). *Measuring digital development: Facts and figures* (tech. rep.). Geneva, Switzerland. Retrieved May 5, 2022, from https://www

.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2021.pdf

Iyengar, M., David, M., Parida, P., Kamath, V., Kochuparambil, B., Graybill, D., Schultz, M., Gaynes, M., Simons, R., Schmidt, R., & Chainer, T. (2012). Server liquid cooling with chiller-less data center design to enable significant energy savings. *2012 28th Annual IEEE Semiconductor Thermal Measurement and Management Symposium (SEMI-THERM)*, 212–223. https://doi.org/10.1109/STHERM.2012.6188851

Jevons, W. S. (1866). *The Coal Question; an Inquiry Concerning the Progress of the Nation and the Probable Exhaustion of Our Coal-Mines*.

Jones, E. (2019). Rethinking Greenwashing: Corporate Discourse, Unethical Practice, and the Unmet Potential of Ethical Consumerism. *Sociological Perspectives*, *62*(5), 728–754. https://doi.org/10.1177/0731121419849095

Jong, M. D. T. d., Huluba, G., & Beldad, A. D. (2020). Different Shades of Greenwashing: Consumers' Reactions to Environmental Lies, Half-Lies, and Organizations Taking Credit for Following Legal Obligations. *Journal of Business and Technical Communication*, *34*(1), 38–76. https://doi.org/10.1177/1050651919874105

Jost, P., & Divitini, M. (2020). Game elicitation: exploring assistance in delayed-effect supply chain decision making. *ACM Digital Library. Proceedings of the 11th Nordic Conference on Human-Computer Interaction: Shaping Experiences, Shaping Society*, 1–10. https://doi.org/10.1145/3419249.3420154

Kamiya, G. (2020). The Carbon Footprint of Streaming Video: Fact-Checking the Headlines. *IEA Commentaries*. https://www.iea.org/commentaries/the-carbon-footprint-of-streaming-video-fact-checking-the-headlines

Kamiya, G. (2021). *Data Centres and Data Transmission Networks* (tech. rep.). IEA. Paris. https://www.iea.org/reports/data-centres-and-data-transmission-networks

Kaufman, M. (2020). The Devious Fossil Fuel Propaganda We All Use: A 'Successful, Deceptive' PR Campaign. *Mashable*. https://mashable.com/feature/carbon-footprint-pr-campaign-sham

Kern, E., Dick, M., Johann, T., & Naumann, S. (2011). Green Software and Green IT: An End Users Perspective. In P. Golinska, M. Fertsch, & J. C. Marx Gómez (Eds.), *Information Technologies in Environmental Engineering: New Trends and Challenges* (pp. 199–211, Vol. 3). Springer. https://doi.org/10.1007/978-3-642-19536-5_16

Koo, C., Chung, N., & Nam, K. (2015). Assessing the Impact of Intrinsic and Extrinsic Motivators on Smart Green IT Device Use: Reference Group Perspectives. *International Journal of Information Management*, *35*(1), 64–79. https://doi.org/10.1016/j.ijinfomgt.2014.10.001

Koomey, J., Berard, S., Sanchez, M., & Wong, H. (2011). Implications of Historical Trends in the Electrical Efficiency of Computing. *IEEE Annals of the History of Computing*, *33*(3), 46–54. https://doi.org/10.1109/MAHC.2010.28

Kuckartz, U. (2018). *Qualitative Inhaltsanalyse: Methoden, Praxis, Computerunterstützung* (4. Auflage). Beltz Juventa.

Kurkoon, P., Pimchangthong, D., & Boonjing, V. (2016). Environmental Awareness in Information Technology Adoption and Consumer Intention to Support Green Businesses: Research Agenda for Empirical Study. *Information Systems Development: Complexity in Information Systems Development (ISD2016 Proceedings)*.

