



The Potential Impact of a Carbon Footprint App on Product Purchasing

Studying the Degree to which the French Generation Z would Adopt an App Specialized on Carbon Footprint

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**The potential impact of a carbon foot-print app on product purchasing
Studying the degree to which the French generation Z would adopt an app specialized on carbon footprint**

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Abstract

The environment, especially CO2 emission, has been a central concern for the future for years. To address this issue, experts must implement tools and techniques. This empirical study aims to determine Generation Z's willingness to use an app that tracks the carbon footprint during products purchasing. The research aimed to explain using a deductive approach, selecting a philosophical realist perspective. The study gathered data via mixed methods questionnaire. The data collection occurred during the initial semester of the 2021 academic year, thus categorizing it as a cross-sectional study. The data was collected among 64 mostly Generation Z participants. Results showed that the participants were generally showing a high level of UX satisfaction about the app idea, which could lead to adopt it for a significant cause of the century. They perceived it as an innovative solution that could help young people better understand when undertaking purchasing decision based on products' carbon footprint. All the results are on a scale of -2 to 2 always above 0,5, showing that these results are all positive. Further research with a larger and more diverse group of participants is recommended in order to strengthen these findings and gain further insights into innovation potential adoption to tackle environmental challenges.

Keywords/tags (subjects)

Carbon Footprint, Generation Z, Mobile App Idea, Intention to use, User Experience, Survey

Miscellaneous (Confidential information)

No confidential information

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1 Introduction

1.1 Background motivation and purpose

For several years, ecology and the environment have been important topics in modern society. The new generations are at the heart of the problem, to contribute to keep a liveable and

sustainable future for the next generations. The carbon footprint raises a significant problem amidst these concerns. Carbon footprint denotes the effect of human activities on the environment, gauged by the quantity of greenhouse gases emitted - normally measured in units of carbon dioxide. Taking measures to limit our carbon footprint is a crucial aspect of combating climate change and securing a sustainable future for our planet. The environment bears the brunt of these activities as they contribute greatly to the global menace of climate change and global warming. The effects of mounting carbon emissions include rising sea levels, soaring temperatures, and exceptional weather phenomena. In addition, the effects of climate change disproportionately affect marginalized communities and low-income countries. It's important to note that reducing carbon footprint is not only the responsibility of governments and large companies, but also of individuals. Changing our daily habits and lifestyle choices can also make a significant impact. For instance, using energy-efficient appliances, reducing water usage, and recycling can all help to reduce our carbon footprint. In summary, reducing carbon footprint is a complex and multifaceted problem that requires the engagement of individuals, governments, and companies. The strategies and technologies presented in this research study can help to lower emissions and mitigate the effects of climate change, but they must be implemented in a coordinated and comprehensive manner. To better understand the importance of the carbon footprint, the author decided to choose as a topic, that of an application on allowing to see the carbon footprint of a product. The target audience for this one is the generation Z.

Generation Z, also known as the "digital natives," are known for their heavy use of technology and social media, making them a prime target for a carbon footprint app. They are also considered to be more environmentally conscious than previous generations and may be more likely to adopt an app that allows them to easily track and reduce their carbon footprint. A carbon footprint app could appeal to Generation Z by providing them with a convenient and easy-to-use tool that allows them to understand the environmental impact of their purchasing decisions. The app could also serve as a platform for them to connect with like-minded individuals and to learn more about sustainable consumption. Additionally, Generation Z is also noted for their strong sense of social responsibility and desire to have a positive effect on the world. A smartphone app that calculates carbon emissions could serve as a means for them to take direct action towards reducing their carbon footprint and having a positive impact on the world. Overall, a carbon footprint app has the potential to appeal to Generation Z by providing them with a convenient and easy-to-use tool that allows them to understand the environmental impact of their purchasing decisions and to

take concrete action towards reducing their carbon footprint. I have chosen this research topic because it is at the heart of a generation of which I belong to and with the desire to better understand and foresee whether an app could have a positive impact on people behavior. The purpose of this investigation is to study the degree to which the French generation Z would have a satisfying User eXperience (UX) of an app-idea named “Global-Footprint” app, which could lead to the adoption of this app specialized on products’ carbon footprint.

1.2 Research objectives, questions and approach

This section presents the following research objectives: (i) Identify relevant previous work on products’ carbon footprint and eventual existing apps; (ii) Analyze the previous work to foresee the current knowledge on this research topic; (iii) Identify the research gaps justifying the needs of this investigation; (iv) Design a research framework allowing to create new knowledge that contributes to the body of knowledge.

