Consumers' perception about environmental CSR practices in the tech industry: the case of Google

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ABSTRACT

This master thesis aims to understand the consumers' perception and awareness about environmental corporate social responsibility (CSR) practices in the tech industry, specifically for the major worldwide search engine, Google. What could be the drivers of a change in perception? It is hypothesized that the variables: respondents' contact with CSR practices and respondents' level of interest in CSR topics can have an impact on consumers' perception. Based on prior research, the author develops a new scale to assess consumers' perceptions and awareness comprised of 15 statements graded in a 1 to 6 Likert scale. The key point of the research, the survey, was conducted to target a specific population: Spanish Millennials and Gen Z aged between 18 to 40 years.

The research is complemented by in-depth interviews with experts in the fields of telecommunications and sustainability to present joint conclusions. Results determine there are no significant perception discrepancies among the respondents, who tend to place themselves in neutral positions between "slightly disagree" and "slightly agree". Yet, respondents tend to agree that they perceive Google's practices as "greenwashing". According to the data, the variables of interest do not show to affect consumers' perceptions. Surprisingly, slightly different perceptions were observed analyzing the results according to respondents' age range and educational level achieved.

Results can be used for the company to understand how it is perceived by the different segments of the studied population and re-assess current practices. Additionally, the study can foster future research encouraging the use of cross-cultural samples or study other business cases.

Keywords

Corporate social responsibility, consumer perception, tech industry, CDR, environment

INTRODUCTION

Corporate Social Responsibility (CSR) practices are trendy nowadays; companies engaging in them want to show to their customers that they care and are committed to contribute towards environmental and societal welfare. CSR practices have been extensively studied regarding their internal and external impact, how they affect a company's performance (Bernal-Conesa, Briones-Peñalver, & De Nieves-Nieto, 2017), employer branding (Shen, Au & Li, 2020), or companies' reputation towards their clients (Khojastehpour & Johns, 2014).

Justification

While the specific topic of the research (environmental CSR practices in the tech industry) has not been present within the curricula of the master studies, the author sees a good fit with the overall focus of the master and its contents. In addition, it is a first introductory step investigating CSR practices for digital products (intangibles) as the author is considering the option of pursuing a Ph.D. at a later point. Lastly, the motivation to focus on the tech industry arises from the author herself, who is currently working in the operations and sustainability departments of a startup. The insights on the consumers' perception of the environmental CSR practices can be useful when drafting the CSR strategy for the company.

Objective and scope

In this master thesis, an empirical study is conducted to analyze consumers' perception and awareness about environmental CSR practices for the case of a specific company in the tech industry, Google. The study wanted to identify what factors could affect consumer perception and awareness of environmental topics and environmental corporate practices. The population object of study are Spanish millennials and gen Z.

The master thesis is structured in four sections. The first section composes the literature review, aiming to provide a state-of-the-art analysis on consumers' perceptions about CSR practices, new trends in CSR practices, and scales to analyze perceptions. The second section, the methodology of the study, includes all the relevant information regarding the study, the new scale, and setup (for survey and interviews). The third section, the data analysis, and results, is the core of the research and explains how the empirical study was carried out. Lastly, in the fourth section, the general conclusions of the research are explained as well as the limitations of the study to encourage further research.

Lastly, the scope of study could be linked to the following SDGs:

- Climate action (Goal 13): Focusing on studying environmental CSR practices of a major company within the technology industry can give insights into how consumers perceive the company's efforts to fight the climate emergency
- Partnership for the Goals (Goal 17): The study involves multiple stakeholders and only working together a substantial change can be made which in its turn directly impacts and fosters the contribution towards goal 13.

1 LITERATURE REVIEW

1.1 Introduction

Society is found in a critical situation, where it is required to act towards the climate emergency (in its turn achieving the agenda 2030 and the SDGs). In that regard, CSR practices have been commonly adopted for some time, and companies are required to take action on society's challenges (Falck & Heblich, 2007). By engaging in such practices, many companies seek to increase their reputation and obtain a competitive advantage (Porter & Kramer, 2006). However, this increased the number of companies that use CSR as a marketing tool to sell an unreal -improved- image of the company's performance and attract a higher share of customers. This practice is known as greenwashing (De Vries et al., 2015; Szabo & Webster, 2021).

Also, recently, the economy has experienced a strong digital shift due to the pandemic. The internet and other digital technologies have become the main channel of communication with the greater public. Companies in the tech industry provided the tools that allowed people to connect, communicate, work amidst the pandemic and this has been boosted their economic performance (Streitfeld, 2021).

Yet, the tech industry has not been the focus of much research regarding their CSR practices. CSR practices have been widely discussed and analyzed for other products (i.e., clothes, (Księżak, 2017) and food (Hartmann, 2011)). It is worth adding that the tech industry is responsible for 2 to 4 percent of the global GHG emissions (UNEP, 2021) which is similar to the airline industry (Griffiths, 2020).

The literature review starts defining what corporate social responsibility is and the origins of the term. It also explains what type of practices are considered to fall within the "environmental pillar". Parallelly, it explores new trends in the tech industry as "green IoT" and states potential dangerous environmental malpractices (greenwashing) which can have an impact on consumers' perception and brand reputation and performance. It also investigates the potential effect of new regulations affecting the industry.

Altogether, it creates the theoretical framework (foundation) to later analyze the results of Spanish consumers' perception of environmental CSR practices for a specific case in the tech industry – and one of its major players: Google.

1.2 Main body

The first-time academia researched what is the purpose of business, the view was narrowed to economic purposes and legal market compliance (Friedman, 1970). With time, the definition included other aspects (social issues/communities, environmental impact), shifting from a shareholder approach towards a stakeholder approach where the needs/interests and demands from all involved parties are considered.

CSR can be defined in multiple ways – as it includes different dimensions-, and therefore, there is no unified definition of the term yet. Generally, it could be defined as the positive impact of businesses on their diverse stakeholders (Joo, Miller & Fink, 2019).

Dahlsrud (2008) while analyzing different definitions of CSR considers 5 dimensions: social, economic, environmental, stakeholder and voluntariness. This means, understanding the impact of companies in society, financial performance, the environment, the different players involved (stakeholders), and the fact that companies go beyond what is legally required. These 5 dimensions can be found in Sarkar & Searcy (2016) when they analyze the definition of CSR over periods of time. "Voluntariness" for the study is now called "discretionary" but it is understood in the same manner, where the company goes beyond the legal requirements, they change "environmental" for "sustainability" as they account for more the concept of the long run and future generations. They also include a sixth category "ethical" responding to moral and fairness.

Ojeda-Hidalgo (2014) concludes after analyzing different definitions of CSR within the academia over the decades, that the best approach for transnational companies is to focus on the theory of "mixed value" ("*teoría del valor mezclado*") where one can find 3 dimensions: economic value, social value, and environmental value, indicating the need for all three values to happen at the same level (a similar approach to the Triple Bottom line).

CSR became the way to articulate an integral and integrated strategy to set sustainability – in terms of sustainable development - in the core of businesses. Besides the external pressure to respond to nowadays problems, companies also benefit from adopting CSR practices. Some of the benefits studied are an increase in reputation, know-how, employee loyalty, and retention (Shen, Au & Li, 2020).

For the study, CSR is understood as the Triple Bottom Line - accounting framework that incorporates three dimensions of performance: social (people), environmental (planet), and financial (profit) (Elkington, 1997). The focus will be on the "Planet" pillar, researching environmental CSR practices in the tech industry (Księżak & Fischbach, 2017). Recently, the environmental component has become more recurrent in the different definitions (Sarkar & Searcy, 2016), fostered by the climate emergency (Bui, Nurul Houqe, & Zaman, 2021). and the COVID-19 pandemic (Manzanedo & Manning, 2020; Zanni, 2020) or after understanding environmental deterioration as the largest externality to which companies have to react (Forcadell, Úbeda, & Aracil, 2021).

Some studies have investigated the reasons driving companies to implement environmental CSR practices (Babiak & Trendafilova, 2011; Allen, 2006; Khojastehpour & Johns, 2014). Their findings concluded that there were primarily strategic motives rather than legitimacy ones pushing the change, specifically having the leader/first-mover advantage and developing a partner network. After that, legitimacy motives were in place in regards such as compliance to societal norms or the mimetic approach, i.e. (copy or adopt practices from industry peers, for example) (Babiak & Trendafilova, 2011) and the positive effect of such practices on company's reputation and profitability (Allen, 2006; Khojastehpour & Johns, 2014).

The academia has chosen the tech industry as a subject of several studies to understand the effects of CSR practices in terms of efficiency and social ratings (Wang et al., 2014) and the effects of CSR practices on employment relationships (Cézanne & Rubinstein, 2011). The author found one study researching the effects of CSR practices (reputation) for the IT industry – taking Microsoft, Apple, and Google as case studies, and the company's performance (Bartscht, 2013). Such findings are coherent with previous research where CSR usage can influence consumers and their beliefs, attitudes, and (purchase) choices, specifically in the case of proactive initiatives having a positive effect on consumers (Becker-Olsen, Cudmore & Hill, 2006).

In addition, consumers might be thinking easily about the impact of their choice of flying while traveling or the purchase of new clothes from the fast fashion industry on the environment, but not many consumers are aware of the environmental impact of their internet usage (Griffiths, 2020). There's literature missing on consumer perception on environmental impact on internet usage, and as we go towards a more digital and interconnected society, internet usage and Google especially being the search engine with major market share worldwide and keeping a steady position fluctuating around 85-90% (Statista, 2021), will play an important role.

Some studies have been assessing the Spanish market and technology companies. It has been confirmed that there's a statistically significant relationship between the integration of CSR and reputation; on the other hand, performance and internal improvement has also this effect on competitiveness and performance (Bernal-Conesa, Briones-Peñalver, & De Nieves-Nieto, 2017).

In addition, the tech industry has several subgroups – for which there's no clear classification of where the companies should belong to. Some of the subgroups are big data, cloud services, eCommerce, communications, media and entertainment, information systems and technology (IT), Internet of Things (IoT) (Boyden, 2021), however, according to Bloomberg (2021) the information technology sector is composed by: Technology Hardware & Equipment,

Semiconductors & Semiconductor Equipment, and Software & Services. The same distribution can be found using the GICS (MSCI, 2022).

To exemplify the confusion to classify the companies in the tech industry, Sands & Morison (2020) place Google and Amazon as part of the information industry. However, Bauer (2014) classifies Google together with Facebook and Twitter under social networking sites (SNS). Lastly, Google classifies itself as a search engine.

Information technology is a great enabler of business strategies and therefore also of CSR practices (Friedman & Friedman, 2011). Hence, it is expected to have a good performance of CSR practices for the companies which are part of the information technology industry.
However, this is opposed to the findings by Wang (2014) where firms with stronger technological capabilities are less likely to use CSR as an economic instrument as they can enable long-term returns with other means (innovation).

Similar to the confusion regarding the definition of CSR, there is no homogenous definition of what environmental sustainability is and therefore, different practices can be listed as environmental CSR for companies (Morelli, 2011). A new term has been created "Corporate Digital Responsibility (CDR) like CSR it includes mainly four dimensions: social, economic, environmental, and technological (Wade, 2020). One can think of CDR as an upgrade of the CSR's Triple Bottom model including the technological dimension (Potocan, 2021).

Other authors when defining CDR focus on the companies impacts while being part of the digital transformation, basing their theory on Carroll's pyramid and defining it as "concept to summarize the emerging responsibilities of corporations relating to their digitalization-related impacts, risks, challenges, and opportunities" (Herden et al., 2021, p.13), or on ensuring the ethical use of new technologies (Orbik & Zozulaková, 2019). Recently, it has been defined as the "set of shared values and norms guiding an organization's operations concerning four main processes related to digital technology and data: […] the creation of technology and data capture, operation and decision making, inspection and impact assessment, and refinement of technology and data" (Lobschat et al., 2021, p.875). The disparity of definitions seems to be sorted under 2 dimensions: the stakeholder dimension and the impact dimension (Andersen, 2021). While Herden et al. (2021) focus on the stakeholders of the company, Orbik and Zozulaková (2019) include a wider group, society (stakeholder dimension). On the other hand, focuses on preventing negative developments while Lobschat et al. (2021) focus on achieving positive development (impact dimension).

Regarding the environmental dimension, it is composed of the following: responsible recycling practices for digital technologies, disposal practices for digital technologies (including life span), and power consumption technologies (Wade, 2020). More generically, Metaxas & Tsavdaridou (2011) summarize the sub-areas of the environmental dimension as i) lifecycle analysis, ii) industrial ecology, and iii) design for disassembly.

Lee & Kim (2015) define climate change management practices (CCPs) which could be understood as environmental CSR practices: low-carbon product development, process efficiency improvement, energy source substitution, organizational engagement, supply chain partner collaboration, and carbon offsetting. They concluded that the most implemented was process efficiency improvement and the least organizational engagement. According to Zanni (2020), the environmental CSR practices fall within the following: energy use, recycling practices, pollution, and natural resources conservation.

In any case, it seems that the industry is missing to address supply chain collaboration, as done within the transport industry (Evangelista, 2014). The effect of training and responsible human management practices ensures success in the implemented environmental practices (Unsworth, Davis, Russell, & Bretter, 2021).

Parallelly, new "green" trends have appeared in the tech industry such as green IT – however, it was conceptualized at the beginning of the 2000s (Harmon & Auseklis, 2009)- and green IoT. Such trends could be understood as strategies including environmental CSR practices.

The key components of green IT (also known as green computing) are: a design for environmental sustainability; energy-efficient computing; power management; datacenters design, layout, and location; server virtualization; responsible disposal and recycling; regulatory compliance; green metrics, assessment tools, and methodology; environment-related risk mitigation; use of renewable energy sources; and eco-labeling of IT products (Murugesan, 2008). It has been proved that there's a relationship between Green IT practices and organizational performance (Ainin, Naqshbandi, & Dezdar, 2016).

Internet of Things (IoT) connects devices to exchange information (e.g., 5G), however, to do so consumes energy, pollutes, and creates e-waste. Green IoT is an improved version of IoT considering energy efficiency (Khan et al., 2021). According to Alsamhi et al. (2018), the focus should be not only on energy efficiency but rather on creating an environmentally friendly IoT (reducing carbon footprint, conservating resources, and managing efficient energy usage. According to Maksimovic (2018), it is needed to include e-waste and hazardous emissions as well in addition to toxic pollutions.

The major problem faced by the information technology industry is that most of its significant material impacts (to keep it out and running) are not visible as in the cases of other industries (with rather tangible goods) (Borning, Friedman, & Logler, 2020). However, the tool (carbon footprint calculator) has been proved to have an impact on individual perception and lifestyle, bringing the "invisible" visible (Edstrand, 2016). It is therefore not shocking that the carbon emission impact of a company is measured in terms of carbon footprint, using the GHG Protocol standard worldwide (Walenta, 2021).

It is proved that firms that invest in carbon disclosure, have higher reporting integrity which might translate into higher quality reporting (Bui et al., 2021). Other authors have investigated the positive relationship between environmental disclosures (carbon emission) and a company's cost of equity (COE) (Garzón-Jiménez & Zorio-Grima, 2021), which could grant a potentially advantageous position of the company in the market.

One must not forget that while companies are making efforts to report on their CSR practices and sustainability strategies, greenwashing is still present nowadays. Greenwashing can be understood as misleading consumers about the company's environmental performance of a product or service using positive communication strategies (Delmas & Burbano, 2011). Other authors define it as publicizing efforts while doing surface-level work, without really contributing to the climate crisis (Sands & Morison, 2020).

Google and Amazon have already been studied as case studies for their potential greenwashing practices (Sands & Morison, 2020). Moreover, recently, it has been shown that the data about the companies' carbon footprint -scope 3 GHG emissions- is underreported for several tech companies – Google, IBM, or SAP (The Associated Press, 2021).

With this in mind, the European Commission is currently drafting the CSRD (Corporate Sustainability Reporting Directive) which will be aligned with the soon-to-be-published EU Taxonomy, and its special focus on the 6 environmental objectives. The directive aims to standardize the reporting to facilitate the comparison among companies. The new regulation is expected to reduce greenwashing efforts as minimizes one of the drivers (Delmas & Burbano, 2011) and fulfills the recommendations to address greenwashing in the information industry: i) provides clear and standardized definitions, ii) enforces transparency, iii) penalizes for misinformation (Sands & Morison, 2020).

In terms of how to assess CSR practices, there is a disparity of criteria. Cuadrado-Ballesteros, García-Sánchez & Martínez-Ferrero (2017) sets as scoring results for environmental issues gathered from the EIRIS database: i) environmental policy and commitment, ii) environmental management system, iii) environmental report and iv) level of improvements in environmental impact. Fatma, Rahman, and Khan (2014) focus their study on the banking sector, but include some of the mentioned criteria, with different wording: communicates to its customer its environmental practices, instead of "environmental report" and includes reducing the consumption of natural resources and exploits renewable energy in a productive process compatible with the environment.

Others, Chang, Lu, Chen, and Huang (2021) focus on the product, setting as criteria: resource reduction, product innovation, and emissions reduction. Specific criteria are set for the hospitality (tourism) industry (Alvarado-Herrera et al, 2017; Fatma, Rahman & Khan, 2016; Fung Wong & Kim, 2020).

And a more detailed set of criteria is developed by El Akremi et al. (2018) to understand employee perception of a company's CSR, the criteria referring to environmental dimension are displayed as follows (El Akremi et al., 2018, p.630):
- *Our company takes action to reduce pollution related to its activities (e.g., choice of materials, eco-design, and dematerialization).*
- *Our company contributes toward saving resources and energy (e.g., recycling, waste management).*
- *Our company makes investments to improve the ecological quality of its products and services.*
- *Our company respects and promotes the protection of biodiversity (i.e., the variety and diversity of species).*
- *Our company measures the impact of its activities on the natural environment (e.g., carbon audit, reduction of greenhouse gas emissions, global warming).*
- *Our company invests in clean technologies and renewable energies.*
- *Our company encourages its members to adopt eco-friendly behaviour (sort trash, save water and electricity) to protect the natural environment.*

1.3 Conclusions

It has been proved that environmental CSR practices are on the rise. The tech industry is a complex ecosystem with a multiplicity of subgroups (industries) within. It is a broad field with lots of potential. Companies are on the quest to adopt CSR (and especially environmental CSR) to get valued differently in the market by the consumers and take profit of their competitive advantage. However, not much literature has been found which analyzes the consumers' perception of such practices by high-tech companies.

There's also a need to focus the study on one specific case to be able to comply with the timeline of the master thesis. Therefore, the research question is the following: are consumers aware of the environmental CSR practices in the tech industry, specifically in the subindustry of software and services, taking the case of Google? What are consumers' perceptions about these practices?

In addition to the main research question, it is intended to answer the following as well: what are the factors that could affect consumer perception and awareness? Hypothesizing that daily contact with CSR practices due to professional or educative reasons as well as the level of interest in CSR topics can have an impact on consumers' perception.

Given the time limitations, this research aims to bring some light into one specific high-tech company case of study from consumers' perspective from one unique country. It is intended to be a starting point to foster future research (using cross-cultural samples or other company cases, for instance).

2 METHODOLOGY OF THE STUDY

2.1 Changes from the initial proposal

After the literature review, the author has decided to change slightly the methodology of the investigation regarding the original thesis proposal. It has been assessed that the tech industry is diverse and has several subgroups (sub industries). The initial idea of assessing 5-10 companies falling within different subgroups as an example, social media (Facebook), Internet of Things (Google), eCommerce (Amazon)), makes the analysis and research complicated given the allocated time for the completion of the thesis.

Therefore, the author has decided to focus on one company: Google. The decision has been based considering the market share of the company (in September 2021 the market share was

86,64%, followed by Bing at 6,79% and Yahoo at 2,75%) (Statista, 2021) and the diversity of products that the company offers (online services and devices, among others) (Google, 2022).

Lastly, data from 2018 estimated that Google processes daily 3,5 billion searches, activities for which the company accounts for around 40% of the internet's carbon footprint (Quito, 2018). All facts reinforce Google's popularity and extensive usage of the Internet, and therefore, it becomes an optimal case study.

2.2 Investigation method

Regarding the investigation method, for this study, a mixed approach is followed: primarily qualitative as it aims to analyze experts' perspective regarding environmental CSR practices in the tech industry and in particular, Google. Then, as explained in the following section, a survey was carried out to examine consumers' awareness and perceptions of environmental CSR practices of Google using the author's developed scale.

Quantitative tools are used to analyze the results of the survey. Both methods complement each other, the author expects to have a better outcome (investigation with more value) than if she would just focus on one approach. These are better explained in the following section.

2.3 Data obtention and data access

2.3.1 General

Up to the present day, the author couldn't find a study answering similar research questions, therefore, new data will be collected for this study. About the data obtention, it has come mostly from primary fieldwork supported by secondary sources. Secondary new data has been added to be able to ensure that the consumers are asked about real and current Google's environmental CSR practices.

Primary sources:
- Semi-structured interviews with experts (via video call):
  - Expert in Telecommunications engineering:
    - Understand the limits of current technology
  - Expert in CSR:
    - Discuss current/potential environmental CSR practices which can help within the tech industry and especially Google as well as potential results on the consumers' perception
- Survey about Google's environmental CSR practices and consumers' perception about them (created using Google Forms). The full survey can be found in the annexes (section b.) of this study.

  - Including more open, qualitative questions: a list of statements (based on previous literature and Google's CSR environmental practices) where the respondent will have to punctuate in a 6-point Likert scale based on Nemoto & Beglar (2014, p.5) (1: Strongly disagree-6: Strongly agree) + 3 words (free of choice) to summarize how the participant perceives Google generally
    As an example:
    - To what extent do you agree with the following statements?
    Question type: Likert scale 1-6 (1- Strongly disagree, 2- Disagree, 3- Slightly disagree, 4- Slightly agree, 5- Agree, and 6- Strongly agree)
    (Selection of statements)
      - I understand Google as a company committed to nowadays climate issues
      - Google has reduced its carbon emission
      - I perceive Google's practices as "greenwashing"

  - But also, quantitative questions: asking for specific numbers (carbon footprint values, cost of carbon offsetting)

As an example:
● How much does it cost to offset a ton -1,000 kg- of CO2 emissions? (in euros)
Question Type: Multiple choice (<10€, 11-30€, 31-50€, 51-70€, 71-90€, 91-110€, >111€)
The description included: There is no single value as the price per ton depends on several factors: i) the place where it is compensated, ii) the technology used and iii) the industry in question. For this exercise, you can think of compensating for a return flight Barcelona - Stockholm (which is 1,020 kg of CO2).

o Data on the participants: gender, age, nationality, level of studies, level of interest for CSR topics, and contact with CSR (educational, at work)

Secondary sources:

• Additional information under Google Sustainability (2022c), data to complete the choice of statements for the survey and develop the scale.