Kurkoon, P., Pimchangthong, D., & Boonjing, V. (2018). Green Support and the Use of Information Technology Products. *Designing Digitalization (ISD2018 Proceedings)*. http://aisel.aisnet.org/isd2014/proceedings2018/Transforming/2

Kutani, A. I., Hennicke, P., Gericke, N., & Bunge, F. (2021). *Energy and Climate Policy in the Post COVID-19 Era Comparative Analyses on Germany and Japan* (tech. rep.). Retrieved December 2, 2021, from http://www.gjetc.org/wp-content/uploads/2021/04/GJETC-Study_Energy-policy-Post-Covid_FINAL-210428.pdf

Kvasnicova, T., Kremenova, I., & Fabus, J. (2016). From an Analysis of e-services Definitions and Classifications to the Proposal of New e-service Classification. *Procedia Economics and Finance*, *39*, 192–196. https://doi.org/10.1016/S2212-5671(16)30282-9

Lange, S., Pohl, J., & Santarius, T. (2020). Digitalization and Energy Consumption. Does ICT Reduce Energy Demand? *Ecological Economics*, *176*, 106760. https://doi.org/10.1016/j.ecolecon.2020.106760

Leung, N. K. Y., Lau, S. K., Shamsub, H., & Lau, S. Y. (2018). A Study of Perception Factors that Affect Green IT Behavior. *AMCIS 2018 Proceedings*, Article 1. https://aisel.aisnet.org/amcis2018/GreenIS/Presentations/1

Likert, R. (1932). A Technique for the Measurement of Attitudes. *Archives of Psychology*, *22*, "Article 140", 5–55.

Loeser, F. (2013). Green IT and Green IS: Definition of Constructs and Overview of Current Practices. *AMCIS 2013 Proceedings*, Article 4. https://aisel.aisnet.org/amcis2013/GreenIS/GeneralPresentations/4

Luks, F. (2017). The Ugly, the Bad, and the Good: Bullshit as Discourse, Accursed Share, and Lubricant. *Journal of Extreme Anthropology*, *1*(1), 85–91. https://doi.org/10.5617/jea.5378

Lyon, T. P., & Maxwell, J. W. (2011). Greenwash: Corporate Environmental Disclosure Under Threat of Audit. *Journal of Economics & Management Strategy*, *20*(1), 3–41. https://doi.org/10.1111/j.1530-9134.2010.00282.x

Lyon, T. P., & Montgomery, A. W. (2015). The Means and End of Greenwash. *Organization & Environment*, *28*(2), 223–249. https://doi.org/10.1177/1086026615575332

Malmodin, J., & Lundén, D. (2018). The Energy and Carbon Footprint of the Global ICT and E&M Sectors 2010–2015. *Sustainability*, *10*(9), 3027. https://doi.org/10.3390/su10093027

Markle, G. L. (2013). Pro-Environmental Behavior: Does It Matter How It's Measured? Development and Validation of the Pro-Environmental Behavior Scale (PEBS). *Human Ecology*, *41*(6), 905–914. https://doi.org/10.1007/s10745-013-9614-8

Marks, L. U., Clark, J., Livingston, J., Oleksijczuk, D., & Hilderbrand, L. (2020). Streaming Media's Environmental Impact [Advance online publication]. *Media+Environment*. https://doi.org/10.1525/001c.17242

Masanet, E., Shehabi, A., Lei, N., Smith, S., & Koomey, J. (2020). Recalibrating Global Data Center Energy-Use Estimates. *Science*, *367*(6481), 984–986. https://doi.org/10.1126/science.aba3758

Maxime, E.-H., & Jean-Noël, G. (2020). Did The Shift Project really overestimate the carbon footprint of online video? Our analysis of the IEA and CarbonBrief articles. https://theshiftproject.org/wp-content/uploads/2020/06/2020-06_Did-TSP-overestimate-the-carbon-footprint-of-online-video_EN.pdf

Mayring, P., & Fenzl, T. (2019). Qualitative Inhaltsanalyse. In N. Baur & J. Blasius (Eds.), *Handbuch Methoden der Empirischen Sozialforschung* (pp. 633–648). Springer Fachmedien Wiesbaden. https://doi.org/10.1007/978-3-658-21308-4_42

Meszaros, J., & Buchalcevova, A. (2017). Introducing OSSF: A Framework for Online Service Cybersecurity Risk Management. *Computers & Security*, *65*, 300–313. https://doi.org/10.1016/j.cose.2016.12.008

Molla, A., Abareshi, A., & Cooper, V. (2014). Green IT beliefs and pro-environmental IT practices among IT professionals. *Information Technology & People*, *27*(2), 129–154. https://doi.org/10.1108/ITP-10-2012-0109

Molla, A., Pittayachawan, S., & Cooper, V. A. (2009). IT and Eco-sustainability: Developing and Validating a Green IT Readiness Model. *ICIS 2009 Proceedings*, 141. http://aisel.aisnet.org/icis2009/141

Moore, G. E. (1965). Cramming more components onto integrated circuits [Article 8]. *Electronics Magazine*, (38), 114.