The Research Questions (RQ) are the followings:

RQ1: What is the degree to which the French Generation Z would get a satisfying UX of an app-idea specialized on products’ carbon footprint?

RQ1.1: What are the UX factors impacting an app idea specialized on products’ carbon footprint?

RQ1.2: What are the factors impacting French Generation Z overall UX satisfaction of an app idea specialized on products’ carbon footprint?

Future consumers must be targeted through digital tools they use on their smartphones or tablets that help them understand the carbon footprint impact of whatever goods that they want to purchase. Creating this new knowledge requires researching the consumers’ potential UX satisfaction that would lead to the willingness to adopt new apps.

The research approach selected for this investigation is a deductive approach.

1.3 Thesis structure

This report is divided into 6 chapters. It begins by stating the carbon footprint business and research background as well as personal and business motivations and purpose of this investigation. The second chapter presents the literature review related to carbon footprint, behavioral theories, adoption framework and identified research gaps as well as resulting proposed research framework. The chapter 3 presents the overall methodology. It describes the applied methods and the reasons for doing so, as well as the way data is collected and analyzed. The research design is outlined in this chapter, followed by the presentation and analysis of data collected through a mixed-methods survey in the fourth chapter, utilizing both quantitative and qualitative data. The fifth chapter delves into the limitations of this empirical study, the extent to which the research questions were answered and comparing the results with the ones of previous work. Finally, the sixth chapter draws conclusions from the analysis of results regarding the initial research objectives and questions and proposes future research avenues to further explore the subject matter.

2 Literature review

2.1 Introduction

A literature review is an assessment and examination of the available literature related to a particular topic or research question. It requires identifying, analyzing, and combining pertinent sources to present a comprehensive summary of the present understanding in a specific area of study.

A literature review can serve several purposes, including identifying gaps in the research, providing context for a new study, and informing policy and practice. It can also help researchers identify key debates, theoretical frameworks, and methodologies in their field, and provide a foundation for their own research. This review explores the current literature on “The potential impact of a carbon footprint app on product purchasing” and critically analyze the existing research to identify key themes, debates, and gaps in the field.

This literature review was conducted through an extensive search of existing scientific publications on Google Scholar, a widely used academic search engine that indexes scholarly literature across a range of disciplines. The search was conducted using a combination of keywords, including

“carbon footprint”, “generation Z”, “mobile app idea”, “global footprint”, “intention to use” and “user experience”. The results were filtered based on relevance, publication date, and study design. By using this method, a broad range of relevant studies were identified and reviewed to provide a comprehensive understanding of the current state of knowledge on the topic.

Table 1. The ten most relevant publications

	Authors	Year of publication	Title
1	Alben, L.	1996	Quality of experience: defining the criteria for effective interaction design.
2	Morville, P.	2004	User Experience Design.
3	Rubinoff, R.	2004	How to quantify the user experience.
4	Grubb, E., & Ellis, C.	2007	Meeting the Carbon Challenge: The Role of Commercial Real Estate Owners.
5	Pallot, M., Pawar, K. S.	2012	A Holistic Model of User Experience for Living Lab Experiential Design.
6	Rambocas, M., & Gamas, J.	2013	Marketing research : The role of sentiment analysis.
7	Hoehle, H. and Venkatesh, V.	2015	Mobile Application Usability: Conceptualization and Instrument Development.
8	Marti, P., Lacono, I.	2019	Experience over time: evaluating the experience of use of an interactive device on the short and medium term.
9	Mahéo, V. A., & Bélanger, É	2021	Generation Z: Portrait of a New Generation of Young Canadians and How They Compare to Older Canadians.
10	Hoffmann, S., Lasarov, W., & Reimers, H.	2022	Carbon footprint tracking apps. What drives consumers' adoption intention?

2.2 Carbon Footprint

The term of carbon footprint is now commonly used in discussions of responsibility and measures to combat climate change. It has become prominent over the past few years with a dramatic increase in recent months and is now a term that is commonly used by the media, governments, and businesses. What is the definition of a carbon footprint? Despite the widespread utilization, there is still ambiguity regarding its definition, its measurements, and the units used. However, this is almost the end of generality. There is no universal agreement on how to calculate or measure a carbon impact.