Google's sustainability strategy is articulated upon 3 pillars, which are materiality topics: carbon (emissions), circular economy, and water. The mission statement is clear: "Carbon neutral since 2007. Carbon-free by 2030" (Google Sustainability, 2022c). Additionally, Google takes pride in its multi-stakeholder effort as it "continue[s] to lead and encourage others to join in improving the health of our planet." (Google Sustainability, 2022d).

The main commitments and developed strategies are detailed:
• Carbon (Google Sustainability, 2022b):
  o In order to decarbonize the economy, Google is looking at next-generation geothermal energy and carbon-intelligent computing.
  o $5.75 Billion was deployed in sustainability bonds, enabling environmentally or socially responsible projects
  o Google has invested (is investing) in creating carbon-free energy for a total production of 5GW by 2030

The goal of carbon-free energy by 2030 is a challenging one since the company includes its datacenters on the target. According to Nimmo (2021), data centers are the soft spot of the tech industry regarding carbon emissions.

• Circular economy (Google Sustainability, 2022)
  o Circular design to enable reuse, repair, and recovery, having 100% of "made by Google" products launching in 2022 to include recycled materials
  o Implementation of minimization of waste generation to achieve Zero Waste to Landfill (from data center operations)

• Water (Google Sustainability, 2022e)

  o Data centers make use of water as a cooling system. Google is committed to being water positive by 2030 (replenishing 120% of the water consumed).
  o Improvement of water management techniques to include circular and water recycling practices.

Additionally, Google uses its own technology to expand its impact, either through partnerships or Google tools, users can make more sustainable choices (Grant, 2021):
• Sustainable routes displayed on Google Maps or recycling information
• Carbon neutral products running on Google's cloud and tools for users to measure and report carbon emissions (Google Cloud, 2022)

2.3.2 Interviews

For the interviews, a set of questions was prepared beforehand however allowing additional questions if required by the author at her discretion given the direction of the interview. The final scheme of the interviews can be found in the annexes (section a.).

2.3.3 Survey

The survey is the central part of the work as it allows obtaining the perception of consumers regarding Google and its environmental CSR practices (object of study). The survey resulted in 14 questions with 2 questions including 4 sub-questions and 15 sub-questions respectively split into 3 different sections (general questions, questions about Google, and statistical data). The last section -statistical data- was placed last intentionally to capture honest and unplanned results from the respondents. In addition, an introduction section was included (it was thought to be displayed on the initial screen) giving further details about the survey. The final scheme of the survey (questions, type of question, and description) can be found in the annexes (section b.).

To create the survey questions, different papers were studied, decomposing the elements which were included as part of the scale for CSR perception, for the focus of "environment" or "environmental CSR". The elements were grouped by similarity of content and named with a common topic that summarizes it. The materiality topics of Google CSR practices, present in Google's webpage "Google Sustainability" (Google Sustainability, 2022c) were included.

The author decided not to assess the materiality topics covered in the Sustainability report as it was thought that the general public would visit the webpage instead of the report. The results of the comparison are displayed in Table 1. While Wong & King (2020) covered more topics than any other article explored, it was primarily focused on the hospitality industry for the assessment of employees. The author has decided to follow the scale proposed by El Akremi et al. (2018) and include the items for "Carbon emissions", "Solid waste" and "Water" from Suganthi (2020) as they are relevant to the sustainability corporate practices of Google and thus, had to be included.

Table 1. Analysis of different scales and the topics covered

Author/ Topic	Materiality topics of Google	Suganthi (2020, p.13)	Alvarado-Herrera et al. (2017, p. 260)	Fung Wong, Kim (2020, p.5)	Fatma, Rahman & Khan (2016, p.46)	El Akremi et al. (2018, p. 630)
Sustainable investments	-		The company is trying to allocate resources to offer services compatible with the environment		This company have a positive predisposition to the use, purchase, or production of environmentally friendly goods	Our company makes investments to improve the ecological quality of its products and services
Energy	Indirectly stated		The company is trying to allocate resources to offer services compatible with the environment	Extent of effort to reduce energy usage in guest room (e.g., occupancy and daylight sensor)	This company exploits renewable energy in a productive process compatible with the environment	Our company invests in clean technologies and renewable energies
Pollution/carbon emissions	Directly stated	The company has reduced its carbon emission	The company is trying to carry out programmes to reduce pollution	Extent of effort to reduce greenhouse gas/carbon emission in guest room (e.g., better control of heating/cooling system)		Our company takes action to reduce pollution related to its activities (e.g., choice of materials, eco-design, and dematerialization)
Environment protection	-		The company is trying to protect the environment	Extent of effort to protect natural environment	This company is concerned with respecting and protecting the natural environment	Our company respects and promotes the protection of biodiversity (i.e., the variety and diversity of species)

Solid waste	Directly stated	The company has reduced its solid wastes generation	The company is trying to recycle its waste materials properly	Extent of effort to implement the reuse/recycle program in guest rooms (e.g., linen/towel reuse/recycle card reminder)		
Preservation of resources	Indirectly stated		The company is trying to use only the necessary natural resources	Extent of effort to conserve natural resources	This company reduces its consumption of natural resources	Our company contributes toward saving resources and energy (e.g., recycling, waste management)
Water	Directly stated	The company has reduced its waste water generation		Extent of effort to reduce water usage in guest room (e.g., low flow plumbing).		
Toxic materials	-	The company has decreased its consumption of hazardous/harmful/toxic materials				
Environmental accidents	-	The frequency of environmental accidents has been reduced				
Balanced ecosystem	-			Extent of effort to maintain a balanced ecosystem (e.g., sustainable food chain)		

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Stakeholders	Directly stated	Trying to sponsor pro-environmental programmes	Extent of effort to educate employees, customers, and partners to support the environmental protection		Our company encourages its members to adopt eco-friendly behaviour (sort trash, save water and electricity) to protect the natural environment
Communication	Indirectly stated			This company communicates to its customer its environmental practices	Our company measures the impact of its activities on the natural environment (e.g., carbon audit, reduction of greenhouse gas emissions, global warming)

Font: Gemma Oleart

In addition, the author included five other statements (Common and Google) about Google CSR practices which were measured using a Likert scale from 1 to 6 (1- Strongly disagree, 2- Disagree, 3- Slightly disagree, 4- Slightly agree, 5- Agree and 6- Strongly agree).

The newly developed scale ("instrument") is included in the appendixes (section c.).

2.4 Sampling techniques

About the sampling for the survey, the study is aimed at the millennial's generation, also known as Generation Y (people born between 1981 and 1996) as well as Generation Z (born between 1997 and 2003)[1] as they are much more sensitive regarding climate change and take a rather active approach (Tyson, Kennedy & Funk, 2021) (i.e., "Fridays for future"). To have consistent results, the study is limited to Spanish nationals (to keep it a single country approach). The author needs to continue the study with at least 100 answers of qualifying respondents (meeting the requirements).

To access the data, the author sent the questionnaire among the students of the master, and it was shared on social media/LinkedIn to access a randomized sample of respondents matching the survey requirements (age range and nationality).

About the sampling of the interviews, a list of experts was set up looking for potential candidates on LinkedIn. The requirements were: i) a profound knowledge of the topic (telecommunications – including keywords such as Big Data, search engines, and CSR, including keywords as sustainability and SDGs), ii) native Spanish (to align the cultural mindset with the survey's respondents) and iii) availability to interview within the upcoming 2/3 weeks. The age wasn't defined as their input is important to understand the theoretical framework but not assess the perceptions in addition, due to the required level of expertise, the subjects will be older than the desired target group. The potential candidates were contacted within the course of the week.

2.5 Data analysis

Lastly, the data analysis has been done using basic statistic tools (for the quantitative information) as well as graphs and tables for its display and narrative analysis for the qualitative information. The software "Word It Out" (De Groote, 2022) was used to produce the word clouds.

It is hypothesized that people in contact with CSR practices -working in sustainability departments or studying related topics- and people with an intrinsic higher level of interest about CSR and sustainability topics might have a different perception than the rest of the respondents as it is expected that they have higher prior awareness ("subjective knowledge"). According to Lin (2002), such knowledge was found to have an effect in consumers' perceptions on investments and investment decisions).

3 DATA ANALYSIS AND RESULTS

3.1 Research

3.1.1 Interviews

Semi-structured interviews were conducted as expected. The author found and contacted two experts matching the criteria to conduct the interviews with them using LinkedIn. The experts have been chosen primarily for their training and knowledge in the field (technology and CSR). Spanish experts have been sought (to avoid cultural discrepancies between them and the study

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[1] The regular definition of Generation X are people born between 1997 and 2012 (Dimock, 2019), however, the study is limited to people above 18 years old, to be able to assess adult consumer perceptions.

participants that may affect the perception of the practices of the company, object of study). The transcript of both interviews is not included in the thesis due to their extension, but they are accessible upon request, to ensure data transparency.[2] Both interviews were conducted on December 7, 2021, using Zoom, after verbal agreement of the interviewees they were recorded to ensure a proper transcript afterward. The first one with the expert in CSR, Andrei Boar lasted for 45 min, and the second one with Àlex Escala, an expert in technology and telecommunications, lasted for 55 min.

Andrei Boar is currently pursuing a Ph.D. in business and economics focusing on sustainable mobility, which will be finished later this year. He is a professor of finance since 3 years ago and researches in the field of SDGs application and ESG performance. Àlex Escala holds a Ph.D. in Applied Mathematics, a master's in information security, and a double bachelor's degree in mathematics and telecommunications engineering. He currently works as a data scientist in the private sector.

The interview with Àlex Escala, expert in telecommunications, had the purpose to understand in depth the tech industry (including how Google works), understanding what carbon neutrality meant and what was the potential for the sector to adopt environmentally friendly practices.

The interview with Andrei Boar, expert in sustainability (SDGs) and perceptions, especially in the mobility sector, had the purpose to complete the theoretical framework (scale and method), define CSR, and see what the challenges are to drive sustainability further.

3.1.2 Survey

The survey was created using Google Forms. The settings were adjusted to keep the anonymity of the respondents. Due to the potential respondent profile, the survey was available in Catalan and Spanish (using two different links/URLs). The links to the survey were then shared on social media: Facebook, Instagram, LinkedIn, and WhatsApp.

A total of 111 answers were collected over 15 days (between the survey being published and closed). However, 7 had to be deleted due to the following reasons:
- Respondent's age range was <18: 1
- Respondent's age range was >40: 2
- Respondent's nationality wasn't Spanish: 3
- Respondent's age range was >40 and respondent's nationality wasn't Spanish: 1

The final dataset was composed of 104 respondents. The dataset with the survey's answers (Excel file) is not included in the thesis due to its extension, but it is accessible on the following link.

Out of the 104 respondents, 50 are female and 54 are male. 39 respondents have between 24 and 26 years, 15 respondents are between 27 and 29 years old, 12 are between 30 and 32 years old, 11 are between 36 and 40 years old and 21 and 23 years old, 9 are between 18 and 20 years old and lastly, 7 are between 33 and 35 years old. 49 respondents have a completed master's degree, 41 have a completed bachelor's degree, 12 have completed A-levels and lastly, 2 have a postgraduate or Ph.D. The level of interest for sustainability topics is generally medium, with 41 respondents grading it as "medium", followed by 34 respondents grading it as "high" and 29 respondents grading it as "low". The population of the study is generally not in contact with CSR practices, only 37 respondents are (due to studies or work motives), while 67 respondents aren't.

The average respondent of the study is a male between 24 and 26 years old, with a master's degree which is not in contact with CSR practices however he has a moderate (medium) interest in sustainability topics.

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[2] Please send an email to gemma-oleart@uoc.edu

Table 2. Distribution of respondents by gender

Gender	Count	%
Female	50	48,08%
Male	54	51,92%
Sum	104	100,00%

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Table 3. Distribution of respondents by age range

Age range	Count	%
18-20 y	9	8,65%
21-23 y	11	10,58%
24-26 y	39	37,50%
27-29 y	15	14,42%
30-32 y	12	11,54%
33-35 y	7	6,73%
36-40 y	11	10,58%
Sum	104	100,00%

Font: Gemma Oleart

Table 4. Distribution of respondents by educational level achieved

Educational level achieved	Count	%
A-levels	12	11,54%
Bachelor's	41	39,42%
Master's	49	47,12%
PhD	2	1,92%
Sum	104	100,00%

Font: Gemma Oleart

Table 5. Distribution of respondents by their level of interest in CSR topics

Level of interest in CSR topics	Count	%
High interest	34	32,69%
Medium interest	41	39,42%
Low interest	29	27,88%
Sum	104	100,00%

Font: Gemma Oleart

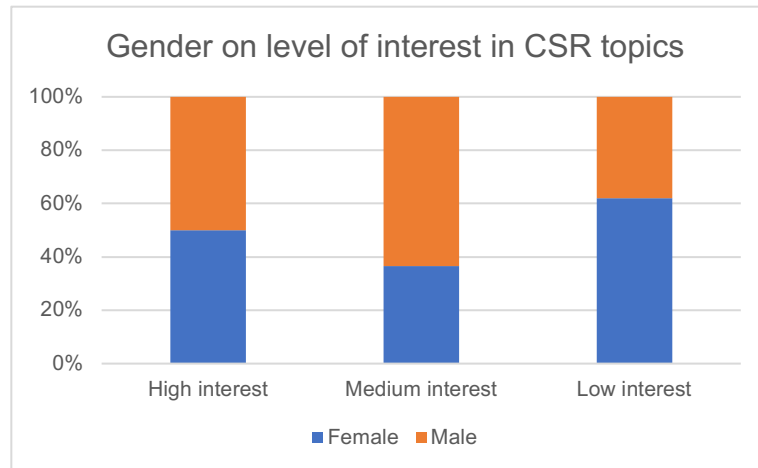Table 6. Distribution of respondents by contact with CSR practices

Contact with CSR practices	Count	%
Contact with CSR practices	37	35,58%
No contact with CSR practices	67	64,42%
Sum	104	100,00%

Font: Gemma Oleart

Additionally, due to a slightly higher share of male respondents, the author wanted to check if there was any specific distribution between gender and the rest of the statistical variables.

Graph 1 displays the percentage of respondents by gender according to their interest level on sustainability topics. Findings concluded that gender is randomly distributed across the sample only showing a slight predominance with a medium interest level of males over females.
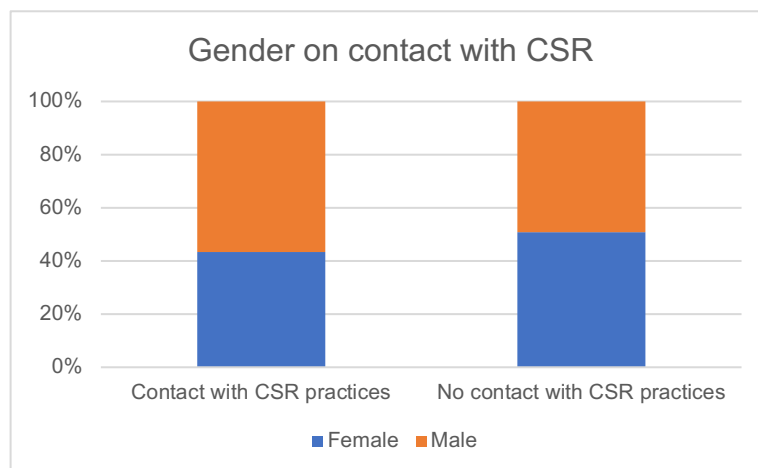
Graph 1. Distribution of respondents by gender according to their level of interest in CSR topics

Font: Gemma Oleart

Graph 2 displays the percentage of respondents by gender according to their contact (or absence) to CSR practices. Findings concluded that gender is homogeneously distributed across the sample.

Graph 2. Distribution of respondents by gender according to their contact with CSR practices

Font: Gemma Oleart

Looking at the results from graphs 1 and 2 the author considers it is not necessary to analyze the data according to gender.

Despite targeting millennials and gen z, the author wanted to see if there was any significant difference between the respondents' age range and their level of interest in CSR topics. Graph 3 displays the percentage of respondents by level of interest in CSR topics according to their age (range). Significant differences can be observed across the sample.

Graph 3. Distribution of respondents by level of interest in CSR topics according to their age range
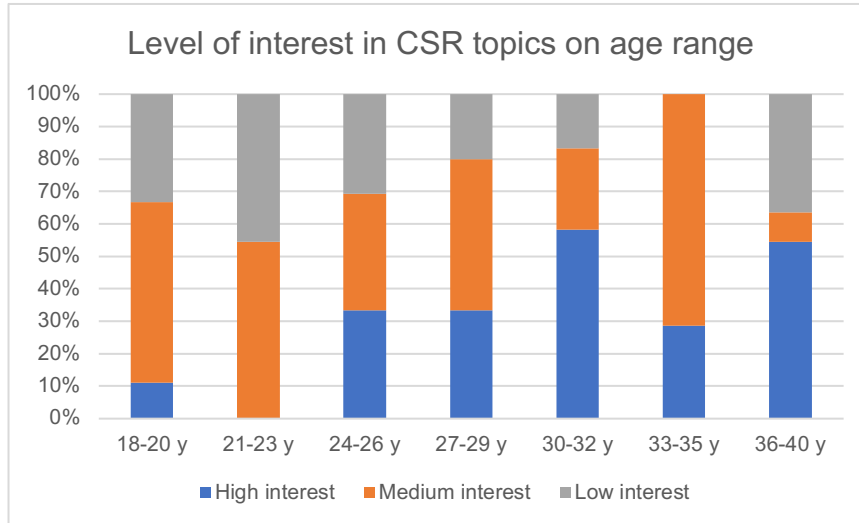
Font: Gemma Oleart

Lastly, in order to understand if education plays a role in a change in perceptions, both variables "educational level" and "level of interest of CSR topics" have been assessed together to see their distribution. Graph 4 displays the joint probability of both variables. From the graph, according to the sample, as the level of studies achieved increases, the level of interest in CSR or sustainability topics increases as well (the level of interest low remains untouched, but the medium interest share gets reduced and becomes high interest).

Graph 4. Distribution of respondents by level of interest in CSR topics according to their educational level achieved
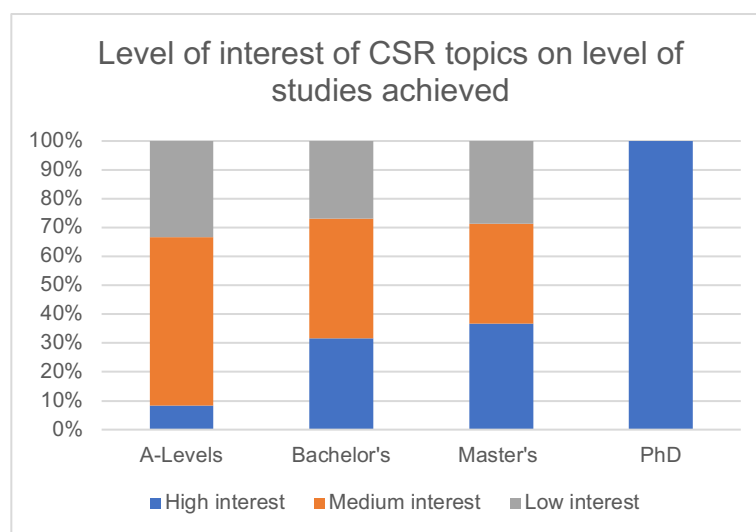
Font: Gemma Oleart

3.2 Data analysis

The answers from both links to the survey (different languages) have been put together in an Excel file ("the survey dataset"). The variable of "nationality" was removed as it was only to ensure that the respondents meet the necessary criteria. The data has been manipulated using statistical software (Excel) to obtain averages, joint probabilities and elaborate the necessary graphs. Regarding the open text question ("Define Google with 3 words"), to create the word cloud, the free-online software "Word it Out" (De Groote, 2022) was used.

The Excel file with the survey dataset as well as all calculations can be accessed on the following link.

3.3 Results

3.3.1 Interviews[3]

The analysis of the interviews follows the narrative approach. After carrying out two in-depth interviews with experts in the field (Andrei Boar, expert in CSR, and Àlex Escala, expert in telecommunications), the main themes were identified and presented in this section. Preliminary conclusions are also offered at the end of this section.

Definitions (introduction to the study's framework)

The two main elements of the framework on which the study is based are: i) the tech industry and ii) CSR (and its practices). Both concepts are open to multiple definitions, and they can lead to confusion as individuals might understand it in a different manner from one another. This "confusion" does not only refer to the general public but also within the academia, where they don't have a fixed definition and as the author confirmed when interviewing Àlex Escala, expert in technology and telecommunications, and Andrei Boar, expert in sustainability and consumer perception, respectively.

Despite initial thoughts of receiving a concrete definition, the definitions provided were slightly ambiguous. Mr. Escala defined the tech industry as "a very big thing where there are many companies that offer services or products of all kinds. What they have in common is that they are based on digital products and digital services". Mr. Boar defined CSR as "Simply a differentiation; it is to explain the sustainable things that the company is doing", however, the idea of "explaining" goes beyond the mere wording, as if such practices are not communicated efficiently to the end consumer/user (person of interest), they won't have an impact and won't serve as differentiation.

So, a first joint definition of the CSR practices in the tech industry would be that companies that offer digital products and services are explaining the sustainable things that they are doing. Theoretically, CSR practices are always the same, but in practice, they aren't as the key point for CSR's success is communication, not all practices can be replicated across industries as they differ about the stakeholders involved.

Perception on Google

The company object of study, Google, is widely known and used, being the most powerful search engine available nowadays. It was important for the author to understand the perception that Mr. Boar and Mr. Escala have on Google to later see how the results of the survey are, as

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[3] The quotes included in this section refer to the personal interviews the author had with the interviewees (Boar or Escala, personal communication, December 7, 2021).

respondents will be asked the same question. For Mr. Boar, Google could be defined as "dependency, integration-in the sense of being an all-in-one- and control. Meanwhile the perception of Mr. Escala was slightly positive choosing "revolution, monopoly, and speed".