Moore, G. E. (1975). Progress in Digital Integrated Electronics. *IEDM Tech. Digest*, 11–13.

Moosbrugger, H., & Kelava, A. (Eds.). (2020). *Lehrbuch. Testtheorie und Fragebogenkonstruktion* (3., vollständig neu bearbeitete, erweiterte und aktualisierte Auflage). Springer.

Nash, K., & Wakefield, R. L. (2021). The Role of Identity in Green IT Attitude and Intention. *Journal of Computer Information Systems*, 1–11. https://doi.org/10.1080/08874417.2021.1960221

Netflix. (2021). Environmental Social Governance Report 2021. Retrieved April 25, 2022, from https://about.netflix.com/en/sustainability

Oates, B. J. (2006). *Researching Information Systems and Computing*. Sage Publications Ltd.

Obringer, R., Rachunok, B., Maia-Silva, D., Arbabzadeh, M., Nateghi, R., & Madani, K. (2021). The Overlooked Environmental Footprint of Increasing Internet Use. *Resources, Conservation and Recycling*, *167*, 105389. https://doi.org/10.1016/j.resconrec.2020.105389

Orange, E., & Cohen, M. A. (2010). From Eco-Friendly to Eco-Intelligent. *The Futurist*, *44*(5), 28–32.

Pakkala, D., & Spohrer, J. (2019). Digital Service: Technological Agency in Service Systems. In T. X. Bui (Ed.), *Proceedings of the 52nd Annual Hawaii International Conference on System Sciences* (pp. 1886–1895). https://doi.org/10.24251/HICSS.2019.229

Pennycook, G., Cheyne, J. A., Barr, N., Koehler, D. J., & Fugelsang, J. A. (2015). On the Reception and Detection of Pseudo-Profound Bullshit. *Judgment and Decision Making*, *10*(6), 549–575. https://econpapers.repec.org/RePEc:jdm:journl:v:10:y:2015:i:6:p:549-563

Petrocelli, J. V. (2018). Antecedents of Bullshitting. *Journal of Experimental Social Psychology*, *76*, 249–258. https://doi.org/10.1016/j.jesp.2018.03.004

Purvis, B., Mao, Y., & Robinson, D. (2019). Three Pillars of Sustainability: In Search of Conceptual Origins. *Sustainability Science*, *14*(3), 681–695. https://doi.org/10.1007/s11625-018-0627-5

Robinson, M., & Crowther, D. (2001). Environmental Science Literacy in Science Education, Biology & Chemistry Majors. *The American Biology Teacher*, *63*(1), 9–14. https://doi.org/10.2307/4451023

Rowley, J. (2012). Conducting Research Interviews. *Management Research Review*, *35*(3/4), 260–271. https://doi.org/10.1108/01409171211210154

Rutsch, J. (2020). Greenwashing oder Vorbild? Die Klimaziele von Google, Facebook, Amazon und Co. *hr-iNFO*. https://www.ardaudiothek.de/episode/hr-info-wissenswert/greenwashing-oder-vorbild-die-klimaziele-von-google-facebook-amazon-und-co/hr-info/86561084/

Sands, H., & Morison, B. (2020). Greenwashing in the Information Industry. *The IJournal: Graduate Student Journal of the Faculty of Information*, *5*(2). https://doi.org/10.33137/ijournal.v5i2.34413

Sandvine. (2020). The Global Internet Phenomena Report COVID-19 Spotlight. Retrieved December 2, 2021, from https://www.sandvine.com/hubfs/Sandvine_Redesign_2019/Downloads/2020/Phenomena/COVID%20Internet%20Phenomena%20Report%20200200507.pdf

Santarius, T., Pohl, J., & Lange, S. (2020). Digitalization and the Decoupling Debate: Can ICT Help to Reduce Environmental Impacts While the Economy Keeps Growing? *Sustainability*, *12*(18), 7496. https://doi.org/10.3390/su12187496

SBTi. (2020). *SBTi criteria and recommendations*. Retrieved December 16, 2021, from https://sciencebasedtargets.org/resources/legacy/2019/03/SBTi-criteria.pdf

SBTi. (2021). *Taking the Temperature: Assessing and Scaling-Up Climate Ambition in the G7 Business Sector*.