Definitions differ depending on whether direct carbon emissions are considered or not, as well as the units of measurement are unclear. According to Grubb and Ellis (2007) *"A carbon footprint is a measure of the amount of carbon dioxide emitted through the combustion of fossil fuels. In the case of a business organization, it is the amount of CO₂ emitted either directly or indirectly as a result of its everyday operations. It also might reflect the fossil energy represented in a product or commodity reaching market."*

The footprint is therefore a topic of global concern. It is our consumption, production, ... that generates this footprint; impacts our present, and will also impact our future and that of the following generations. There are several everyday solutions that can be implemented by everyone. These solutions can be implemented by politics with the adoption of laws, by companies by producing in a more responsible way or by our individual consumption.

The fight against climate change and its adverse effects necessitates a concerted effort towards reducing carbon footprint. This refers to the sum total of greenhouse gas emissions produced by a person, entity, or nation, and it has a direct impact on the environment and atmosphere. By reducing carbon footprint, we can significantly mitigate the negative effects of human activities on the environment. The reduction of carbon footprint can be achieved by adopting sustainable practices and using renewable energy sources, which can have a positive impact on the planet and future generations.

2.3 Generation Z

Generation Z refers to the demographic cohort born between 1997 and 2012, following Generation Y (Millennials) born between 1981 and 1996. Both generations share some similar characteristics, but Generation Z is often described as being more tech-savvy and diverse than their predecessors. The "Z" is a term that is used in the communication field to describe people born between 1997 and 2010. They account for 32% of the total population on Earth at this time and were born following the creation of Google. They've always observed the internet's nature, as a result, this age group is primarily considered to have a "digital" nature. Similar to previous generations, it also has its share of inaccuracies. This is also referred to as the "WTF" generation, "Wikipedia, Twitter and Facebook". More than simple tools, the internet and social media have become their primary domain, the location of their exchanges and experiments.

However, we are unaware of any studies that specifically define generation Z as adventurous, ambitious, and motivated by success... a complex generation that doesn't allow itself to be categorized.

Despite this, they are individuals that have a significant impact on brands, regardless of the sector or activity, this is primarily due to their capacity to prescribe and have a significant influence.

However, they go further than this, according to the philosopher Serres (2012) "*Their way of being, connected, horizontal and creative, permeates everything in our society*". As a result, they have become a conduit for industry and communication to change.

Generation Z is a generation that is reliant on the internet, smartphones, and social media. In reality, they are the first generation to experience the arrival of the internet and smartphones in their homes during their childhood. As a result, Generation Z has different consumer habits than their predecessors.

Other times referred to as the "zapping generation", because of the use of the remote control and smartphone apps, the majority of Gen Z no longer watch traditional television and instead prefer online content that is available at any time, such as YouTube and streaming sites (Netflix, Disney+, Amazon Prime, etc.) that offer. What they want and do: they consume content everywhere, all the time (time constraints are 90+), on multiple media, and especially it is varied.

The generation Z is nowadays taking the ascendant into business. People born from the early 2000s to 2010 are belonging to this generation. People considered as generation Z, are known because of their life linked to Internet and informatic. They are used to live more with the virtual aspect rather than the real one that the last generations (X and Y) were living.

Despite this, in general, Gen Zers are distinct from Gen Xers and Baby Boomers, but some of their orientations are similar to those of Millennials (Mahéo & Bélanger, 2021).

2.4 Environmental related App Ideas

With the arrival of the internet and smartphones, came the creation of mobile applications. A mobile application according to Hoehle and Venkatesh (2015) refer to software designed for handheld devices such as tablets and smartphones. They can be pre-installed on devices or downloaded from mobile application stores like Apple's iTunes store. These apps are developed specifically for mobile operating systems and provide users with unique features and functionality

The purpose of a mobile application is to allow users to use it for different reasons depending on its functionality. Over the years, more and more applications, various and varied, arrive on the market.

The environment has been a central concern for the future for years. To address this issue, experts must implement tools and techniques. This study aims to determine Generation Z's willingness to use an app that tracks the carbon footprint of products while shopping. The study employs a mixed methods approach and data was collected through a questionnaire with 64 mostly Gen Z participants. The findings indicated a generally favorable outlook among participants towards the proposed app concept, expressing readiness to embrace it for a cause deemed significant in the present era. They saw it as an innovative solution that could help young people understand and reduce their carbon footprint. More extensive studies with a larger and more varied participant base are recommended to strengthen these findings and gain insights into organizations' motivations to use innovation to tackle environmental challenges.