As expected, perceptions are assessed according to mental frameworks, and therefore, it is noted that while Mr. Boar's choice of words would focus on the danger of such a tool, Mr. Escala ere focused on the use of technology. In both cases, the words "monopoly" and "control" could be seen as the same, since once you have the monopoly, you have the market power and hence, control of it.

Environmental CSR practices in the tech industry and Google

To understand what type of CSR practices Google does, one first has to understand the end-user, and Mr. Escala provided the necessary insights. Google provides products and services for the general end-user (individuals) such as Google Search, Gmail, Google Meet but also provides products and services for companies (developers) such as the Google Cloud Platform -which allows storing webpages or databases-. The products offered to individuals are usually free of charge, as Google monetized the data extracted from the user while the products offered to companies have a fee. Hence, it could be expected that Google communicates information to end-users (general public) and same or other information to professionals (developers). The survey of the study tackled the first aspect, until which point users are aware or know about such practices.

For the study, the focus was placed on environmental CSR practices. One way to compare ESG performance is using indicators that could give the reader an overview of how good or bad a company is doing in comparison to another. Unfortunately, as pointed out by Mr. Boar, there are not many homogenous indicators in the field of sustainable performance (or ESG) because most are lacking application, however, one of the most used is the carbon footprint. For the tech industry and especially Google, calculating the carbon footprint can be a challenge as it is difficult to estimate how many computers (or computers' time) are involved in a single Google search and therefore, it is also more difficult to estimate the carbon footprint of each of them.

However, considering all searches worldwide, "we could easily be talking about thousands of computers". Another difficulty to estimating the carbon footprint of a search is that "each search has a different consumption" as it depends on the search terms ad how often is requested (logically, popular searches should consume less as a predetermined answer is saved). Mr. Escala couldn't give an approximate value of the carbon footprint of a Google search and similarly, Mr. Boar couldn't either. For the author herself, it was difficult to find the value of a Google search studied some years ago. Instead, generally, companies focus on carbon neutrality (net emissions) goals, which were discussed with the interviewees. Mr. Escala recently learned about the concept as companies were sharing it online (usually in LinkedIn).

Carbon neutrality (in the tech industry and Google)

Mr. Escala defined carbon neutrality/net emissions as "Everything I consume, on the other hand, I reduce or remove from the environment, for example, CO_2". According to Plan A (2021), carbon neutrality is defined as "any CO_2 released into the atmosphere from a company's activities is balanced by an equivalent amount being removed". For Mr. Boar, the issue with the "net emission" goal -a recurring topic at the COP26 meeting- is that is rather focused on offsetting emissions rather than reducing them.

It is seen that there is a lot of confusion around these terms as society use to use them interchangeability however, there's a tiny difference between net-zero emissions and net-zero carbon emissions. While the first refers to the compensation of all GHG emissions of a company, the second refers to activities which release net-zero carbon emissions (Plan A, 2021).

Hence, from Mr. Escala's statement two alternative practices for carbon offsetting are drawn, a company can either i) invest in renewable energy which will replace non-renewable energy and/or ii) plant trees to remove CO_2 from the air. According to Mr. Boar, this view in carbon

neutrality goes beyond the scope of companies, as "Countries can also pollute more by paying others not to pollute".

Both interviewees raised concerns about adopting this kind of goal, instead of aiming for a reduction in the carbon footprint of certain product or service (reducing the actual emissions), what it is known as "net-zero carbon emissions", for a specific activity or "climate neutrality" if it refers to reduce to 0 all GHG emissions (Plan A, 2021). First of all, changes aren't immediate, they take time. Secondly, to foster the energy transition investment is needed and it could be financed by the offsetting practices of large companies such as Google. However, such behavior could be seen as the "easy choice" since the company would pay to shift away its responsibility.

While any help contributes to change, some efforts fall far short of what should be, or it is desirable (on an aggregate level) and here one faces the lack of incentives in the tech industry.

Lack of incentives in the tech industry and Google

In the tech industry, immediacy is the sign of quality and customers expect it as well, "Google has no incentive to not reward speed", as Mr. Escala said. While it is technologically possible to design algorithms with low emissions (trying to build them to pollute as little as possible), there are no incentives to do so, as customers could see it as a bad quality product. Society has to move away from this dichotomy [for the case of Google]: "We have the best searches in the world, or we have low emissions". Since a shift in demand is unlikely because there are not many alternatives and it would be costly for the user (due to the network effect), to shift supply, regulation understood as the supranational agreements have to change to prioritize or focus on reducing emissions rather than carbon offsetting.

Why does Google disclose carbon neutrality targets but not its own carbon footprint? Because it is not worth it. Since there is no mandatory disclosure on both information, companies are "free" to choose to disclose what they want and in either case, it would still be considered CSR practices. Additionally, focusing on net emissions targets allow companies to externalize their responsibility as Mr. Boar pointed out the margin to improve environmentally the tech industry is to focus on how energy is sourced. He stated that we, as society, have to be aware of the trade-off with the environmental aspect of technology, brand-new technology allows growth and new opportunities, but it pollutes. As an example, Mr. Escala, also an expert in cybernetics, pointed out the extensive energy consumption and pollution from cryptocurrencies, currently on trend. So, the lack of incentives is not only a problem found on Google, but rather largely extended.

The trap of greenwashing

But disclosing carbon-neutrality goals, it is not enough to tell that companies are sustainable because companies can still "fly their employees from HQ to offices in a private jet for convenience", as Mr. Escala pointed out for a known digital consultancy agency. Going back to the beginning, taking Mr. Boar's CSR definition, it is a differentiation technique, and as such, it aims at increasing sales and companies' revenue, therefore it is not surprising that most companies according to Mr. Boar conduct regular greenwashing techniques -presenting a better environmental performance of the company that it really is-. However, there are some -a few- [companies] that are truly committed to sustainability. Hence, the problem lies with the communication stage because "as long as no one controls it, it can be a source of manipulation", and therefore, potential greenwashing which in some cases might be difficult to discover for the general public.

To limit greenwashing, homogenous criteria (indicators, reporting guidelines) are implemented through regulation.

Need for regulation

According to Mr. Boar, it is needed that the regulation sees fit within the application framework as "most of them are an abstract application guide and we need to know how to land these guides in the reality of companies".

A proposed example to communicate CSR practices would be taking inspiration from the financial statements. Mr. Boar proposed to communicate information at two different levels, one part collecting all relevant and essential information (homogenous indicators such as carbon footprint) and a second layer collecting all other things a company might want to report on. The key point here is to achieve a homogenous reporting as "without it [reporting] there is no impact". Mr. Boar has seen – as an expert in finance as well, the blossom of ESG investment which requires that homogenous reporting. However, to arrive to the end customer information needs to be explained differently, and "that is pure marketing".

In either case, audits that are designed to ensure the correctness of information, should not only check that the norm's requirements are present in a specific document but also that the procedures included are done correctly, and for that companies need to increase transparency in their reporting (report on results but also procedures), an element which is far away in the tech industry.

Corporate Digital Responsibility (CDR)

The need for regulation of the tech industry not only applies to environmental aspects such as disclosure of the carbon footprint calculation but social and economic aspects as well such as user's rights and protection (a concern raised by Mr. Boar) or data monetarization procedures and handling (a concern raised by Mr. Escala).

According to Mr. Boar, the new concept of corporate digital responsibility (CDR) tackles this duality as "companies can have environmental externalities but also technological externalities which are negative", and therefore, as such would fall within the scope of a compliance technique. Broadly, the field of sustainability included compliance and CSR and there's a need for the field to find a balance to achieve the best social outcomes.

Main conclusions

- Both CSR and the tech industry don't have a unique definition of themselves, instead, the definition is built individually according to their own mental frameworks with a set of concrete parameters in which companies accommodate their practices within. On one hand, CSR can be understood as the different practices companies voluntarily adhere to, that when communicated can help increase sales and improve financial performance (among others). On the other hand, the tech industry conceptually includes all businesses which provide digital products and services.
- There is some confusion when discussing what the climate target should be regarding carbon: i) reducing GHG emissions to 0 ("climate neutrality targets") or ii) keeping the GHG emissions as usual and then offsetting them to virtually remain at 0 ("carbon neutrality" or "net-zero emissions" targets).
- There is the need for new incentives for companies to invest in how to make products with minimal environmental impact, which is in its turn highly linked to the previous. From where will all the funding come if the offsetting is removed from the net -zero strategy? And in any case, further regulation will be needed but it will come late.
- Greenwashing is a thread and disincentivizes companies to shift towards more sustainable practices. Further regulation and monitoring (mandatory audits) are required to ensure the credibility of a company's published efforts (sustainability report).
- As consumers, we got used to a certain technological standard (quick, efficient robust tools), but there's always a hidden trade-off: are we ready to wait a couple of seconds for Google's searches with a reduced environmental impact without thinking that their quality got reduced? There's a need to make a conscious critic about consumers' values in the tech industry.
- Besides Google's environmental impact, there are much more topics to dive into such as the data protection and usage of users/consumers data for monetarization purposes, the tax-evasion behavior, …

3.3.2 Survey

The survey had different questions divided by sections, for the presentation of the results, questions are re-arranged to go from the general to the specific before presenting the results of the new scale for environmental CSR perceptions and are grouped by topics. The two variables of interest which are studied across all the questions are respondents' contact with CSR practices and respondents' level of interest in CSR topics.

The choice for these two variables is the initial assumption that exposure (either professionally or academically) and/or intrinsic interest in the topic can influence people's perception and judgment. If results are not conclusive with these two variables, other variables are explored such as respondents' age range and/or respondents' educational level achieved.

Perception of the tech industry's environmental impact

Graph 5 displays the results at an aggregated level of the sample regarding two statements referring to the perception of the environmental impact of the tech industry according to the Likert scale (1: Strongly disagree-6: Strongly agree). Table 7 displays the numerical average as well as the percentage of agreement (total of answers placed between 4-6 in the Likert scale) and disagreement (total of answers placed between 1-3 in the Likert scale) for both statements for the sample.

The statements are: "The tech industry is largely responsible for climate change" (displayed on the left side of the graph) and "The tech industry is one of the most polluting" (displayed on the right side of the graph). Ideally, since pollution contributes to climate change, it was expected to see a similar distribution of the results – meaning, that the respondents should similarly perceive both statements and therefore grant a similar grade in the Likert scale. The average results are placed around 3,5 (out of 6) which would mean that on average, respondents stay at a neutral position (between 3: Slightly disagree-4: Slightly agree). It can be observed from the distribution of the results that even though the average is almost the same, there's a tendency to slightly agree more on the first statement than on the second (56,73% vs. 48,08%), where the scale is more uniformly chosen.

Graph 5. Grading of statements about the environmental impact of the tech industry
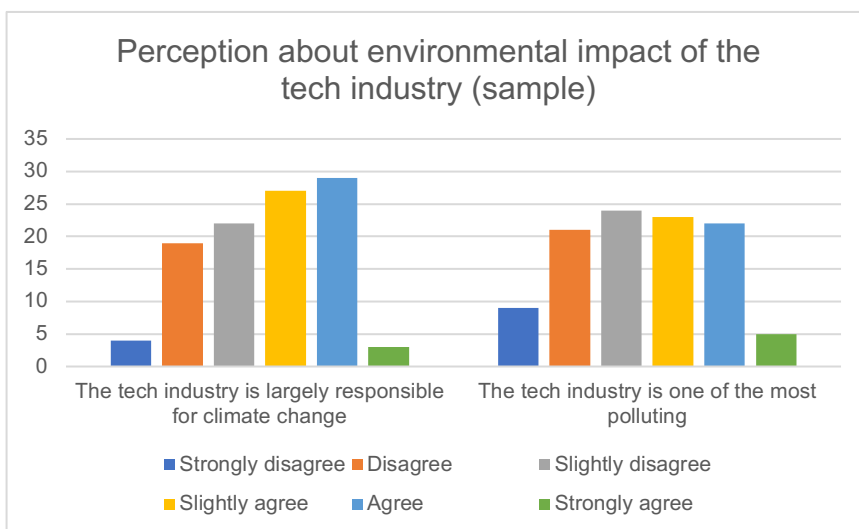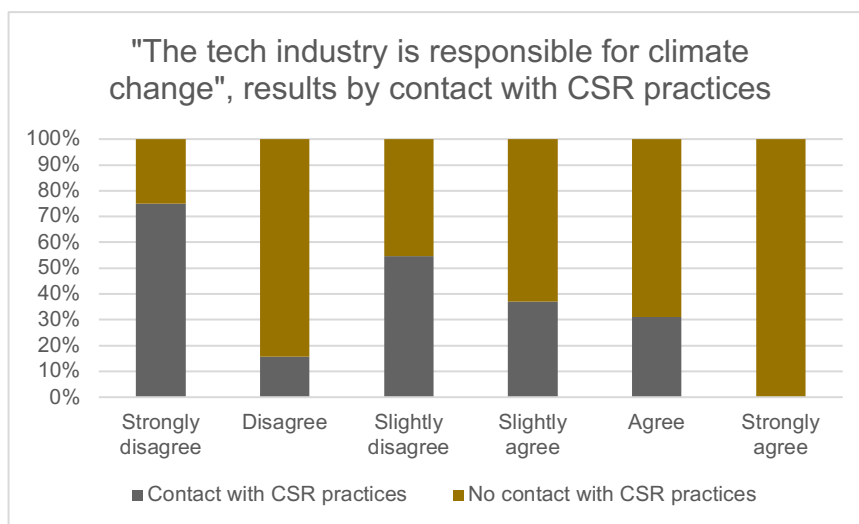

Font: Gemma Oleart

Table 7. Disagreement and agreement percentages and averages for the statements

Statement	Disagree (1-3)	Agree (4-6)	Disagreement %	Agreement %	Numerical average
The tech industry is largely responsible for climate change	45	59	43,27%	56,73%	3,64
The tech industry is one of the most polluting	54	50	51,92%	48,08%	3,41

Font: Gemma Oleart

Graphs 6 and 7 show if the respondents' level of interest in CSR topics or the respondents' contact with CSR practices had an effect on the respondents' perception on the first of the two statements studied above.

Graph 6. Individual grading of the statement "The tech industry is largely responsible for climate change" according to respondents' contact with CSR practices

Font: Gemma Oleart

From graph 6 it can be observed that when respondents are in contact with CSR practices they tend to disagree with the statement, while those respondents that aren't in contact with CSR practices display a larger share of agreement.

Graph 7. Individual grading of the statement "The tech industry is largely responsible for climate change" according to respondents' level of interest in CSR topics
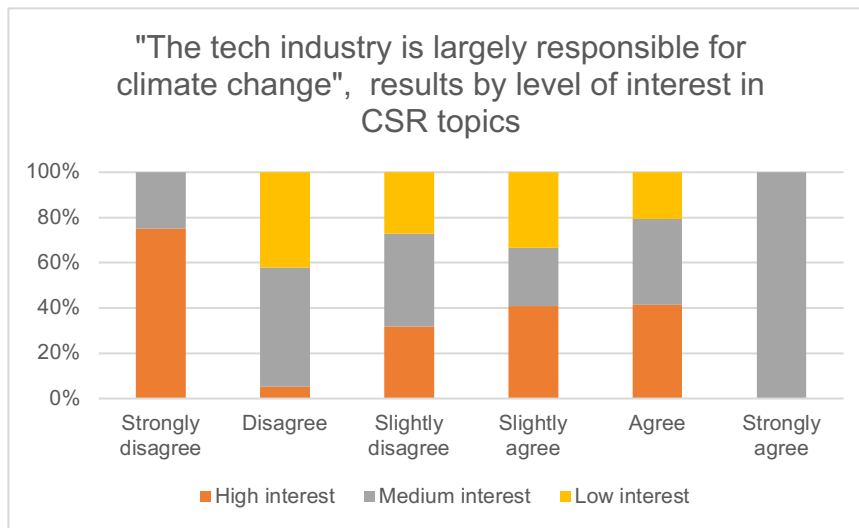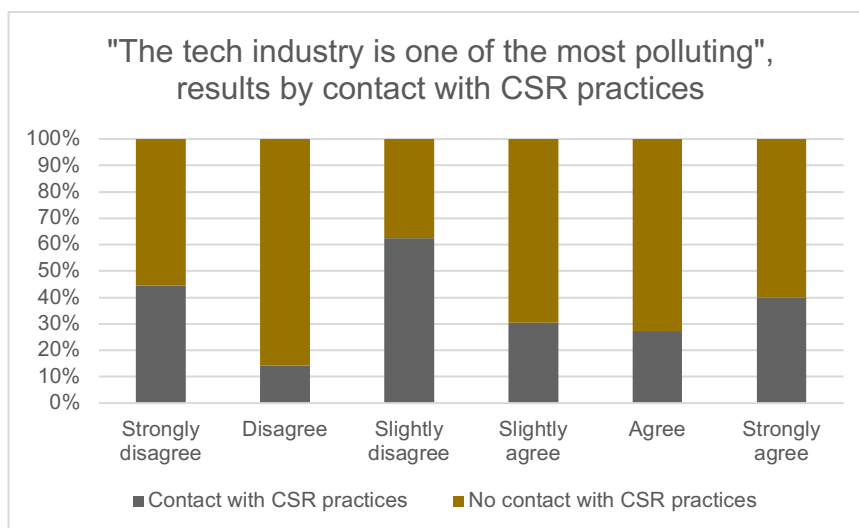

Font: Gemma Oleart

From graph 7, the results according to respondents' level of interest in CSR topics play a key role in their perception that the tech industry is responsible for climate change. Starting with the respondents with a low-level interest (marked in yellow) they adopt a neutral position, on average they place themselves between slightly disagree and slightly agree. If we consider the respondents with a medium level of interest (marked in gray) the results change, pointing on average to a slightly higher share of agreement. Lastly, looking at the respondents with a high level of interest, they tend towards a slightly higher share of disagreement. The findings are in line with those of graph 6.

Graphs 8 and 9 show if the respondents' level of interest in CSR topics or the respondents' contact with CSR practices had an effect on the respondents' perception of the second statement studied above.

Graph 8. Individual grading of the statement "The tech industry is one of the most polluting" according to respondents' contact with CSR practices

Font: Gemma Oleart

From graph 8 respondents in contact with CSR practices tend slightly on average towards a disagreement. However, respondents without contact with CSR practices fall at a neutral position (placing themselves between 3 -Slightly disagree and 4-Slightly agree, in the Likert scale).

Graph 9. Individual grading of the statement "The tech industry is one of the most polluting" according to respondents' level of interest in CSR topics
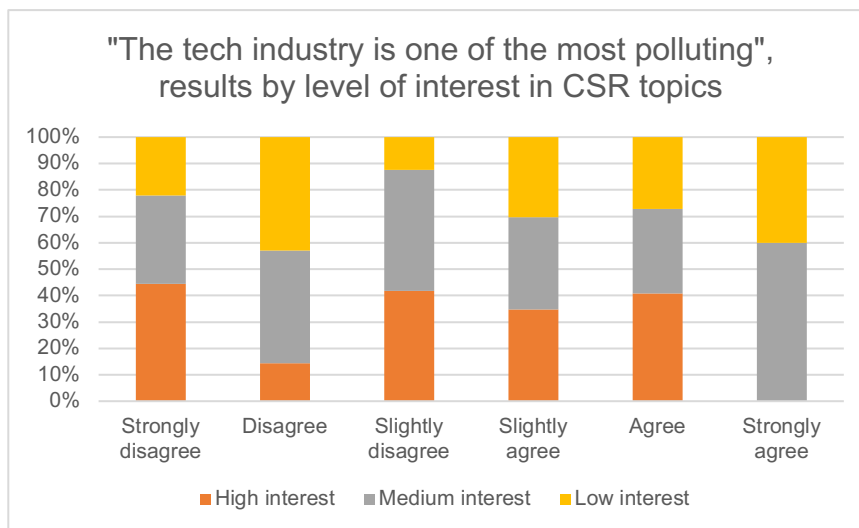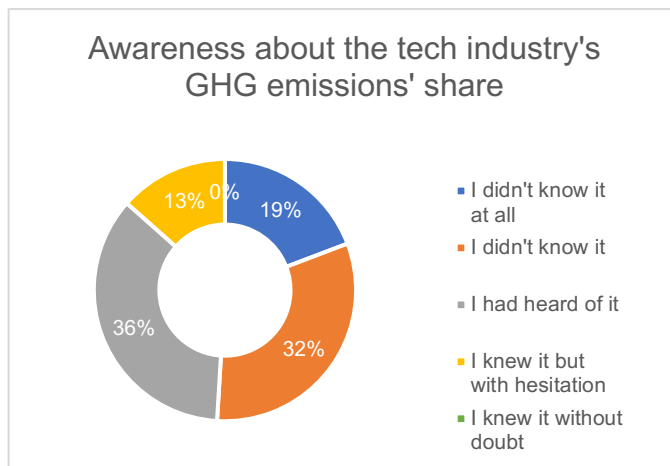

Font: Gemma Oleart

From graph 9 respondents with a high level of interest in CSR topics tend on average towards a slight disagreement. Those with medium interest tend towards a slight agreement and those with a low-interest place themselves on average at a rather neutral position (placing themselves between 3 -Slightly disagree and 4-Slightly agree, in the Likert scale).

>> Results are coherent among both statements. Respondents with a high level of interest in CSR topics and respondents in contact with CSR practices tend slightly towards a disagreement, more critical perception.

Awareness about the tech industry's GHG emissions share

Respondents were asked to judge their degree of awareness referring to the following statement: "The tech industry is responsible for between 2 and 3.7% of the world's greenhouse gas emissions, depending on the study" using a Likert scale 1-5: 1-I didn't know it at all; 5-I knew it without a doubt. Graph 10 shows the results of the sample.

Graph 10. Distribution of respondents regarding the statement "The tech industry is responsible for between 2 and 3.7% of the world's greenhouse gas emissions, depending on the study"

Font: Gemma Oleart

Findings from graph 10 conclude that the majority (51%) of the respondents weren't aware of it (19% - not aware at all, 32% - not aware), followed closely by 36% of the respondents who had heard of it but weren't fully aware. Only 13% of the respondents knew it however not with certainty. No respondents were fully aware of it and certain.