Schiettekatte, A. F. R. (2021). *Environmental Impact of Producing and Operating Server Infrastructure: A Systematic Literature Review* [Bachelor Degree Project]. University of Skövde [[Bachelor Degree Project in Information Technology]].

Schmidt, N.-H. (2011). *Environmentally Sustainable Information Management: Theories and Concepts for Sustainability, Green IS, and Green IT* (1. Aufl., Vol. 64). Cuvillier. https://cuvillier.de/de/shop/publications/295-environmentally-sustainable-information-management

Schreier, M. (2014). Varianten qualitativer Inhaltsanalyse: Ein Wegweiser im Dickicht der Begrifflichkeiten. *Qualitative Social Research*, *15*(1), Article 18. https://doi.org/10.17169/fqs-15.1.2043

Seele, P., & Gatti, L. (2017). Greenwashing Revisited: In Search of a Typology and Accusation-Based Definition Incorporating Legitimacy Strategies. *Business Strategy and the Environment*, *26*(2), 239–252. https://doi.org/10.1002/bse.1912

Spicer, A. (2018). *Business Bullshit*. Routledge.

Spotify. (2021). Equity and Impact Report 2021. Retrieved April 25, 2022, from https://www.lifeatspotify.com/diversity-equity-impact/climate-action

Stevenson, H. (2021). Reforming Global Climate Governance in an Age of Bullshit. *Globalizations*, *18*(1), 86–102. https://doi.org/10.1080/14747731.2020.1774315

TeleGeography. (2021). Global Internet Geography: Executive Summary. Retrieved December 2, 2021, from https://www2.telegeography.com/hubfs/assets/product-tear-sheets/product-page-content-samples/global-internet-geography/telegeography-global-internet-geography-executive-summary.pdf

TerraChoice. (2009). The Seven Sins of Greenwashing: Environmental Claims in Consumer Markets.

The Shift Project. (2019). Climate Crisis: The Unsustainable Use of Online Video. Retrieved March 21, 2022, from https://theshiftproject.org/en/article/unsustainable-use-online-video/

The Shift Project Materials. (2019). 1byte Model Applied to Video Traffic [[video+ materials]]. Retrieved May 2, 2022, from https://theshiftproject.org/wp-content/uploads/2020/06/Video-Materials-1byte-Model-applied-to-video-traffic-updated-2020.xlsx

U.S. EPA. (2021). Clean Energy Finance: Using Renewable Energy Certificates to Achieve Local Environmental Goals. https://www.epa.gov/sites/default/files/2021-04/documents/usepa_renewableenergycertificates_april_2021.pdf

Vrana, J., & Singh, R. (2021). Digitization, Digitalization, and Digital Transformation. In N. Meyendorf, N. Ida, R. Singh, & J. Vrana (Eds.), *Handbook of Nondestructive Evaluation 4.0* (pp. 1–17). Springer International Publishing. https://doi.org/10.1007/978-3-030-48200-8_39-1

Wagner, K., & Schramm-Klein, H. (2019). Alexa, Are You Human? Investigating Anthropomorphism of Digital Voice Assistants – A Qualitative Approach. *ICIS 2019 Proceedings*, Article 7. https://aisel.aisnet.org/icis2019/human_computer_interact/human_computer_interact/7

Warde, P. (2011). The Invention of Sustainability. *Modern Intellectual History*, *8*(1), 153–170. https://doi.org/10.1017/S1479244311000096

Widdicks, K., Hazas, M., Bates, O., & Friday, A. (2019). Streaming, Multi-Screens and YouTube. *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*, 1–13. https://doi.org/10.1145/3290605.3300696