Table 8 displays the knowledge percentage (or level of awareness), calculated upon the values 4 and 5 on the Likert scale ("I knew it but with hesitation" and "I knew it without a doubt") on the statement for the different variables: level of interest of CSR topics and contact with CSR practices. The degree of awareness increases with a higher interest in CSR topics (from 6,90% to 20,59%) and with the contact of CSR practices (from 8,96% to 21,62%). The results of table 8 can be seen additionally in graphs 11 and 12.

Table 8. Knowledge percentage of respondents who knew about the industry's GHG emissions share

| Variables	Sample results	Level of interest			Contact with CSR practices	
Awareness of tech industry GHG emissions' share		High interest	Medium interest	Low interest	Contact with CSR practices	No contact with CSR practices
Knowledge %	13,46%	20,59%	12,20%	6,90%	21,62%	8,96%

Font: Gemma Oleart

Graph 11. Distribution of respondents regarding the statement according to respondents' contact with CSR practices
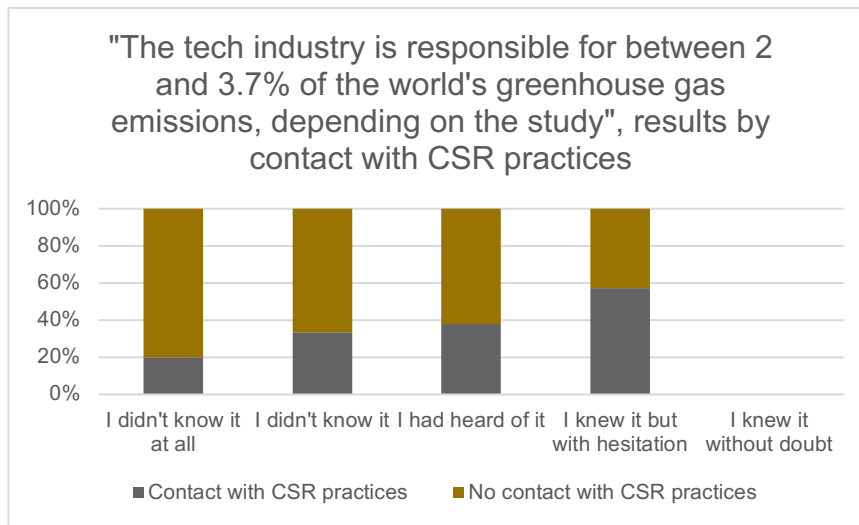
Font: Gemma Oleart

As expected from the results of table 8, in graph 11 the percentage of awareness or knowledge for the statement increases in the case of the respondents with contact with CSR practices. However, no respondent knew it with certainty.

Graph 12. Distribution of respondents regarding the statement according to respondents' level of interest in CSR topics
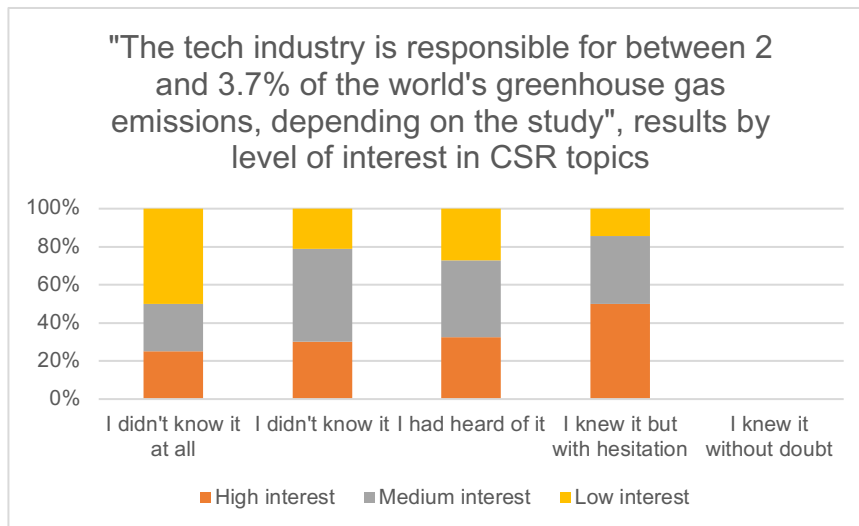
Font: Gemma Oleart

Similarly, to graph 11, in graph 12 the share of knowledge or awareness increases if respondents have a high level of interest in CSR topics. Results are rather neutral for respondents with a medium level of interest and for those respondents with a low level of interest, there's a majority of unawareness. Additionally, no respondent knew it with certainty.

>> Respondents with a high level of interest in CSR topics and respondents in contact with CSR practices show a higher level of awareness regarding the tech industry's GHG emissions share.

Awareness about carbon offsetting costs

Respondents were asked to choose what is the cost for offsetting a 1 tonne of CO_2e. To simplify it, an additional description was provided: they could think of a round trip by plane Barcelona-Stockholm which with the average airline accounts for 1.020kg of CO_2e.

According to Atmosfair to compensate a tonne costs 23€ (Atmosfair, 2022). Just for the comparison, using the calculator of "carbonfootprint.com", a British consultancy page, the values for offsetting a tonne vary from 11,11€ to 24,36€ (Carbon Footprint, 2022).

For this question, the answers were categorized as:

- Correct: if the option selected was 11-30€
- Approx.: if the option selected was either <10€ or 31-50€
- Wrong: if the option selected was any other value

Graph 13 displays the distribution of the results for the whole sample. More than half of the respondents chose wrong values (55%) and only a fourth got the correct result (25%).
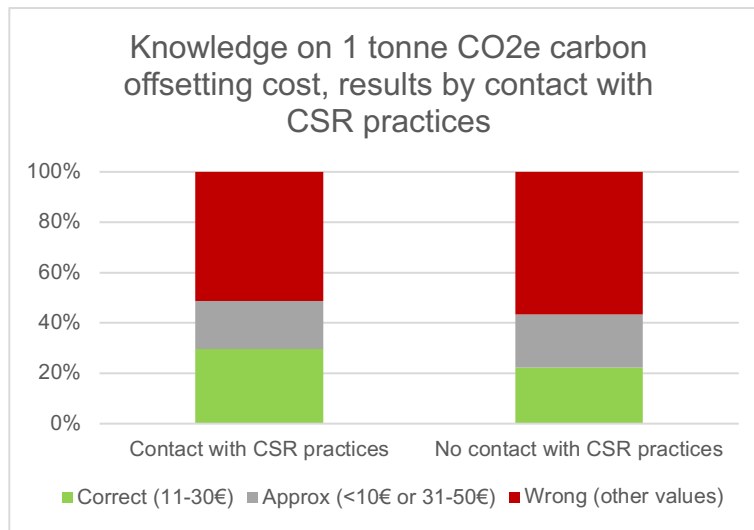
Graph 13. Distribution of respondents' answers about the cost of offsetting 1 tonne of CO_2e
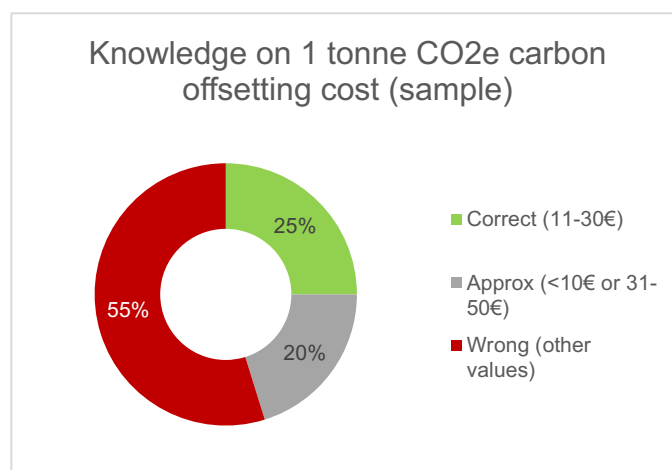
Font: Gemma Oleart

Graph 14 displays the results for the variable contact with CSR practices. It can be seen that the general result is very similar among respondents with contact with CSR practices and the ones who don't. There's a slight increase in the correctness percentage for those who have contact with CSR practices (from slightly above 20% to almost 30%).

Graph 14. Distribution of respondents' answers about the cost of offsetting 1 tonne of CO_2e according to their contact with CSR practices

Knowledge on 1 tonne CO2e carbon offsetting cost, results by contact with CSR practices

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Graph 15 displays the results for the variable level of interest in CSR topics. From the graph, it is shown that the correctness level increases with a higher level of interest in CSR topics (from around 15% for respondents with low interest to almost 40% for respondents with high interest).

Graph 15. Distribution of respondents' answers about the cost of offsetting 1 tonne of CO_2e according to their level of interest in CSR topics

Knowledge on 1 tonne CO2e carbon offsetting cost, results by level of interest in CSR topics
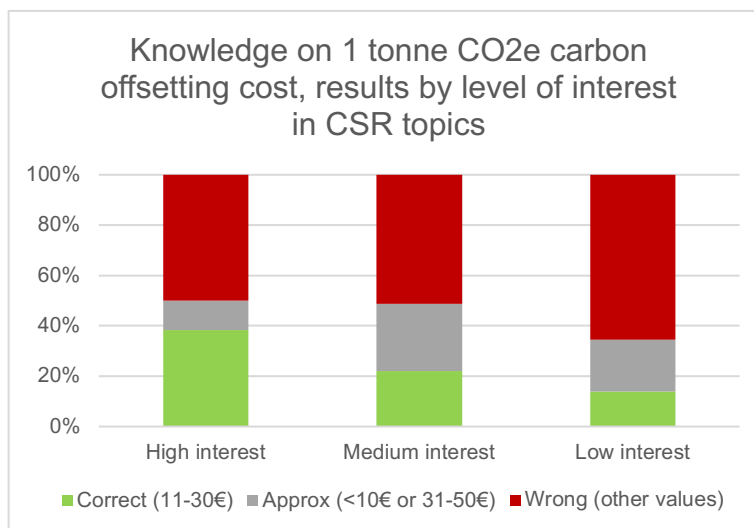
Font: Gemma Oleart

Table 9 displays the correctness percentage for each variable - total of "correct" answers. The highest correctness percentage is for respondents with a high level of interest in CSR topics (38,24%) and respondents with contact with CSR practices (29,73%).

Table 9. Correctness percentage of respondents' answers depending on the variables

| Variables	Sample results	Level of interest			Contact with CSR practices	
		High interest	Medium interest	Low interest	Contact with CSR practices	No contact with CSR practices
Carbon offsetting cost (1 tonne CO₂e)						
Correctness %	25,00%	38,24%	21,95%	13,79%	29,73%	22,39%

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>> While respondents with a high level of interest in CSR topics and those with contact with CSR practices achieved a higher correctness level, showing a higher degree of awareness, in either case, the share for wrong answers is above 50% which could indicate that respondents were just "lucky" on their choice, and therefore it can be said that either variable has an effect on the awareness level in regards of carbon offsetting costs.

Perceived control in the tech industry

Graph 16 displays the results at an aggregated level of the sample regarding the following statement: "There is enough control over the industry" refers to the perception of the industry's level of control in a Likert scale (1: Strongly disagree-6: Strongly agree). Table 10 displays the numerical average as well as the percentage of agreement (total of answers placed between 4-6 in the Likert scale) and disagreement (total of answers placed between 1-3 in the Likert scale) for the statement for the sample.

Graph 16. Respondents' perception of the tech industry's level of control
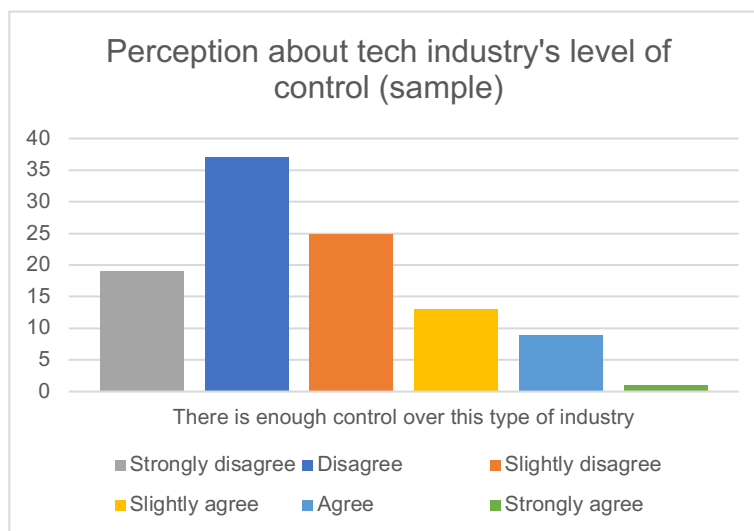
Font: Gemma Oleart

The majority of the respondents disagree with the statement (placing themselves at around 2,5 between 2- "Disagree" and 3- "Slightly disagree"). Looking at table 6, the percentage of disagreement is equal to 77,88%.

Table 10. Disagreement and agreement percentages and averages for the statement

Statement	Disagree (1-3)	Agree (4-6)	Disagreement %	Agreement %	Numerical average
There is enough control over this type of industry	81	23	77,88%	22,12%	2,61

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Graphs 17 and 18 analyze the results of the statement for the two variables of interest.

In graph 17 respondents who are in contact with CSR practices tend to disagree with the statement much more than those respondents that are not in contact with CSR practices. Indirectly stating that there's a need for further control within the industry.

Graph 17. Individual grading of the statement "There is enough control over this type of industry" according to respondents' contact with CSR practices
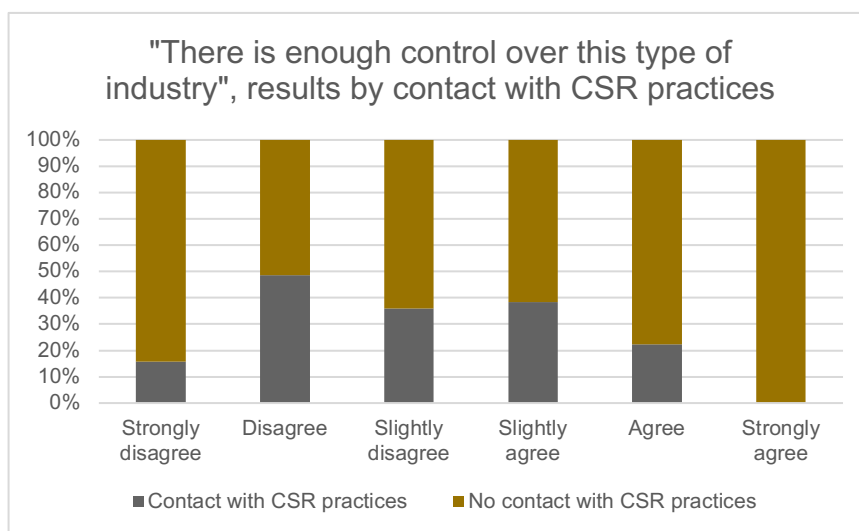
Font: Gemma Oleart

Looking at graph 18, respondents with a high and low level of interest in CSR topics display the same average pivoting around the value 3 "slightly disagree". Unexpectedly, respondents with a medium level of interest in CSR topics tend to slightly agree with the statement.
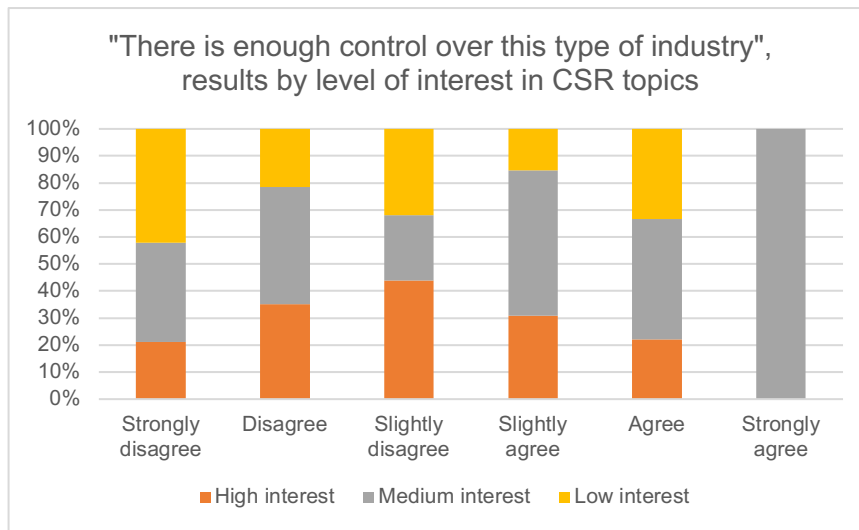
Graph 18. Individual grading of the statement "There is enough control over this type of industry" according to respondents' level of interest in CSR topics
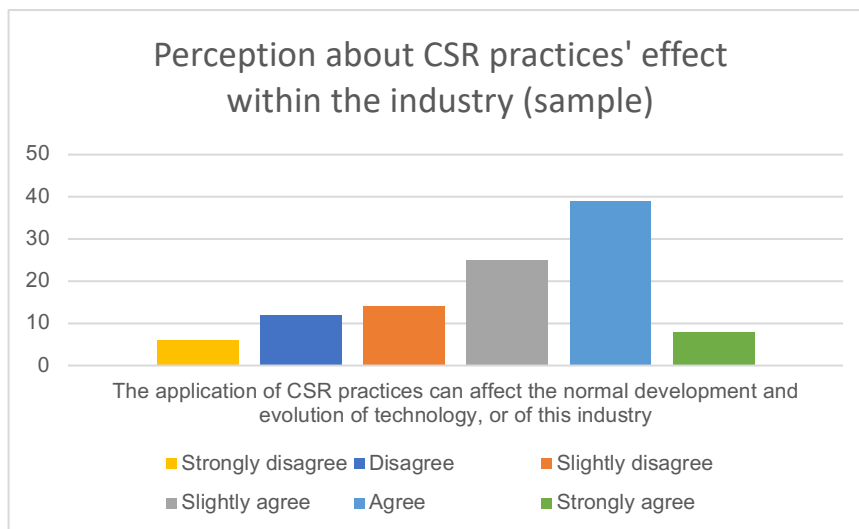

Font: Gemma Oleart

>> At a sample level, respondents disagree that there is enough control in the industry. Respondents in contact with CSR practices and respondents with a high and low level of interest in CSR topics tend to disagree with the statement. In this case, contact with CSR practices can influence respondents' perception but the results don't allow to prove the influence of level of interest in CSR topics.

Perceived effect of CSR practices within the industry

Graph 19 displays the results at an aggregated level of the sample regarding the following statement "The application of CSR practices can affect the normal development and evolution of technology or of this industry" referring to the perception on CSR practices' effect within the tech industry according to the Likert scale (1: Strongly disagree-6: Strongly agree). Table 11 displays the numerical average as well as the percentage of agreement (total of answers placed between 4-6 in the Likert scale) and disagreement (total of answers placed between 1-3 in the Likert scale) for the statement for the sample.

From graph 19 the majority of the respondents agree with the statement. The average value is almost placed at 4 "slightly agree". Confirmed by the results in table 11 as there's a 69,23% of agreement among the respondents. The majority see that CSR practices can affect the normal development of the industry.

Graph 19. Respondents' distribution of perception about CSR practices affecting the industry

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Table 11. Disagreement and agreement percentages and average on the statement

Statement /Likert scale	Disagree (1-3)	Agree (4-6)	Disagreement %	Agreement %	Numerical average
The application of CSR practices can affect the normal development and evolution of technology, or of this industry	32	72	30,77%	69,23%	3,99

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Graphs 20 and 21 show if the respondents' level of interest in CSR topics or the respondents' contact with CSR practices affected the respondents' perception of CSR practices' effect within the tech industry.

From graph 20 respondents in contact with CSR practices tend to slightly disagree with the statement, stating that CSR practices don't necessarily affect the normal development and evolution of technology. On the other hand, respondents not in contact with CSR practices tend to slightly agree with the statement. However, in both cases, the average is placed again in a neutral position between 3-Slightly disagree and 4-Slightly agree.

Graph 20. Individual grading of the statement "The application of CSR practices can affect the normal development and evolution of technology, or of this industry" according to respondents' contact with CSR practices

"The application of CSR practices can affect the normal development and evolution of technology, or of this industry", results by contact with CSR practices
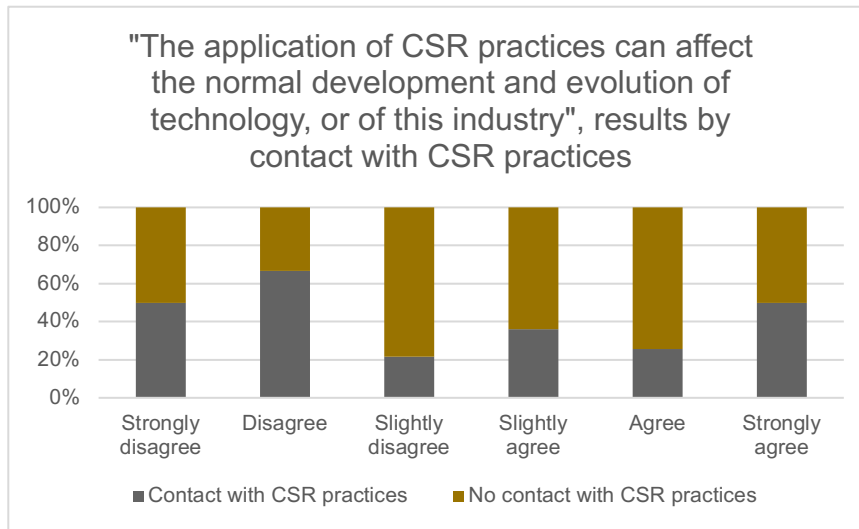
Font: Gemma Oleart

From graph 21, there's a similar pattern such as the one displayed in graph 18. Respondents with a high level of interest in CSR topics and respondents with a low level of interest in CSR topics show a similar trend, as they tend to slightly agree with the statement. Those with a high level of interest tend even more towards an agreement. Respondents with a medium level of interest in CSR topics, however, show a slight disagreement on the statement.

Graph 21. Individual grading of the statement "The application of CSR practices can affect the normal development and evolution of technology, or of this industry" according to respondents' level of interest in CSR topics

"The application of CSR practices can affect the normal development and evolution of technology, or of this industry", results by level of interest in CSR topics
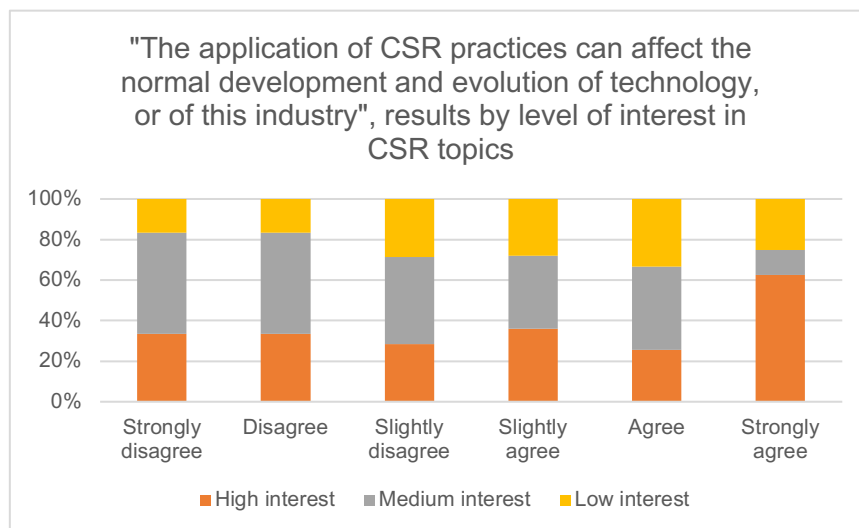
Font: Gemma Oleart

>> Contrarily to the previous statement, at a sample level, respondents agree that CSR practices can affect the normal development and evolution of the industry. However, directions clash in this statement as respondents in contact with CSR practices tend to disagree and respondents with a high and low level of interest in CSR topics tend to agree on the statement.

Similarly, to the previous statement, in this case, contact with CSR practices can influence respondents' perception but the results don't allow to prove the influence of level of interest in CSR topics.

Measures to improve companies' environmental performance

Respondents were asked to provide measures to improve companies' performance in the environment in an open question (free text). The different answers collected were classified under nine different categories:

- No answer: if the answer was left blank or the text was not a specific proposal
- Legislation/regulation/taxes: proposals referring to a legal and/or fiscal change
- Incentives/investment: proposals referring to incentives (prizes, recognitions) and investment
- Control/audit/fines: proposals focused on auditing processes
- Emissions/targets CO2: proposals focused on carbon net objectives, CO_2 emissions, …
- Renewables/energy transition: proposals referring to the renewables sector and the energy transition
- Information/communication stakeholders: proposals referring to how information is communicated to stakeholders, reports, …
- CSR as marketing: proposals understanding the power of CSR practices as a marketing tool
- Circular economy: proposals including the introduction of the logistics management system, recycling parts, social economy

An overwhelming 29% of the respondents left the question blank. After that, the top categories were legislation, regulation, and taxes (13%), information/communication stakeholders (11%) and control, audit, fines, and incentives and investment (both categories with 10%). Graph 22 displays the distribution of the categories.
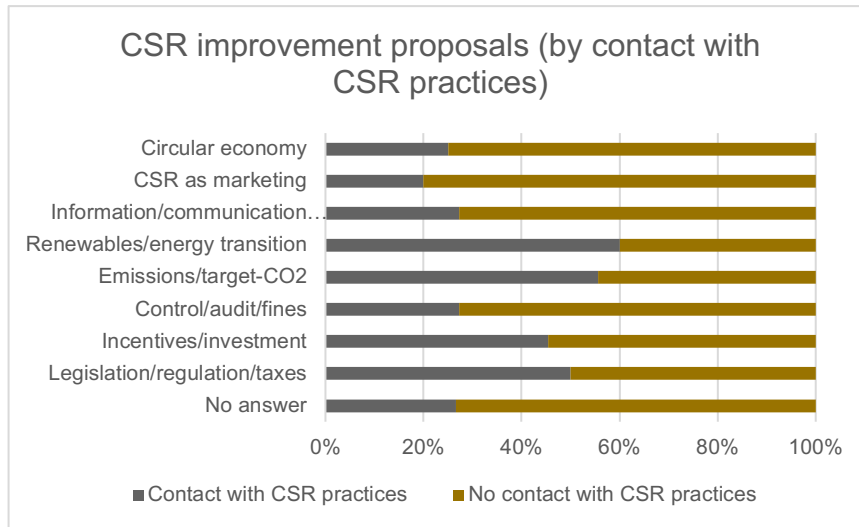
Graph 22. Distribution of collected answers into proposed categories
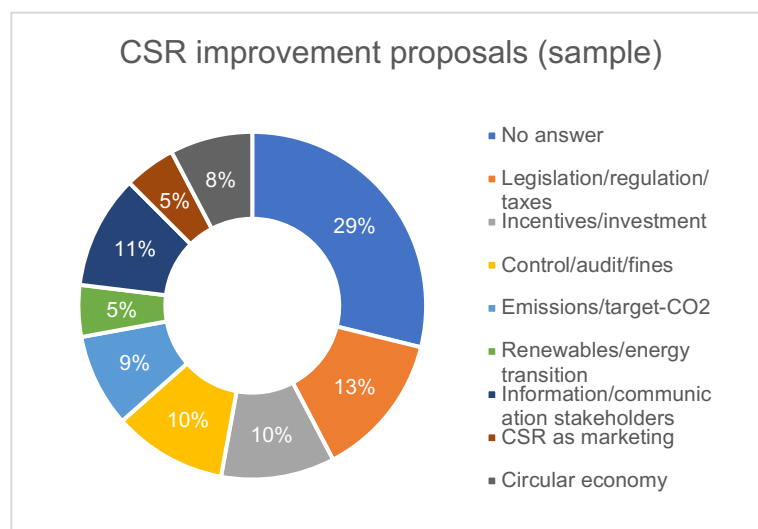
Font: Gemma Oleart

Graph 23 displays the CSR measure proposals by respondents in contact with CSR practices. Respondents in contact with CSR practices focus mainly on renewables/energy transition and emissions/target CO_2. Respondents without contact with CSR practices mainly focus on the circular economy, CSR as marketing and information and communication stakeholders.

Graph 23. Distribution of collected answers into proposed categories according to respondents' contact with CSR practices

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Graph 24 displays the CSR measure proposals by respondents' level of interest in CSR topics. Respondents with a high level of interest focus mainly on incentives and investment. Respondents with medium interest focus on control/audit/fines. Lastly, respondents with low interest, mainly focus on legislation/regulation and taxes on emissions/targets CO_2.
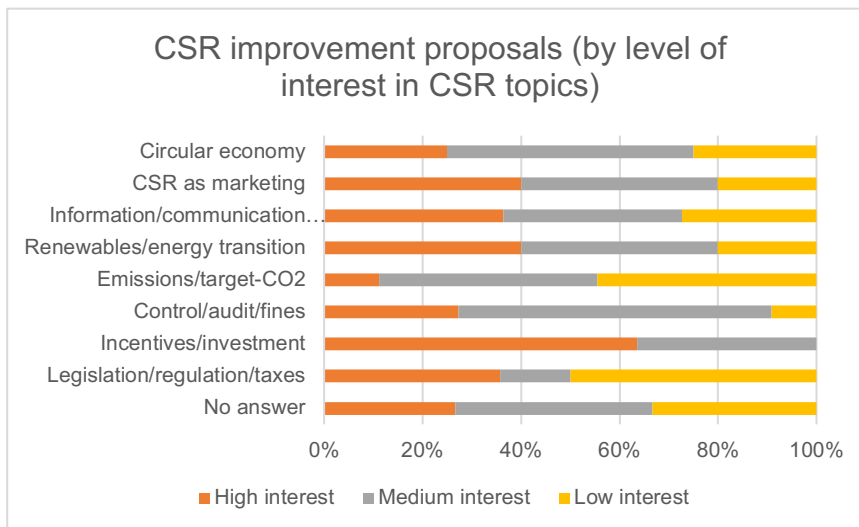
Graph 24. Distribution of collected answers into proposed categories according to respondents' level of interest in CSR topics

Font: Gemma Oleart

Surprisingly, the preferred suggested measures fall within different categories depending on the variable studied, there is no homogenous trend. However, the general answers and specifically

the CSR measure proposals by respondents' level of interest in CSR topics (displayed on graph 23) summarize the points brought up during the experts' interviews. First, the need for incentives and investment (as brought up by Àlex Escala), the need to establish control/audits and fines (as brought up in the case of audits by Andrei Boar), and the need for new legislation/regulation and emissions/targets CO_2 (as brought up by Andrei Boar and Àlex Escala, however, the answer is by respondents with a low level of interest in CSR topics).

>> Both variables (contact with CSR practices and level of interest in CSR topics) can influence respondents' measures to improve companies' environmental performance (as they focus on different topics).

Classification of Google within the industry

Respondents were asked to choose in which sub-sector within the industry they would place Google. It is important to consider Google's classification by the respondents to ensure that generally, everyone understood it similarly. Different classification could imply a potential different business and activities by the company and slightly predominance of other aspects of CSR. The company object of study (Google) was mostly classified by 58% of the respondents as a search engine, followed by 24% of the respondents which classify it as cloud services, only 1% of the respondents classify Google as a social network but 17% of them, agree that it is a combination of all three (Graph 25).

Graph 25. Distribution of respondents' classification of Google
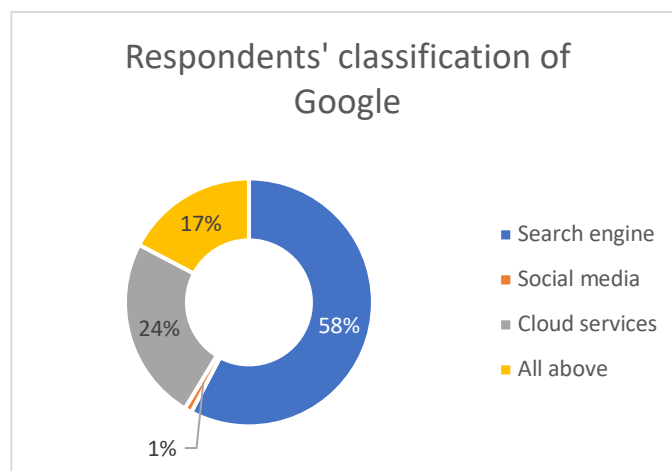
Font: Gemma Oleart

Table 12 displays the percentage of respondents who classified Google as a search engine showing the results for the sample and then broken down for the variables: level of interest in CSR topics and contact with CSR practices.

Table 12. Percentage of classification of Google as "search engine" according to the variables

Variables	Sample results	Level of interest			Contact with CSR practices	
Google classification		High interest	Medium interest	Low interest	Contact with CSR practices	No contact with CSR practices
Search engine %	57,69%	64,71%	51,22%	58,62%	51,35%	61,19%

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>> In all cases more than the majority of the respondents were classified as "search engine" which leads towards a "unified" vision of Google.

Awareness of Google's search carbon footprint

Respondents were asked to provide a numerical value for the carbon footprint of an average Google search (free text question). The following graph (graph 26) displays the accuracy of the answers provided to the question.

The results have been classified accordingly to the following:

- "Approx.": for values between 3 and 10 g (since there is no agreement on the actual value, while Google itself reported 0,2 g of CO_2 (Google Blog, 2009) other investigators found a larger emissions value. Therefore, the "approx. result" is taken with the averages from Alex Wissner-Gross's estimate (about 7 g) John Buckley's estimate (between 1-10g) and Chris Goodall's estimate (between 7g and 10g) as most searches are not one-shot but rather looking to different links and pages) (Swaine, 2009).
- Wrong: for any other value introduced outside of the range (3-10g)
- No answer: if it was left blank or the answer was "I don't know" and similar

Graph 26. Distribution of respondents' answers regarding the carbon footprint of a Google search
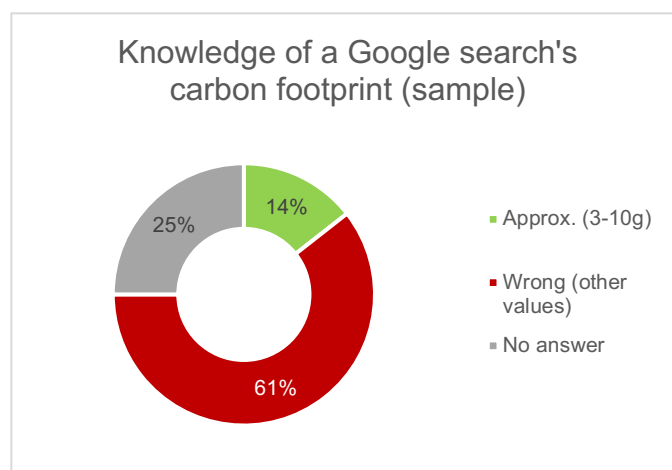
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From graph 26, it can be seen that 61% of the respondents got a wrong answer, and 25% of them didn't reply at all. Only 14% of the survey respondents got an approximate result. Results at an aggregate level show poor knowledge about the carbon footprint of a Google search.

Graph 27 displays the results for the variable contact with CSR practices. It was expected to see an increase in the correctness percentage for those who are in contact with CSR practices, but there's almost no difference among the respondents (correctness percentage at around 15%). There's a slight decrease of no answers for those in contact with CSR practices.

Graph 27. Distribution of respondents' answers regarding the carbon footprint of a Google search according to respondents' contact with CSR practices
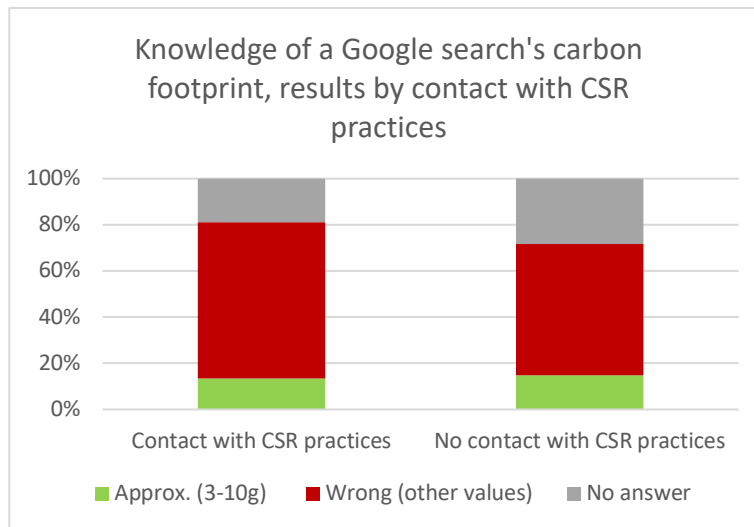
Font: Gemma Oleart

Graph 28 displays the results for the variable level of interest in CSR topics. It was expected to see an increase in the correctness percentage for those who have a higher level of interest, but there's almost no difference among the respondents (correctness percentage at around 15%, even a bit under for respondents with a low level of interest).

Graph 28. Distribution of respondents' answers regarding the carbon footprint of a Google search according to respondents' level of interest in CSR topics
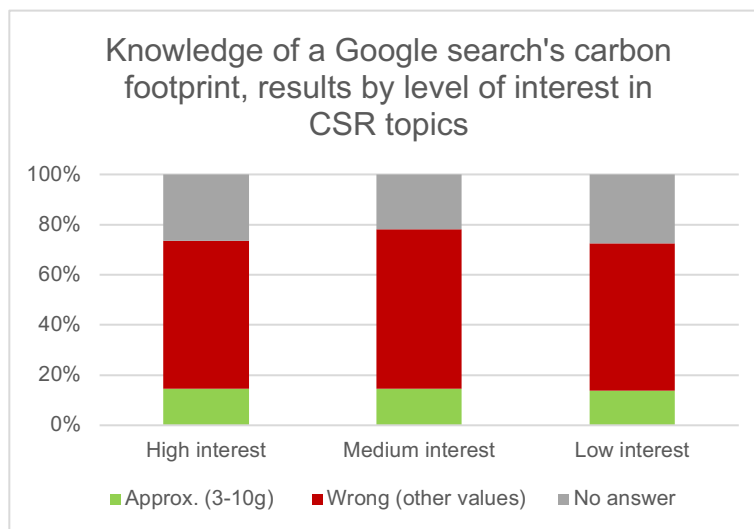
Font: Gemma Oleart

Table 13 displays the correctness percentage for each variable. The highest correctness percentage is for respondents without contact with CSR practices (14,93%) followed closely by respondents with high interest in CSR topics (14,71%). However, such results could be fostered by "luck", not strict knowledge as there is a consistent amount of "no answer" across the different variables (between 20%-35%). Surprisingly the lowest correctness percentage is for respondents with contact with CSR practices (13,51%).

Table 13. Percentage of correct answers according to the variables

Variables	Sample results	Level of interest			Contact with CSR practices	
The carbon footprint of a Google search		High interest	Medium interest	Low interest	Contact with CSR practices	No contact with CSR practices
Correctness %	14,42%	14,71%	14,63%	13,79%	13,51%	14,93%

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One potential explanation for low or random correct results in table 13 would be due that respondents don't think of Google as a search engine, however, it has been proven that respondents do consider it a search engine (see table 12).

>> Despite mostly being classified as a search engine, the majority of the respondents didn't know or answered wrongly the carbon footprint in a Google search. Either contact with CSR practices and level of interest in CSR topics don't seem to influence the awareness on Google's search carbon footprint.

General perception of Google

Respondents were asked to provide three words (or adjectives) that summarize the perception they have of Google in a free-text question. Answers were translated into English and adjusted (from noun to adjective or vice versa) to avoid duplicates. Each word or adjective provided was assigned a value of 1 if it had a positive connotation (examples are: innovative, powerful, useful, technology) and a value of 0 if it had a negative connotation (examples are: opaque, liar, monopoly, control). In case a respondent didn't provide three words, the set was considered to be "incomplete".

Table 14 displays the distribution of the words across the sample.

Table 14. Distribution of words by their connotation

Connotation	Word count	%
Positive	184	58,97%
Negative	107	34,29%
Incomplete answers	21	6,73%

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The vast majority of the words (58,97%) had a positive connotation. A total of 34,29% of words had a negative connotation and only 6,75% referred to incomplete answers.

Then, each set of three words was classified between:

- Positive perception: if the total values of the set were 3.

- Neutral perception: if the total value of the set was 2.

- Negative perception: if the total value of the set was 0 or 1.

Graph 29 shows the general distribution of the perception on Google from the punctuation of the sets (it also includes the percentage of incomplete answers). The results are almost proportionally distributed across the sample: almost a third of the respondents presented a positive perception (32%), almost a third presented a negative perception (32%) and almost a third presented a neutral view (29%), there was a 7% of the results referring to incomplete answers.

Graph 29. Distribution of general perception about Google
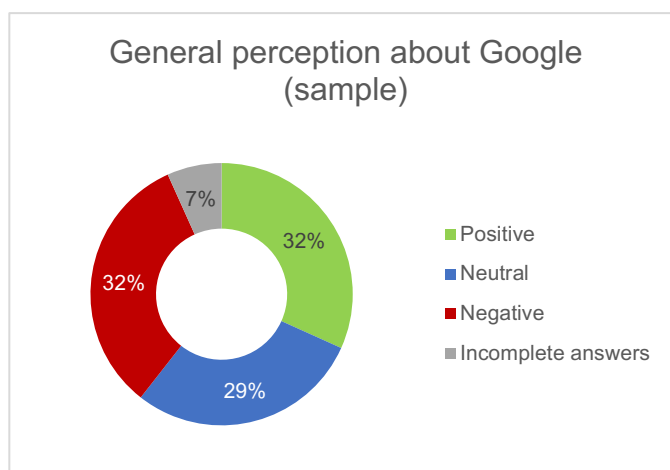
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Graphs 30 and 31 display the results about the respondents' general perception of Google for the two variables of interest: contact with CSR practices (graph 30) and level of interest in CSR topics (graph 31).

From graph 30, there are no major differences, the share of positive, neutral, and negative is proportional between respondents who are in contact with CSR practices and the ones who don't. There's almost 15% of the respondents in contact with CSR practices who didn't reply to the answer correctly leaving incomplete sets. It can be seen that the share of negative perception for those in contact with CSR is higher than for the ones who don't. The share of positive perception for the case of respondents not in contact with CSR practices is slightly higher, reaching almost 40%.

Graph 30. Distribution of general perception about Google according to respondents' contact with CSR practices
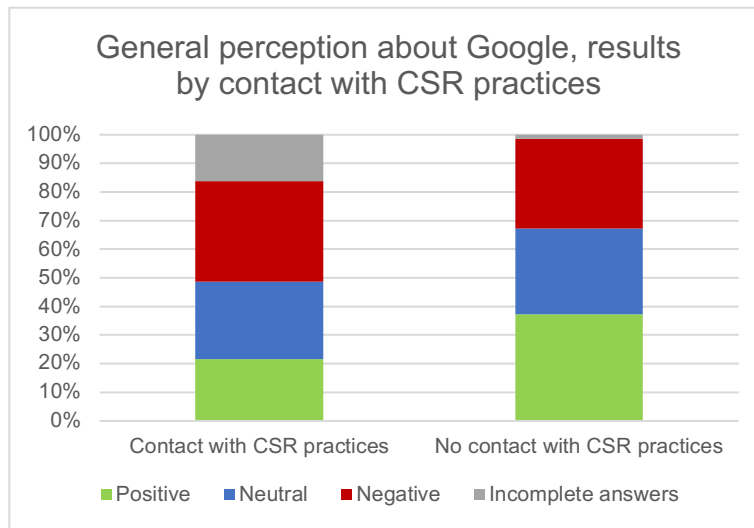
Font: Gemma Oleart

From graph 31 it can be seen that the distribution of the perception is still around a third according to the variable of the level of interest in CSR topics. Once again, most of the incomplete answers fall within the population of respondents with high interest, for them, the share of negative perception is higher than for other respondents with a minor level of interest. The results between respondents with medium and low interest are almost the same, but with those with medium interest, there's a slight percentage of incomplete answers.

Graph 31. Distribution of general perception about Google according to respondents' level of interest in CSR topics
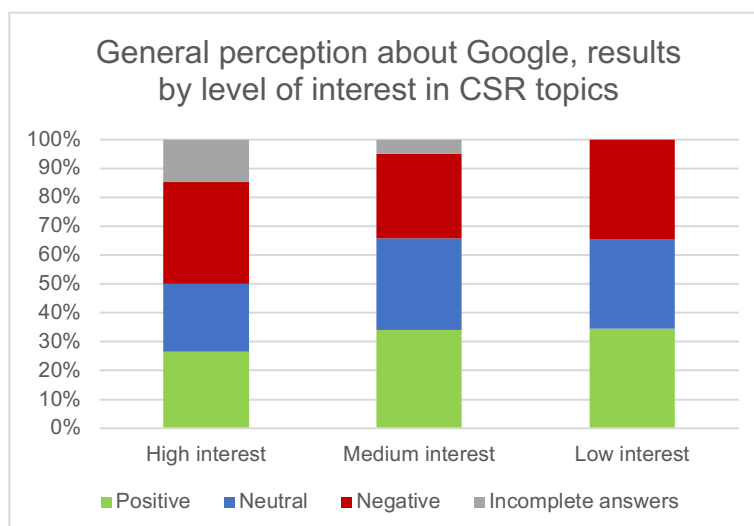
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>> Since the results follow the general trend of the sample for both variables of interest, no general conclusions can be drawn if the variables have an effect on respondents' general Google perception.

The author wanted to investigate the other variables: educational level achieved and age range to see if they could affect consumers' general perception about Google. Graphs 32 and 33 display respondents' general perception according to their educational level achieved (graph 32) and their age range (graph 33).

From graph 32 as the respondents' educational level increases, the proportion of positive perception decreases (from above 60% in the case of respondents with A-levels to around 30% for those with bachelor's degree to slightly below 30% for those with a master's degree and 0% for those with a Ph.D.). The share of neutral perceptions increases as respondents' educational level increases. Most of the incomplete answers fall with respondents with Ph.D., and slightly for respondents with a master's degree. There is no trend for the share of negative perception in the sample.

Graph 32. Distribution of general perception about Google according to respondents' educational level achieved
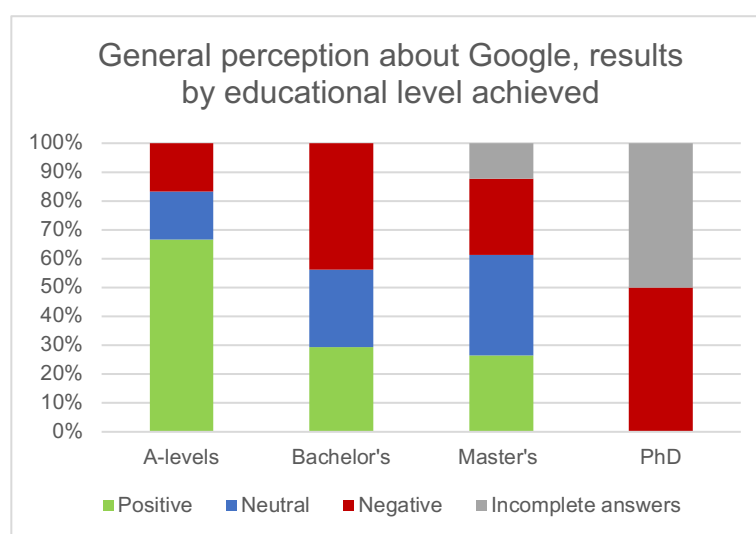
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Graph 33 shows a general trend of almost proportional distribution of the perceptions (always not considering the share of incomplete answers). There are a couple of elements to be pointed out. Respondents between 18 and 20 years old show the largest share of positive perceptions about Google (being at almost 80% and the 20% referring to neutral perception).

There is a trend that the positive share gets reduced with the respondents' age range but in the case of 24-26 years old and surprisingly, the 36-40 years old. The largest share of negative perception falls for the respondents between 33-35 years old (more than 50% and the rest falls within neutral perception).

Graph 33. Distribution of general perception about Google according to respondents' age range

General perception about Google, results by age range
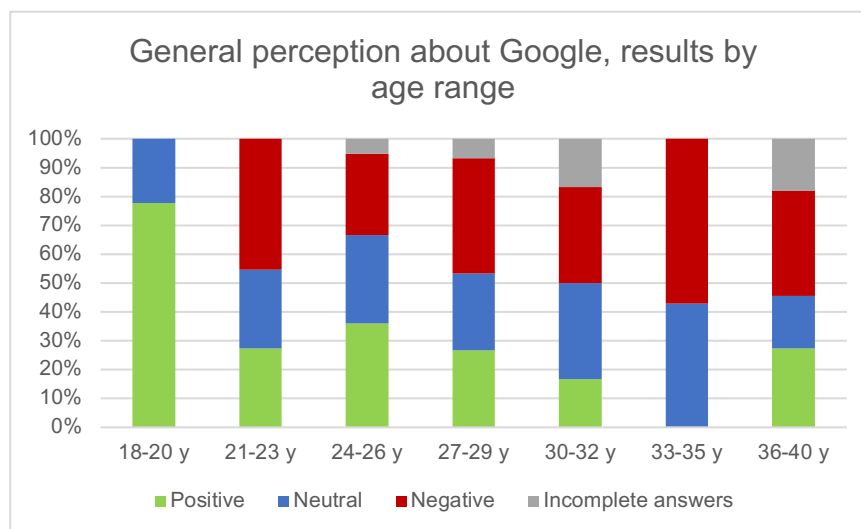
Font: Gemma Oleart

>> The first thing to notice is the presence of a consistent share of neutral perception between 10 and 50% (average around 25%). As the respondents' educational level increases, the share of positive perception gets reduced substantially. Regarding age range, the younger the respondents are the larger the positive perception share.

The author wanted to display visually the chosen words from the respondents about their perception of Google. To do so, a "word cloud" was created using "Word it Out", free online software (De Groote, 2022).

The inclusion criteria were:

- Words from complete sets (respondents give 3 words each)
- Words have a frequency of at least 2 (one-time words are excluded)

Figure 1 shows visually the results of the sample respondents according to the inclusion criteria: composed of 43 words out of a total of 107 (unique words) from 291 words provided by the respondents, as 7 sets have been removed as they had incomplete answers. In the word cloud, the size of the words is linked to the frequency of those (the larger the words, the larger the frequency). The words with the highest frequency are (number of times): Innovative (21), Control (17), Monopoly (16), Useful and Giant (13), and Data (10). While some of the main words carry a positive component (Innovative, useful) others carry a negative one (control, monopoly).

The word cloud exemplifies the dichotomy or hidden trade-off between an improved technology (praising features just as innovation, usefulness, or power) while at the same time it grows on the other side as an entity for which users are concerned (with words such as control, monopoly, opaque, manipulator). A topic which was also brought up during the experts' interviews.

Figure 1: Word cloud displaying perception about Google, sample results

Font: Gemma Oleart (using "Word It Out" software)

The author decided to create the word clouds according to the variables of interest as well, to see if there would be substantial differences at first sight. Figure 2 displays the two word clouds according to the contact of CSR practices. On the left, it is displayed the word cloud of respondents with contact with CSR practices, and on the right, the one of respondents without contact with CSR practices. There is not much difference in the choice of the main words among the two clouds. Respondents with contact with CSR practices chose as top words (frequency of the word): innovative (8), control (6), and monopoly and manipulator (5). Respondents without contact with CSR practices chose as top words (frequency of the word): innovative (13), giant, control, and monopoly (11), and useful (9).

Figure 2: Word cloud displaying perception about Google according to respondents' contact with CSR practices (with contact, on the left; without, on the right)
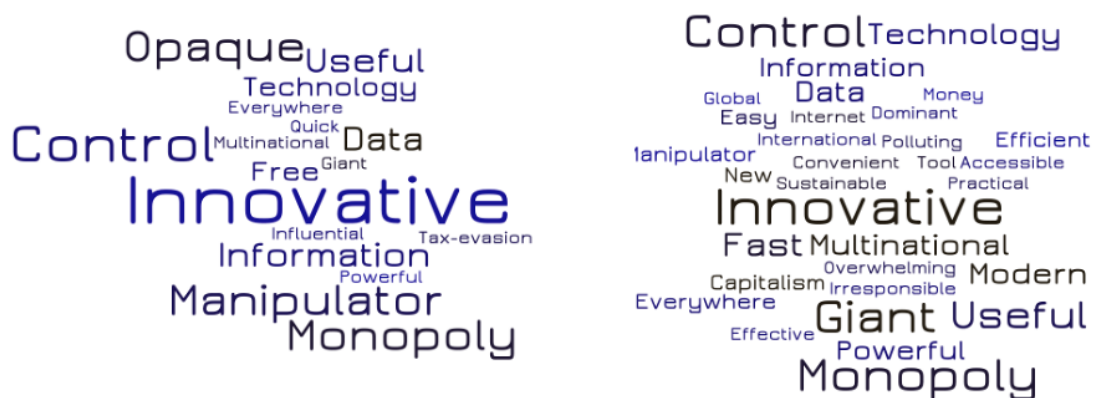
Font: Gemma Oleart (using "Word It Out" software)

Figure 3 displays the three word clouds according to the level of interest in CSR topics. On the left it is displayed the word cloud of respondents with a high level of interest, in the center it is displayed the word cloud of respondents with a medium level of interest and on the right, the one of respondents with a low level of interest.

There is not much difference in the choice of the main words among the three clouds. Respondents with a high level of interest chose as top words (frequency of the word): monopoly and innovative (8), control (7) information and manipulator and technology (4). Respondents with a medium level of interest chose as top words (frequency of the word): innovative (8), control and useful (7), and data (6). Respondents with a low level of interest chose as top words (frequency of the word): giant and innovative (5), useful, monopoly, fast and multinational (4), and control (3).

Figure 3: Word clouds displaying perception about Google according to respondents' level of interest in CSR topics (high interest, on the left; medium interest, in the middle; low interest, on the right)

Font: Gemma Oleart (using "Word It Out" software)

>> There is not much difference in the main words chosen by the respondents' which could lead to an initial result that the variables of interest do not have an effect influencing consumers' perception (at least, generally speaking of the company).

Perception about Google's environmental CSR practices (scale)

To evaluate respondents' perception about Google's environmental CSR practices the scale, shown in table 15, composed of 15 statements was used. Respondents could choose within a Likert scale 1-6 (1-Strongly disagree, 6-Strongly agree).

Table 15 shows the new scale to assess perception about Google's environmental CSR practices in detail and displays the average numerical value for each statement (according to the Likert scale 1-6) as well as the percentage of agreement (answers ranked 4-6) and disagreement (answers ranked 1-3) for the whole sample. The author has chosen to display the results with the numerical averages because in a graph with the rounded values (non-decimal) it is difficult to see the differences, as they are really subtle.

Table 15. Disagreement and agreement percentages, including average values for the statements of the developed scale

Statement code	Statement	Measure	Disagree-ment %	Agree-ment %	Average value (Likert scale)
C1	"I understand Google as a company committed to nowadays climate issues"	Perception of the company's environmental commitment	76,92%	23,08%	2,59
C2	"I understand Google as a company that understands the damage it does to the environment"	Perception of the company's awareness of environmental impact	61,54%	38,46%	3,03
C3	"I consider Google a sustainable, ethical company that cares about the environment"	Perception of the company being sustainable	75,96%	24,04%	2,55
S1	"Google takes action to reduce pollution-related to its activities"	Perception of the company's efforts towards pollution	70,19%	29,81%	2,93
S2	"Google has reduced its carbon emission"	Perception of the company's efforts on carbon emissions	67,31%	32,69%	3,13
S3	"Google contributes toward saving resources and energy"	Perception of the company's efforts towards preserving resources	70,19%	29,81%	2,88
S4	"Google makes investments to improve the ecological quality of its products and services"	Perception of the company's efforts towards sustainable investments	60,58%	39,42%	3,28
S5	"Google respects and promotes the protection of biodiversity"	Perception of the company's efforts towards biodiversity	75,00%	25,00%	2,69
S6	"Google measures the impact of its activities on the natural environment"	Perception of the company's efforts towards communication	64,42%	35,58%	3,01
S7	"Google has reduced its solid wastes generation"	Perception of the company's efforts towards solid waste generation	65,38%	34,62%	3,12
S8	"Google has reduced its waste water generation"	Perception of the company's efforts towards waste water management	70,19%	29,81%	2,98
S9	"Google invests in clean technologies and renewable energies"	Perception of the company's efforts towards energy transition	60,58%	39,42%	3,29
S10	"Google encourages its members to adopt eco-friendly behaviour"	Perception of the company's efforts towards stakeholder engagement	47,12%	52,88%	3,37
G1	"Google will meet its 2030 carbon-free energy targets"	Perception of the company's efforts towards climate neutrality goals	59,62%	40,38%	3,26
G2	"I perceive Google's practices as "greenwashing""	Perception of the company doing greenwashing	26,92%	73,08%	4,13

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The average of average values from the table above falls slightly above 3 "slightly disagree" (3,08), meaning respondents mostly slightly disagree on the statements. It can be seen that the strongest disagreement is with C3 (with a value of 2,55) -"I consider Google a sustainable, ethical company that cares about the environment"- followed closely by C1 (with a value of 2,59) - "I understand Google as a company committed to nowadays climate issues"-. The statement with the highest agreement is G2 (with a value of 4,13) -"I perceive Google's practices as "greenwashing""-.

Graph 34 displays the same information as table 15: the average value (numerical) is shown on the right axis on a Likert scale (line) and the percentage of disagreement and agreement are shown on the left axis (columns).

Graph 34. Disagreement and agreement percentages, including average values for the statements of the developed scale
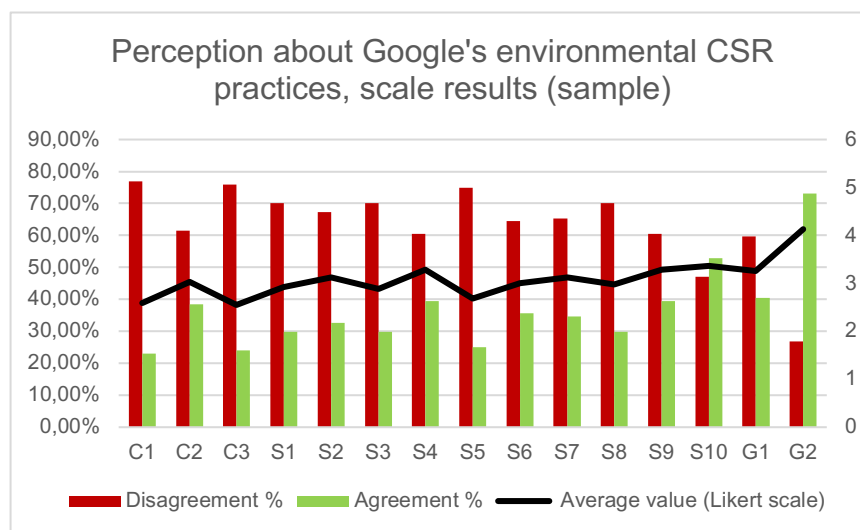
Font: Gemma Oleart

From graph 34, it's easy to see which two statements have a different perception (exact agreement values are checked in table 15).

- G2: I perceive Google's practices as "greenwashing" (agreement of 73,08%)
- S10: Google encourages its users to adopt eco-friendly behavior (agreement of 52,88%)

In contrast, the statements with the highest disagreement are:
- C1: I understand Google as a company committed to nowadays climate issues (76,92%)
- C3: I consider Google a sustainable, ethical company that cares about the environment (75, 96%)
- S5: Google respects and promotes the protection of biodiversity (75%)

>> Both extreme statements are coherent with one another, showing the general perception of the respondents that Google lacks environmental commitment or if it truly committed, there must be some adjustment in the way of communicating them as practices are perceived as greenwashing.

It was initially expected to see substantial differences in perception regarding the variables of level of interest in CSR topics and contact with CSR practices, as it was hypothesized that exposure or/and knowledge could be a factor influencing the respondents' perception.

The numerical averages are presented for the 15 statements composing the new scale according to the chosen variables to prove the hypothesis: for graph 35 and table 16 according to respondents' contact with CSR practices and for graph 36 and table 17 according to respondents' level of interest in CSR topics. The graphs are provided to facilitate the tables' reading.

Graph 35 shows the average perception of the different statements composing the scale for respondents who are in contact with CSR practices (grey line) and respondents who aren't (brown line). From a general view, both lines are showing a similar trend, which displays similar perception across the different respondents (since statements show similar averages). Looking in detail, the gray line -respondents who are in contact with CSR practices- is always at a lower value than the brown one, interpreting that they tend to a higher disagreement upon the statements, they have a slightly more critical opinion.

For respondents with contact with CSR practices, the lowest grading was referring to the following statements:

- o C3: "I consider Google a sustainable, ethical company that cares about the environment" (2,35)
- o C1: "I understand Google as a company committed to nowadays climate issues" (2,43)
- o S3/S5: "Google contributes toward saving resources and energy"/"Google respects and promotes the protection of biodiversity" (2,59)

And the major grading was referring to the following statements:

- o G2: "I perceive Google's practices as "greenwashing"" (4)
- o S10: "Google encourages its users to adopt eco-friendly behavior" (3,35)
- o G1: "Google will meet its 2030 carbon-free energy targets" (3,27)

For respondents without contact with CSR practices, the lowest grading was referring to the following:

- o C3: "I consider Google a sustainable, ethical company that cares about the environment" (2,66)
- o C1: "I understand Google as a company committed to nowadays climate issues" (2,67)
- o S3: "Google contributes toward saving resources and energy" (2,75)

And the major grading was referring to the following statements:

- o G2: "I perceive Google's practices as "greenwashing"" (4,19)
- o S4: "Google makes investments to improve the ecological quality of its products and services" (3,43)
- o S10: "Google encourages its users to adopt eco-friendly behavior" (3,37)

Graph 35. Average grading of the scale statements according to respondents' contact with CSR practices
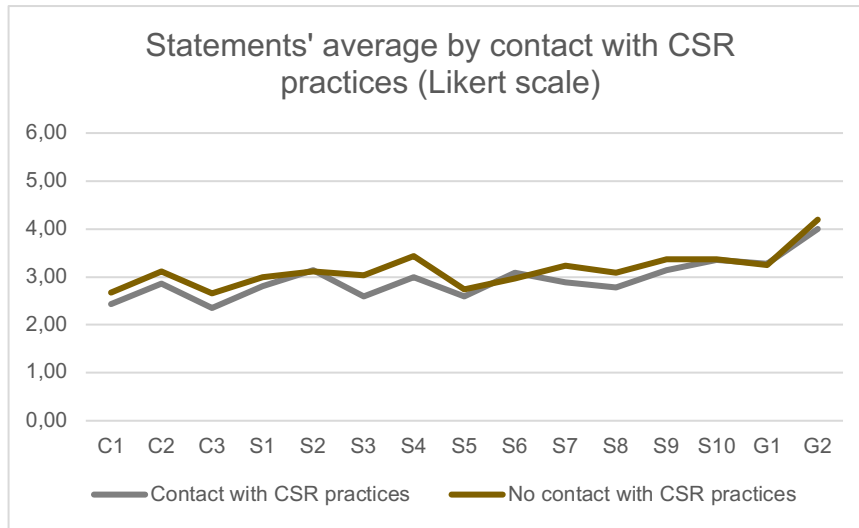
Font: Gemma Oleart

Table 16. Average grading of the scale statements according to respondents' contact with CSR practices

Statement code / Average num. value	C1	C2	C3	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	G1	G2	Average
Contact with CSR practices	2,43	2,86	2,35	2,81	3,14	2,59	3,00	2,59	3,08	2,89	2,78	3,14	3,35	3,27	4,00	2,95
No contact with CSR practices	2,67	3,12	2,66	3,00	3,12	3,03	3,43	2,75	2,97	3,24	3,09	3,37	3,37	3,25	4,19	3,05

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Graph 36 shows the average perception of the different statements composing the scale according to the respondents' level of interest in CSR topics (high interest: orange line; medium interest: gray line; and low interest: yellow line). From a general view, the lines are showing a similar trend, which displays similar perception across the different respondents without major discrepancies (since statements show similar averages). Looking in detail, the orange line - respondents have a high level of interest in CSR topics- is slightly a lower value than the other two, suggesting that respondents with high interest in CSR topics might judge more strongly the statements, however, the differences are non-significant, as it can be seen in table 17, displaying the numerical values.

For respondents with a high level of interest in CSR topics, the lowest grading was referring to the following statements:

- o C1/C3/S5: "I understand Google as a company committed to nowadays climate issues"/ "I consider Google a sustainable, ethical company that cares about the environment"/ "Google respects and promotes the protection of biodiversity" (2,53)
- o S3: "Google contributes toward saving resources and energy (2,65)
- o C2: "I understand Google as a company that understands the damage it does to the environment" (2,71)

And the major grading was referring to the following statements:

- o G2: "I perceive Google's practices as "greenwashing"" (4,21)
- o S10: "Google encourages its members to adopt eco-friendly behaviour" (3,38)

- S4: "Google makes investments to improve the ecological quality of its products and services" (3,15)

For respondents with a medium level of interest in CSR topics, the lowest grading was referring to the following statements:

- C3: "I consider Google a sustainable, ethical company that cares about the environment (2,51)
- C1: "I understand Google as a company committed to nowadays climate issues" (2,71)
- S4: "Google makes investments to improve the ecological quality of its products and services" (2,76)

And the major grading was referring to the following statements:

- G2: "I perceive Google's practices as "greenwashing"" (4,12)
- G1/S4: "Google will meet its 2030 carbon-free energy"/ "Google makes investments to improve the ecological quality of its products and services" (3,34)
- S9/S10: "Google invests in clean technologies and renewable energies"/ "Google encourages its members to adopt eco-friendly" (3,27)

For respondents with a low level of interest in CSR topics, the lowest grading was referring to the following statements:

- C1: "I understand Google as a company committed to nowadays climate issues" (2,48)
- C3: "I consider Google a sustainable, ethical company that cares about the environment" (2,62)
- S5: "Google respects and promotes the protection of biodiversity" (2,79)

And the major grading was referring to the following statements:

- G2: "I perceive Google's practices as "greenwashing"" (4,03)
- S9: "Google invests in clean technologies and renewable energies" (3,62)
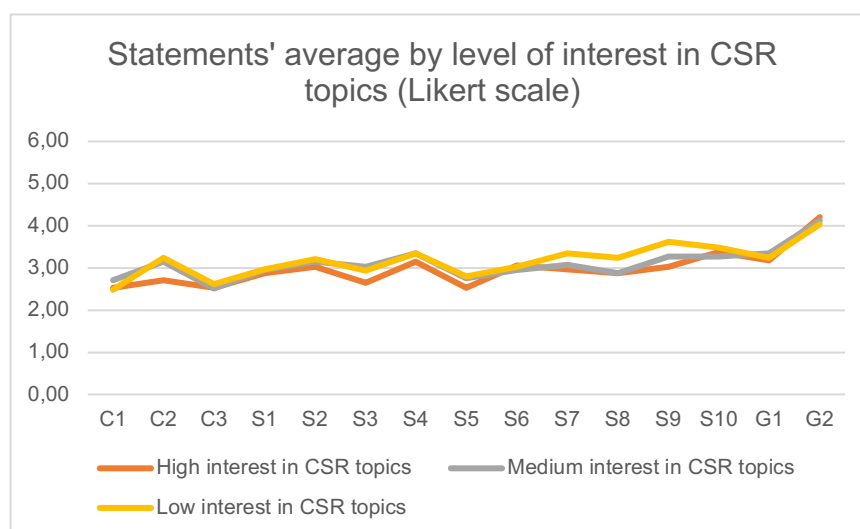- S10: "Google encourages its members to adopt eco-friendly behaviour" (3,48)

Graph 36. Average grading of the scale statements according to respondents' level of interest in CSR topics

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Table 17. Average grading of the scale statements according to respondents' level of interest in CSR topics

Statement code / Average num. value	C1	C2	C3	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	G1	G2	Average
High interest in CSR topics	2,53	2,71	2,53	2,88	3,03	2,65	3,15	2,53	3,06	2,97	2,88	3,03	3,38	3,18	4,21	2,98
Medium interest in CSR topics	2,71	3,15	2,51	2,95	3,15	3,02	3,34	2,76	2,95	3,07	2,88	3,27	3,27	3,34	4,12	3,10
Low interest in CSR topics	2,48	3,24	2,62	2,97	3,21	2,93	3,34	2,79	3,03	3,34	3,24	3,62	3,48	3,24	4,03	3,17

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Table 18 displays the highest and lowest ranked statements of the scale for the general sample results and according to the two variables of interest: contact with CSR practices and level of interest in CSR topics. The different averages are rounded up to the nearest unit (Likert scale) and the code of colors is as follows:

- Statements placed between 1 and 2: light red background and red letters, it is understood as perceived negatively
- Statements placed at 3: light red background and black letters, it is understood as perceived neutral (slightly negative)
- Statements placed at 4: light green background and black letters, it is understood as perceived neutral (slightly positive)
- Statements placed between 5 and 6: light green background and green letters, it is understood as perceived positively

Table 18. Statements with highest and lowest grading averages for the different variables

	Sample results	Contact with CSR		Level of interest in CSR topics		
		Contact with CSR	No contact with CSR	High interest	Medium interest	Low interest
Highest ranked	Perception of the company's activities as greenwashing	Perception of the company's activities as greenwashing	Perception of the company's activities as greenwashing	Perception of the company's activities as greenwashing	Perception of the company's activities as greenwashing	Perception of the company's activities as greenwashing
2nd highest ranked	Perception of the company's efforts towards stakeholder engagement	Perception of the company's efforts towards stakeholder engagement	Perception of the company's efforts towards sustainable investments	Perception of the company's efforts towards stakeholder engagement	Perception of the company's efforts towards carbon-free energy targets/Perception of the company's efforts towards sustainable investments	Perception of the company's efforts towards energy transition
2nd lowest ranked	Perception of the company's environmental commitment	Perception of the company's environmental commitment	Perception of the company's environmental commitment	Perception of the company's efforts on preserving resources	Perception of the company's environmental commitment	Perception of the company being sustainable
Lowest ranked	Perception of the company being sustainable	Perception of the company being sustainable	Perception of the company being sustainable	Perception of the company's environmental commitment/Perception of the company being sustainable/Perception of the company's efforts towards biodiversity	Perception of the company being sustainable	Perception of the company's environmental commitment

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There is a general agreement on the statements ranked above (some statements appear multiple times). Across all variables, there's a general agreement to perceive Google's activities as greenwashing (neutral value), the rest of the statements are generally perceived as neutral/negative. Respondents with contact with CSR practices perceived more strongly (negatively) Google's efforts on environmental commitment and Google being a sustainable company. The results are similar for those respondents not in contact with CSR practices but stay a rather neutral perception.

Regarding the results for respondents according to their level of interest in CSR topics, the general overview suggests a majority of neutral/negative perception about Google practices. Respondents with a low level of interest in CSR topics show stronger perceptions (in the extremes) while respondents with high and medium interest remain in more neutral perceptions. The main difference across the variable is that respondents with a high level of interest in CSR agree much more on the grading, as several statements receive the same punctuation.

>> Results on perceptions are similar for the general sample values and according to the two variables of interest (contact with CSR practices and level of interest in CSR topics), pointing out at an initial conclusion on not affecting (at least significatively) consumer perceptions.

Since the results were similar among the different variables despite initial expectations to reach other conclusions, the author decided to check if there were significant differences in respondents' perception regarding their age range and their educational level achieved, to point out if the variables could influence consumers' perception.

Graph 37 and table 19 display the results according to respondents' educational level achieved while graph 38 and table 20 display the results according to the respondents' age range.

Graph 37 shows the average perception of the different statements composing the scale according to the respondents' educational level achieved (A-levels: blue line, Bachelor's degree: orange line, Master's degree: gray line, and Ph.D.: yellow line). From a general view, it can be seen there's some diversity in the answers (lines are showing a different trend, which displays different perceptions across the respondents according to their educational level achieved).

Looking in detail, perceptions of respondents with a bachelor and a master are similar, however, the ones with a master -grey line - show a lower average (they disagree more). Respondents with A-levels follow the same pattern seen for the bachelor and master respondents but a higher level, placing it directly between 3 and 4 (they took a rather neutral position). Lastly, respondents with a Ph.D. show an irregular trend, possibly due to the fact of the small sample, however, the highest and lowest average awarded is on the yellow line (they judge strongly and place themselves in the extreme values).

For respondents with A-levels, the lowest grading was referring to the following statements:

- C3: "I consider Google a sustainable, ethical company that cares about the environment" (3,25)
- C1: "I understand Google as a company committed to nowadays climate issues" (3,33)
- S6: "Google measures the impact of its activities on the natural environment" (3,36)

And the major grading was referring to the following statements:

- S7: "Google has reduced its solid wastes generation" (4,16)
- G2 / S4: "I perceive Google's practices as "greenwashing""/"Google makes investments to improve the ecological quality of its products and services" (4,15)
- S9: "Google invests in clean technologies and renewable energies" (4,06)

For respondents with a bachelor's degree, the lowest grading was referring to the following statements:

- C3: "I consider Google a sustainable, ethical company that cares about the environment" (2,47)
- C1: "I understand Google as a company committed to nowadays climate issues" (2,51)
- S5: "Google respects and promotes the protection of biodiversity" (2,52)

And the major grading was referring to the following statements:

- G2: "I perceive Google's practices as "greenwashing"" (4,32)
- S10: "Google encourages its members to adopt eco-friendly behaviour" (3,44)
- S9: "Google invests in clean technologies and renewable energies" (3,32)

For respondents with a master's degree, the lowest grading was referring to the following statements:

- C3: "I consider Google a sustainable, ethical company that cares about the environment" (2,38)
- C1: "I understand Google as a company committed to nowadays climate issues" (2,42)
- S5: "Google respects and promotes the protection of biodiversity" (2,44)

And the major grading was referring to the following statements:

- G2: "I perceive Google's practices as "greenwashing"" (3,65)
- G1: "Google will meet its 2030 carbon-free energy targets" (3,09)
- S4: "Google makes investments to improve the ecological quality of its products and services" (3,02)

For respondents with a Ph.D. degree, the lowest grading was referring to the following statements:

- C2: "I understand Google as a company that understands the damage it does to the environment" (1,50)
- C1: "I understand Google as a company committed to nowadays climate issues" (2,33)
- S1/S3: "Google takes action to reduce pollution-related to its activities"/ "Google contributes toward saving resources and energy" (3,00)

And the major grading was referring to the following statements:

- G2: "I perceive Google's practices as "greenwashing"" (5,33)
- G1: "Google will meet its 2030 carbon-free energy targets" (4,75)
- S10: "Google encourages its members to adopt eco-friendly behaviour" (4,60)

Graph 37. Average grading of the scale statements according to respondents' educational level achieved
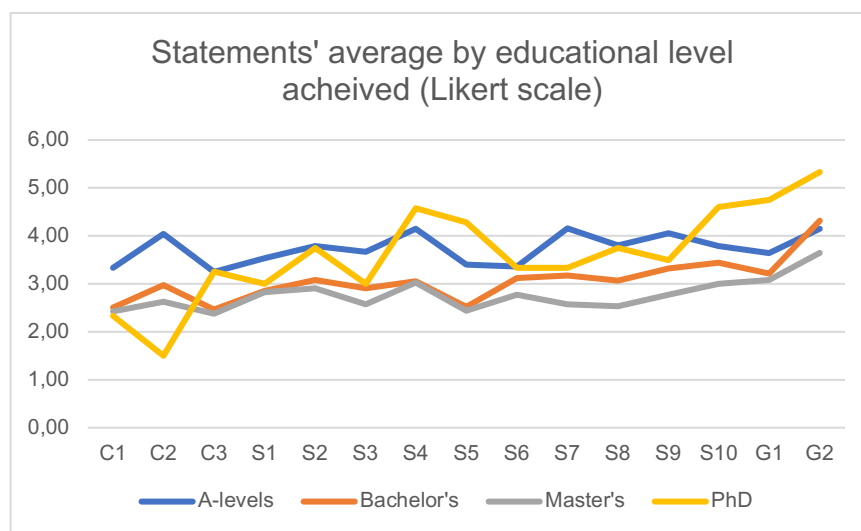
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Table 19. Average grading of the scale statements according to respondents' educational level achieved

Statement code / Average num. value	C1	C2	C3	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	G1	G2	Average
A-levels	3,33	4,05	3,25	3,54	3,79	3,67	4,15	3,40	3,36	4,16	3,80	4,06	3,79	3,64	4,15	3,74
Bachelor's	2,51	2,98	2,47	2,85	3,08	2,90	3,05	2,52	3,12	3,18	3,07	3,32	3,44	3,21	4,32	3,40
Master's	2,42	2,63	2,38	2,83	2,91	2,58	3,02	2,44	2,78	2,57	2,53	2,78	3,00	3,09	3,65	2,92
PhD	2,33	1,50	3,25	3,00	3,75	3,00	4,57	4,29	3,33	3,33	3,75	3,50	4,60	4,75	5,33	3,20

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Graph 38 shows the average perception on the different statements composing the scale according to the respondents' age range (18-20 years old: blue line, 21-23 years old: orange line,24-26 years old: gray line, 27-29 years old: yellow line, 30-32 years old: light blue line, 33-35 years old: green line and 36-40 years old: black line). From a general view, it can be seen there's some diversity in the answers however, the trend is similar.

Looking at the blue line (18-20 y) a couple of things can be observed, the average is generally higher than for the rest of age range and the pattern is against the rest in C3 (higher value), S6 (lower value), S10 (lower value) and G2 (lower value). Ages between 21-23 y -orange line-, 24-26 y -gray line- and 27-29 y -yellow line- follow almost the same pattern. Regarding ages between 30-32 y -clear blue line- and 33-35 y -green line-, they show a similar trend but those of 33-35 y tend to have a lower average (they disagree more). Surprisingly, respondents between 36-40y -black line- have an average stable at around 3 "slightly disagree", with the only expectation of a higher value in G2.

For respondents between 18 and 20 years, the lowest grading was referring to the following statements:

- C1: "I understand Google as a company committed to nowadays climate issues" (3,11)
- C2/S6: "I understand Google as a company that understands the damage it does to the environment" /"Google measures the impact of its activities on the natural environment" (3,44)
- G2: "I perceive Google's practices as "greenwashing"" (3,56)

And the major grading was referring to the following statements:

- S4: "Google makes investments to improve the ecological quality of its products and services" (4,56)
- S7/S9: "Google has reduced its solid wastes generation"/"Google invests in clean technologies and renewable energies" (4,22)
- G1: "Google will meet its 2030 carbon-free energy targets" (4,11)

For respondents between 21 and 23 years, the lowest grading was referring to the following statements:

- C3: "I consider Google a sustainable, ethical company that cares about the environment" (2,00)
- S5: "Google respects and promotes the protection of biodiversity" (2,18)
- C1: "I understand Google as a company committed to nowadays climate issues" (2,36)

And the major grading was referring to the following statements:

- G2: "I perceive Google's practices as "greenwashing"" (4,64)
- C2: "I understand Google as a company that understands the damage it does to the environment" (3,82)
- S10: "Google encourages its members to adopt eco-friendly behaviour" (3,45)

For respondents between 24 and 26 years, the lowest grading was referring to the following statements:

- C3: "I consider Google a sustainable, ethical company that cares about the environment" (2,51)
- C1: "I understand Google as a company committed to nowadays climate issues" (2,67)
- S5: "Google respects and promotes the protection of biodiversity" (2,69)

And the major grading was referring to the following statements:

- G2: "I perceive Google's practices as "greenwashing"" (4,26)
- S4: "Google makes investments to improve the ecological quality of its products and services" (3,49)
- S9: "Google invests in clean technologies and renewable energies" (3,44)

For respondents between 27 and 29 years, the lowest grading was referring to the following statements:

- C1: "I understand Google as a company committed to nowadays climate issues" (2,40)
- C3: "I consider Google a sustainable, ethical company that cares about the environment" (2,53)
- C2/S1/S5: "I understand Google as a company that understands the damage it does to the environment"/ "Google takes action to reduce pollution-related to its activities"/ "Google respects and promotes the protection of biodiversity" (2,73)

And the major grading was referring to the following statements:

- G2: "I perceive Google's practices as "greenwashing"" (4,00)
- G1: "Google will meet its 2030 carbon-free energy targets" (3,33)
- S9/S10: "Google invests in clean technologies and renewable energies"/ "Google encourages its members to adopt eco-friendly behaviour" (3,20)

For respondents between 30 and 32 years, the lowest grading was referring to the following statements:

- C1/C3: "I understand Google as a company committed to nowadays climate issues"/ "I consider Google a sustainable, ethical company that cares about the environment" (2,25)
- S5: "Google respects and promotes the protection of biodiversity" (2,33)
- S1: "Google takes action to reduce pollution-related to its activities" (2,58)

And the major grading was referring to the following statements:

- G2: "I perceive Google's practices as "greenwashing"" (4,25)
- S10: "Google encourages its members to adopt eco-friendly behaviour" (3,67)
- S6: "Google measures the impact of its activities on the natural environment" (3,25)

For respondents between 33 and 35 years, the lowest grading was referring to the following statements:

- C3: "I consider Google a sustainable, ethical company that cares about the environment" (1,57)
- S5: "Google respects and promotes the protection of biodiversity" (2,00)
- S3/C2: "Google contributes toward saving resources and energy"/ "I understand Google as a company that understands the damage it does to the environment" (2,14)

And the major grading was referring to the following statements:

o   G2: "I perceive Google's practices as "greenwashing"" (4,43)
o   S10: "Google encourages its members to adopt eco-friendly behaviour" (3,57)
o   G1: "Google will meet its 2030 carbon-free energy targets" (3,14)

For respondents between 36 and 40 years, the lowest grading was referring to the following statements:

o   S6: "Google measures the impact of its activities on the natural environment" (2,64)
o   S5: "Google respects and promotes the protection of biodiversity" (2,73)
o   S3: "Google contributes toward saving resources and energy" (2,82)

And the major grading was referring to the following statements:

o   G2: "I perceive Google's practices as "greenwashing"" (3,45)
o   S10: "Google encourages its members to adopt eco-friendly behaviour" (3,18)
o   C3/S1/S2/S4: "I consider Google a sustainable, ethical company that cares about the environment"/ "Google takes action to reduce pollution-related to its activities"/ "Google has reduced its carbon emission"/ "Google makes investments to improve the ecological quality of its products and services" (3,09)

Graph 38. Average grading of the scale statements according to respondents' age range
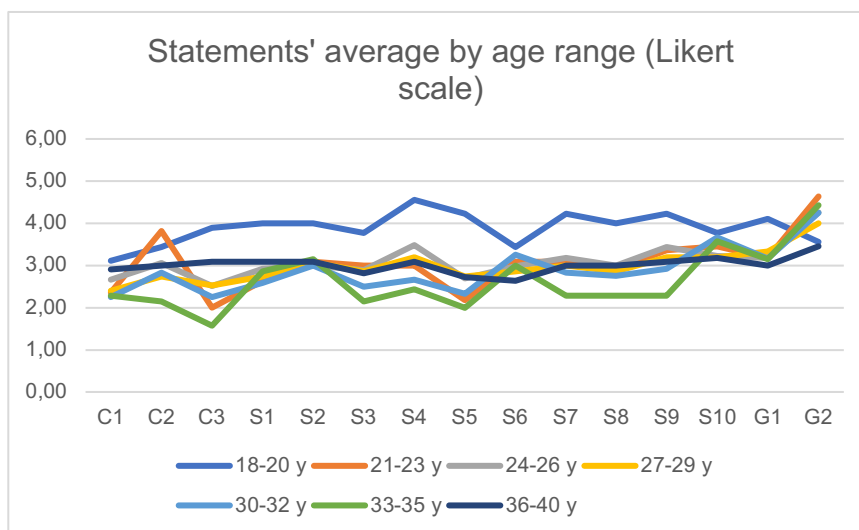
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Table 20. Average grading of the scale statements according to respondents' age range

Statement code / Average num. value	C1	C2	C3	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	G1	G2	Average
18-20 y	3,11	3,44	3,89	4,00	4,00	3,78	4,56	4,22	3,44	4,22	4,00	4,22	3,78	4,11	3,56	3,89
21-23 y	2,36	3,82	2,00	2,64	3,09	3,00	3,00	2,18	3,09	3,09	2,91	3,36	3,45	3,18	4,64	3,47
24-26 y	2,67	3,05	2,51	2,92	3,00	2,90	3,49	2,69	2,97	3,18	3,00	3,44	3,23	3,18	4,26	3,08
27-29 y	2,40	2,73	2,53	2,73	3,07	2,87	3,20	2,73	2,87	3,00	2,87	3,20	3,20	3,33	4,00	3,04
30-32 y	2,25	2,83	2,25	2,58	3,00	2,50	2,67	2,33	3,25	2,83	2,75	2,92	3,67	3,17	4,25	2,93
33-35 y	2,29	2,14	1,57	2,86	3,14	2,14	2,43	2,00	3,00	2,29	2,29	2,29	3,57	3,14	4,43	2,76
36-40 y	2,91	3,00	3,09	3,09	3,09	2,82	3,09	2,73	2,64	3,00	3,00	3,09	3,18	3,00	3,45	2,83

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Tables 21 and 22 display the highest and lowest ranked statements of the scale for the general sample results and according to the two variables: educational level achieved (table 21) and age range (table 22).

The different averages are rounded up to the nearest unit (Likert scale) and the code of colors is as follows:

- Statements placed between 1 and 2: light red background and red letters, it is understood as perceived negatively
- Statements placed at 3: light red background and black letters, it is understood as perceived neutral (slightly negative)
- Statements placed at 4: light green background and black letters, it is understood as perceived neutral (slightly positive)
- Statements placed between 5 and 6: light green background and green letters, it is understood as perceived positively

Table 21. Statements with highest and lowest grading averages according to respondents' educational level achieved and sample values

	Sample results	Educational level achieved			
		A-levels	Bachelor's	Master's	Ph.D.
Highest ranked	Perception of the company's activities as greenwashing	Perception of the company's efforts on solid waste	Perception of the company's activities as greenwashing	Perception of the company's activities as greenwashing	Perception of the company's activities as greenwashing
2nd highest ranked	Perception of the company's efforts towards stakeholder engagement	Perception of the company's activities as greenwashing/Perception of the company's efforts towards sustainable investments	Perception of the company's efforts towards stakeholder engagement	Perception of the company's efforts towards carbon-free energy targets	Perception of the company's efforts towards carbon-free energy targets
2nd lowest ranked	Perception of the company's environmental commitment	Perception of the company's environmental commitment	Perception of the company's environmental commitment	Perception of the company's environmental commitment	Perception of the company's environmental commitment
Lowest ranked	Perception of the company being sustainable	Perception of the company being sustainable	Perception of the company being sustainable	Perception of the company being sustainable	Perception of the company's awareness of environmental impact

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From table 21 perceptions became stronger (more to the extremes, going away from the neutral option) as the respondents' educational level achieved increases. There are no major differences across the perceptions. All respondents regardless of the level of education achieved agree on the positive perception towards the company's activities as greenwashing. Similarly, all respondents, regardless of the level of education achieved, agree on negatively perceiving the company's environmental commitment as well as the perception of the company being sustainable. They are a couple of outstanding values: for respondents with A-levels in addition to perceiving the company's activities as greenwashing, also perceive neutral positively the company's efforts on solid waste. For respondents with a master's degree or Ph.D. going the second-highest rank goes from the company's effort on stakeholder engagement to carbon-free energy targeting instead (for respondents with Ph.D. the perception is positive).

Table 22. Statements with highest and lowest grading averages according to respondents' age range and sample values

	Sample results	Age range						
		18-20 y	21-23 y	24-26 y	27-29 y	30-32 y	33-35 y	36-40 y
Highest ranked	Perception of the company's activities as greenwashing	Perception of the company's efforts towards sustainable investments	Perception of the company's activities as greenwashing	Perception of the company's activities as greenwashing	Perception of the company's activities as greenwashing	Perception of the company's activities as greenwashing	Perception of the company's activities as greenwashing	Perception of the company's activities as greenwashing
2nd highest ranked	Perception of the company's efforts towards stakeholder engagement	Perception of the company's efforts on solid waste/Perception of the company's efforts towards energy transition	Perception of the company's awareness of environmental impact	Perception of the company's efforts towards sustainable investments	Perception of the company's efforts towards carbon-free energy targets	Perception of the company's efforts towards stakeholder engagement	Perception of the company's efforts towards stakeholder engagement	Perception of the company's efforts towards stakeholder engagement
2nd lowest ranked	Perception of the company's environmental commitment	Perception of the company's awareness of environmental impact/Perception of the company's efforts towards measurement and communication	Perception of the company's efforts towards biodiversity	Perception of the company's environmental commitment	Perception of the company being sustainable	Perception of the company's efforts towards biodiversity	Perception of the company's efforts towards biodiversity	Perception of the company's efforts towards biodiversity
Lowest ranked	Perception of the company being sustainable	Perception of the company's environmental commitment	Perception of the company being sustainable	Perception of the company being sustainable	Perception of the company's environmental commitment	Perception of the company's environmental commitment/Perception of the company being sustainable	Perception of the company being sustainable	Perception of the company's efforts towards measurement and communication

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Table 22 shows a different trend from the general sample, going away from neutral perceptions and being more (positively or negatively) positioned. Depending on the respondents' age range the statements are perceived significantly differently. Younger respondents (18-20 years old) tend towards a more positive perception of Google's CSR practices, those of 21 to 23 years old are strongly positioned. Those of 24-26 years old follow the general sample trend, those of 27-29 years to 33-35 years old have a more negative perception but an increase in the positive practices. Lastly, respondents between 36 and 40 years, show the lowest on average results, they have a neutral negative perception of Google and moderated regarding potential greenwashing. Concerning the statements of choice, there's a general agreement on a neutral positive agreement to see the company's practices as greenwashing. There are doubts about the company's environmental commitment as well as consider the company sustainable. It is quite relevant that regarding the age range, the efforts of the company in regard to biodiversity are perceived negatively.

Perceptions on the environmental CSR practices follow a similar trend as the one observed for the general perception of Google according to respondents' educational level achieved and age range.

>> It wasn't expected to observe significant differences with variables such as age and educational level achieved. Contrarily to what was expected, with the sample of the study, no substantial differences have been seen depending on the level of interest in CSR and contact with CSR practices, from which it cannot be concluded that education and sensibility/exposure are factors influencing consumer perception.

Coherence of the data

To check that the answers were coherent, some statements were analyzed as pairs, since they have a relation with one another. The following pairs were studied:

- C2 "I understand Google as a company that understands the damage it does to the environment" - C3 "I consider Google a sustainable, ethical company that cares about the environment": as the author considers that no company can care without understanding its impact first.
- S1 "Google takes action to reduce pollution-related to its activities" - S2 "Google has reduced its carbon emission": as the author considers that reducing carbon emissions is a way of reducing pollution.
- S3 "Google contributes toward saving resources and energy" - S7 "Google has reduced its solid wastes generation": as the author considers that reducing solid waste, is a practice of saving resources and energy.
- G1 "Google will meet its 2030 carbon-free energy targets" - S2 "Google has reduced its carbon emission": as the author considers that to reach the target, the carbon emission needs to be reduced as well.

- G2 "I perceive Google's practices as "greenwashing"" - C3 "I consider Google a sustainable, ethical company that cares about the environment": as the author considers these two statements completely contradictory, a company cannot be perceived as sustainable, and ethical and parallelly perceived as greenwashing.

Table 23 displays the differences in the averages grading values differences between the statements analyzed (pairs). For pairs C2-C3, S1-S2, S3-S7, and G1-S2 a value inferior at 1 is expected, as the pairs have a positive interrelation, and they should have to be graded "equally". However, for pair G2-C3, as they have a negative interrelation– it is either one or the other, but not both-, it is expected that a value superior at 1 is observed.

Table 23. Average grading differences between the pairs (sample)

| Interrelation	C2-C3	S1-S2	S3-S7	G1-S2	G2-C3
Difference (average)	0,87	0,56	0,57	0,75	2,06

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As expected, in the study one can see that there's a positive interrelation between C2-C3, S1-S2, S3-S7, and G1-S2. The strongest one lies between S3-S7 referring to preservation of resources and waste management as it has the closest value to zero which means fewer differences in gradings by the respondents. As expected, a negative interrelation has been observed between G2-C3 referring to practices as greenwashing and perception of the company being sustainable, since the number is higher than 1.

Graphs 39 to 42 display the interrelations results on different variables: by contact with CSR practices (graph 39), by the level of interest of CSR topics (graph 40), by educational level achieved (graph 41), and by age range (graph 42).

Graph 39 shows a slight difference between respondents with contact with CSR practices and the ones who don't. Those who have contact with CSR practices have lower interrelation values for the positive correlation and higher interrelation values for the negative correlation, showing a higher degree of coherence in their perceptions. However, the difference is minimal (decimals).

Graph 39. Average grading differences between the pairs according to respondents' contact with CSR practices
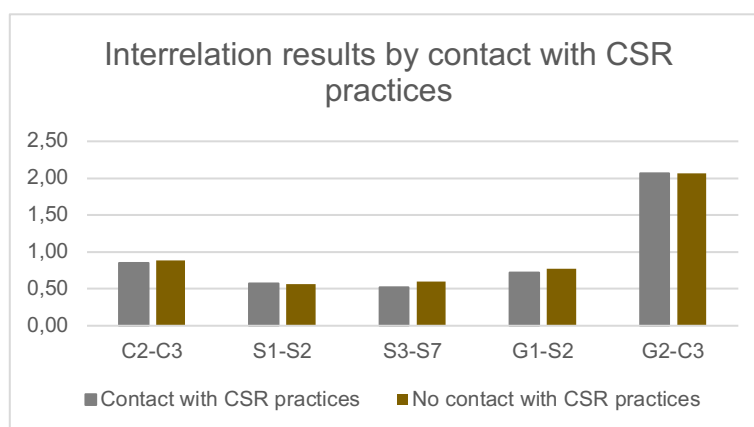
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Graph 40 shows slight differences according to the level of interest in CSR topics. Respondents with high interest show slightly higher coherence than the rest. Respondents with a low level of interest show lower interrelation results for the negative correlation.

Graph 40. Average grading differences between the pairs according to respondents' level of interest in CSR topics
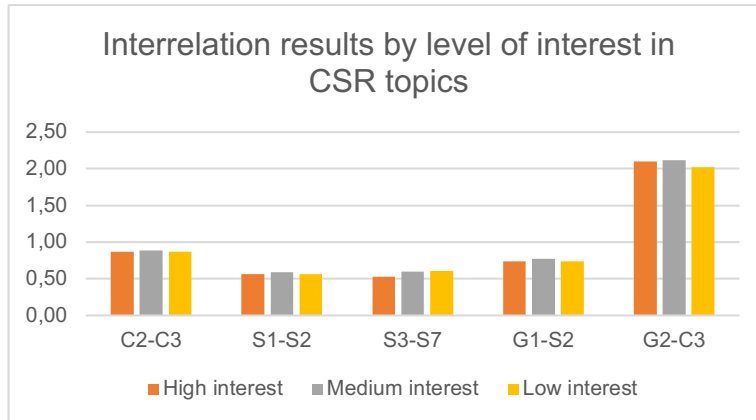
Font: Gemma Oleart

Graph 41 shows almost no difference for respondents with A-levels and bachelor's and master's degrees. However, for Ph.D. there's no difference between C2 and C3 as the respondents graded it with the same values. The interrelation results are smaller for S1-S2 and S3-S7 but are much higher (almost doubled) for G1-S2.

Graph 41. Average grading differences between the pairs according to respondents' educational level achieved
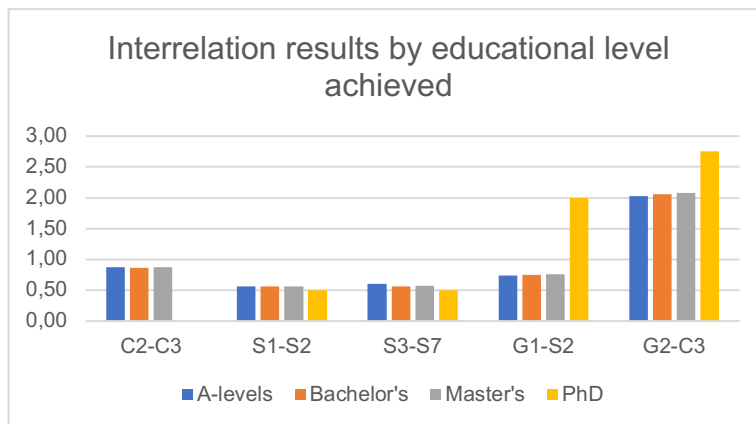
Font: Gemma Oleart

The results are similar across age ranges. However, the age range 18-20 years has slightly more coherent results for C2-C3 and slightly less coherent for S1-S2, S3-S7, and G1-S2 than the rest of the age ranges.
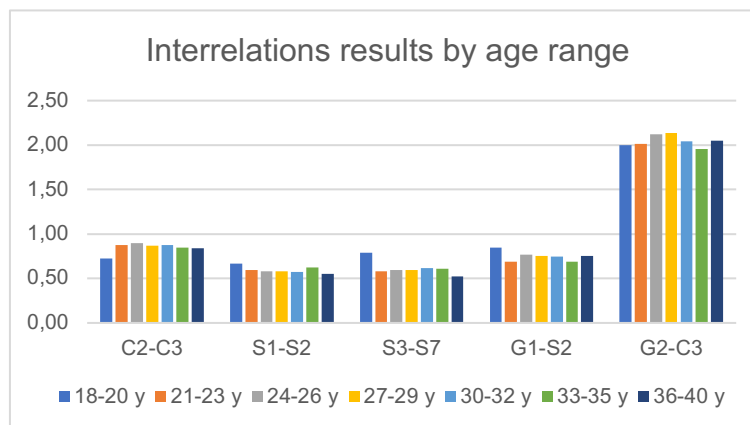
Graph 42. Average grading differences between the pairs according to respondents' age range

Font: Gemma Oleart

>> Data was generally coherent, but for the pair G1-S2 for the respondents with a Ph.D., such results can be due to the small sample of respondents with that educational level achieved.

It has been shown that the general population of the study perceive similarly the following elements: i) The company's understanding of the environmental impact and the perception of that company being sustainable, ii) carbon-free energy targets and efforts towards reduction of emissions. Specifically, even more, iii) efforts towards pollution reduction and efforts towards reduction of emissions and iv) efforts towards the preservation of resources and efforts towards waste management. The respondents perceive contrarily the following: greenwashing practices and the perception of the company being sustainable.

The results point out at a potential new approach for Google and other companies to change consumers' perceptions on their practices. They could focus their efforts on one practice from within a pair (choosing where they are graded lower, also known as "improvement areas") to try to modify indirectly the perception on the other practice within the pair. [4] Lastly, the results point out at the awareness of the respondents towards greenwashing.

CONCLUSIONS

a. General conclusions

The study was thought to analyze the consumers' perception and awareness of Google's environmental CSR practices. What could be the drivers of a change in perception? The author developed a new scale including 15 statements, based on prior research, to tackle all materiality topics of Google. Respondents were asked to grade their perception towards the statements on a Likert scale from 1, strongly disagreeing, to 6, strongly agreeing. The targeted population were Spanish Millennials and Gen Z aged between 18 to 40 years.

The study wanted to observe if there were significant differences in perception depending on the respondents' level of interest in CSR topics, or the respondents' contact with CSR practices. For the 15 statements of the survey, no significant difference was found. Unexpectedly, differences were found by age range and educational level achieved.

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[4] Before confirming the generalization, it would have to be checked that the interrelations hold at all times.

Respondents were asked about Google's perception, where it was observed a sustained "neutral" position across the sample at an average value of 25%. 2 trends were observed: younger respondents had larger percentages of positive perception and as respondents' educational level increased, the percentage of positive perception dropped. Overall, Google had a general good/neutral perception.

A duality on how Google is perceived has been found: as the innovative tool and at the same time, the control that has. The respondents replied strongly to the need for further control (regulation) within the tech industry and was a homogenous answer to a proposal for improvement. More than a third of the sample population has a negative perception of Google and while no specific answers were collected as "technology control" for improvement, it seems that the population would engage easily into the CDR concept.

Looking at the specific Google's practices, on an aggregate level, different profiles of consumers don't seem to perceive things radically differently. There's a homogenous trend to place oneself in-between semi-neutral values. Respondents tend to choose 3 ("slightly disagree") or 4 ("slightly agree") in a 1-6 Likert scale for general perceptions about the industry, however, the average is placed at 3 "slightly disagree" for Google's practices perception.

 The strongest perception values and agreement percentage is on statements G2 ("I perceive Google's practices as "greenwashing"") as "Slightly agree" and C3 ("I consider Google a sustainable, ethical company that cares about the environment") as "Disagree", however, the highest disagreement percentage is for C1 ("Google is committed to nowadays climate issues"). The statements are indirectly related and point out one potential reason why consumers see Google's environmental CSR practices as greenwashing. The respondents also "Slightly agree" regarding Google's effort to encourage its users to adopt sustainable measures. Respondents with a low level of interest in CSR topics showed a slightly more positioned opinion while, respondents with contact with CSR practices tend to more disagreement with the different statements, judging more negatively. The same trends observed for Google's general perception have been also observed in the case of the Google CSR practices: as respondents' educational level increases there are stronger perceptions and younger respondents tend towards a more positive perception of Google CSR practices.

Additionally, interrelations across statements were studied to ensure that respondents' answers were coherent. It was observed that respondents consider very similar efforts towards pollution and towards carbon emissions or efforts towards preserving resources and towards waste generation. Such similarity can help companies target their practices in detail as the perception in one is likely to replicate in the other aspect "automatically".

Lastly, findings were pointing out that there is a lot of unawareness and confusion referring to the tech industry in technical questions, for example, 50,9% of the respondents weren't aware of the GHG emissions of the industry. Generally, consumers don't know how much the carbon footprint of a digital product is such as a Google search, or what is the cost for carbon offsetting. Closely linked to these results, the study wanted to tap in if education had any effect in a change in technical questions, while slightly better results were found in the technical questions as well as stronger interrelations for respondents with a high-interest level in CSR topics and respondents in contact with CSR practices, there is not enough evidence to rule out that they had "good luck". The research insights can help the company to understand the customers' point of view and reassess current practices.

b. Limitation and further research

The findings of this study are a good starting point to understand consumers' perception about environmental CSR practices for a specific company in the tech industry (Google) within the context of Spain and in a concrete generation (millennials and gen z). However, the author is aware that the study holds some strong assumptions (untested in the study setting):
* Gen Z individuals and millennials are the most representative individuals
* The respondents are daily (or almost) users of Google's products and services

- Environmental CSR is the best indicator for Google's CSR (largest impact)

The author encourages further research targeting other companies within the tech industry (social media) to understand if the different use of the product can have an impact on the perception of consumers. At a later point, before drawing general conclusions, a cross-cultural study would need to be performed to ensure robust conclusions and clarify that the culture does not have an impact for this industry on consumer perceptions. In the light of the results, additionally, it can be explored through qualitative research why consumers might not relate the environmental impact with Google and other tech companies.

On a broader view, there have been two questions that haven't been included in this study:
- The process to determine what is the largest impact of the company on society which in its turn would make CSR strategies focus on one pillar or another.
- The difference between perception (thought) regarding Google and intention (actual behavior) of using Google services. It would be interesting to see whether consumers that use frequently Google would consider switching to another option if they are presented with negative information about its environmental impact.

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ANNEXES

a. Interview scheme

1. Personal presentation of the author and the work (context for the interview)
2. Presentation of the interviewee (personal data and technical background)
3. Questions according to the interview:

A) Technology

- How would you define the tech industry?

- Where [which industry] does Google fit in? Where would you classify it?

- Are there good environmental practices in the field of the "Internet" (tech industry)? Which?

- Do you think that the impact of this industry on the environment is a materiality topic and how? What are the priorities in this regard?

- Is the current technology clean? (servers, data management)

- What are the biggest challenges towards an "environmentally friendly" or sustainable internet?

- Is there a company case of good environmental practices that you would highlight in the industry? Is there a company in the industry that you consider as little responsible in the matter of environmental practices and why?

- Define Google with 3 words

B) CSR

- What is CSR for you? How would you define it?

- Can CSR practices be the same for different industries? (construction industry vs. Internet/cutting edge technology)

- What potential does the tech industry have to minimize its impact on the environment?

- In your opinion, why was the concept of CDR [Corporate Digital Responsibility] born?

- How do you perceive Google's CSR policy?

- How can the general public discover that a specific practice is greenwashing?

- Is there an example of best practices in the industry?

- Define Google with 3 words

4. Interviewee's space (final words, comments, …)

5. Closing

b. Survey scheme

Title of the survey: Consumers' perceptions about Google's CSR (environmental) practices

Introduction
Dear participant,
Thank you for your interest in our online survey, which we are carrying out for the collection of data necessary for the elaboration of the Final Master's Thesis (TFM) of the master's degree in Corporate Social Responsibility at the Universitat Oberta de Catalunya (UOC).

About the survey
The survey lasts about 5 minutes and consists of three parts. The first part consists of answering general questions, the second part of answering questions related to the company under study (Google), finally the third part collects statistical data. The aim is to find out how consumers' perceptions of environmental CSR practices are conducted by Google.
All data obtained is confidential and is processed on an aggregate level.

Please note the following when completing the survey:
- Must be over 18 and under 40.
- You must have Spanish nationality.

Recommendations:
Find a quiet place where you are not disturbed.
Fill in the questionnaire without interruption.
Do not click "back" or "update" in your browser, as this may interrupt your data storage.

We hope you enjoy completing the survey!
Select "continue" to begin.

Contact
Author TFM / survey: Gemma Oleart - gemma-oleart@uoc.edu
Academic tutor: Eleni Papaoikonomou - epapaoikonomou@uoc.edu

Section 1: General questions
This first section includes generic questions.

- To what extent do you agree with the following statements?
  Question type: Likert scale 1-6 (1- Strongly disagree, 2- Disagree, 3- Slightly disagree, 4- Slightly agree, 5- Agree, and 6- Strongly agree)
  - The tech industry is largely responsible for climate change.
  - The tech industry is one of the most polluting.
  - There is enough control over this type of industry
  - The application of CSR practices can affect the normal development and evolution of technology, or of this industry.

- The tech industry is responsible for between 2 and 3.7% of the world's greenhouse gas emissions, depending on the study.
  Question type: Scale 1-5 (1- I didn't know it at all, 2- I didn't know, 3- I had heard of it, 4- I knew it but with hesitation, 5- I knew it without doubt)

- On issues of corporate ethical responsibility or CSR, can you think of any proposals to improve the behavior of companies and at the same time the environment?
  Question type: Long text answer

Section 2: Google related questions
This second part includes several questions about the company object of study (Google).

- Of the proposed categories, where would you place Google?
  Question type: Multiple choice (Cloud services, social networks, search engine, and "other").

- To what extent do you agree with the following statements?
  Question type: Likert scale 1-6 (1- Strongly disagree, 2- Disagree, 3- Slightly disagree, 4- Slightly agree, 5- Agree, and 6- Strongly agree)

  - I understand Google as a company committed to nowadays climate issues
  - I understand Google as a company that understands the damage it does to the environment
  - I consider Google a sustainable, ethical company that cares about the environment
  - Google takes action to reduce pollution related to its activities
  - Google has reduced its carbon emission
  - Google contributes toward saving resources and energy
  - Google makes investments to improve the ecological quality of its products and services
  - Google respects and promotes the protection of biodiversity
  - Google measures the impact of its activities on the natural environment
  - Google has reduced its solid wastes generation
  - Google has reduced its wastewater generation
  - Google invests in clean technologies and renewable energies
  - Google encourages its users to adopt eco-friendly behavior
  - Google will meet its 2030 carbon-free energy targets

o I perceive Google's practices as "greenwashing"

- What is the carbon footprint of a Google search? (in g of CO_2). Enter a numeric answer.
  Question type: Short text answer
  The description included: The carbon footprint is the indicator of greenhouse gas (GHG) emissions associated with the life cycle of a product, service, or organization. It is quantified as equivalent CO_2 emissions that are released into the atmosphere. Source: https://mediambient.gencat.cat/ca/05_ambits_dactuacio/empresa_i_produccio_sostenible/estrategia_ecodisseny/ecodisseny/eines/eines_av/petjada_carboni/

- How much does it cost to offset a tonne -1,000 kg- of CO_2 emissions? (in euros)
  Question Type: Multiple choice (<10€, 11-30€, 31-50€, 51-70€, 71-90€, 91-110€, >111€)
  The description included: There is no single value as the price per tonne depends on several factors: i) the place where it is compensated, ii) the technology used and iii) the industry in question. For this exercise, you can think of compensating for a return flight Barcelona - Stockholm (which is 1,020 kg of CO_2).

- Enter three adjectives/words that define how you perceive Google.
  Question Type: Long text answer

Section 3: Statistical data
For statistical purposes, we ask you to provide us with the following information. Remember that the data is anonymous and only works on an aggregate level.

- Select your age group (years)
  Question type: Multiple choice (< 18, 18-20, 21-23, 24-26, 27-29, 30-32, 33-35, 36-40, >40)
  The description included: Remember that you must be between 18 and 40 years old to be able to answer the survey. If you do not meet the requirements, your answers will be deleted.

- What genre do you identify with?
  Question type: Multiple choice (Female, Male, and Other)

- Which is your nationality?
  Question type: Multiple choice (Spanish and Other)
  The description included: Remember that you must be a Spanish national to be able to answer the survey. If you do not meet the requirements, your answers will be deleted. The survey remains neutral to political ideologies, please answer in Spanish if your ID/passport is managed by the Spanish authorities.

- What is your maximum level of education attained (completed)?
  Question type: Multiple choice (Highschool/A-levels "ESO/Bachillerato", University degree or similar, Master's degree and Postgraduate or doctorate)

- What is your interest in CSR/Sustainability topics?
  Question type: Multiple choice (High, Medium, Low)

- Are you in touch with CSR practices in your daily life (whether for study or work)?
  Question type: Multiple choice (Yes, No)

c. Instrument (developed scale)

Generic (**C**ommon):

- C1: "I understand Google as a company committed to nowadays climate issues"

- C2: "I understand Google as a company that understands the damage it does to the environment"

- C3: "I consider Google a sustainable, ethical company that cares about the environment"

Based on El Akremi et al. (2018) and Suganthi (2020) (**S**cale):

- S1: "Google takes action to reduce pollution-related to its activities"

- S2: "Google has reduced its carbon emission"

- S3: "Google contributes toward saving resources and energy"

- S4: "Google makes investments to improve the ecological quality of its products and services"

- S5: "Google respects and promotes the protection of biodiversity"

- S6: "Google measures the impact of its activities on the natural environment"

- S7: "Google has reduced its solid wastes generation"

- S8: "Google has reduced its waste water generation"

- S9: "Google invests in clean technologies and renewable energies"

- S10: "Google encourages its members to adopt eco-friendly behavior"

Specific (**G**oogle):
- G1: "Google will meet its 2030 carbon-free energy targets"

- G2: "I perceive Google's practices as "greenwashing""