The preservation of the environment is currently the subject of many questions and debates. It is a subject that affects everyone in one way or another, and that must be considered in all areas.

Mobile applications are also affected by this wave, so it is important to follow the trend by adapting to these new rules. Application developers have discovered several ways to preserve the environment. Apps that promote awareness. Many apps have been created to compensate for the lack of knowledge and the lack of daily habits that lead to environmental conservation. Thus, mobile applications that encourage eco-gestures on the go and become part of the daily routine of users are observed on platforms. Among the beneficial applications are those that are environmentally friendly. They have a unique purpose, and their use reduces our ecological impact. Therefore, whether a professional or an individual, mobile applications are in some cases beneficial to sustainable development, and if everyone used them appropriately, it could have a significant impact on the environment. The idea of creating an application related to this topic is therefore a way to communicate on an important subject.

2.5 Experience Design

The procedure of generating novel concepts involves the collaboration of multiple members of the team that work together to co-create innovative ideas, explore alternate applications, experiment with how the alternative solutions can effectively support the intended purposes, and assess the user experience quality by taking measurements.

This is the process of experience design as ex-press described by Pallot and Pawar (2012) in Figure 1.

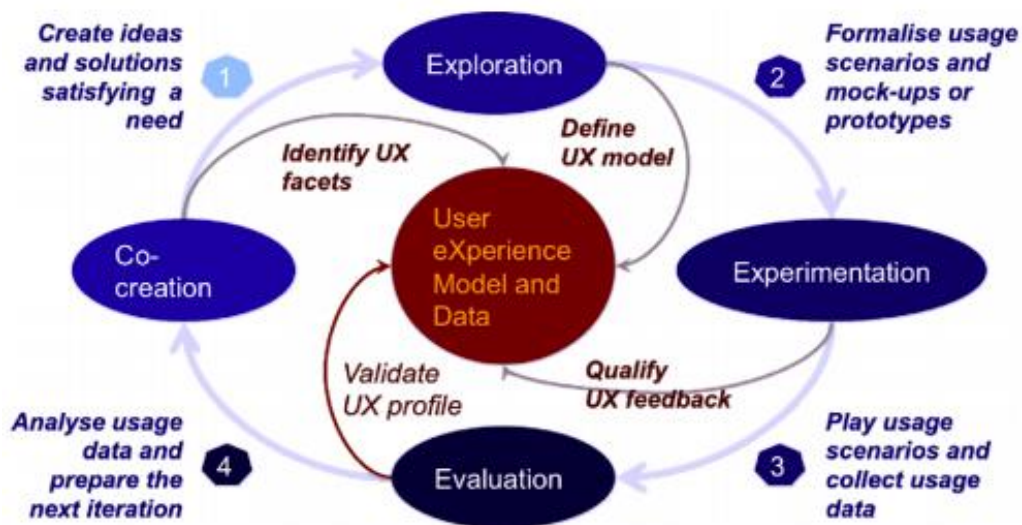


Figure 1: Iterative eXperience Design (XD) process (Pallot & Pawar, 2012)

The four facets of a User Experience design are utility, effectiveness, reliability, affordability, and user friendliness. They are intended to better support evaluating the UX's facets such as enjoyment, empathy, ethics, and innovation.

As the study notes, new technologies often receive broad acceptance when their UX facet scores are high. By analyzing the data, the author can confirm that higher UX facet scores lead to greater adoption.

2.6 User Experience

The Oxford dictionary defines the word "experience" as two separate concepts. It says that the first definition is the process of learning through doing and observing. This is referred to as learning from experience. Daily life experiences are also considered to be "experiences." These often involve unusual or unpleasant situations. The second definition of experience is larger occurrences involving significant people in an impactful way. This is referred to as an experience that a user undergoes with a particular object or situation. The terms "user experience" and "UX"

are derived from the combination of two other terms. The first half, "UX," refers to all of the events and activities that a user can remember about their usage. It is important to note that if the event is positive or successful, users likely repeat it. However, if the event results in failure, users avoid doing it again.

Alben (1996) was the first to define user experience in the context of interactive products. He defines it as *"UX encompassing all aspects of how people use an interactive product - how it feels in their hands, how it functions, how it serves a purpose, how it fits into their overall lifestyle and how it affects their daily lives. -everyday life"*. Norman (1999) defined UX as a concept that includes all the interactions of a user with a product: how it is perceived, learned, and used.

For Rubinoff (2004), the concept "user experience" is the concept that places the end user at the center of design and development efforts. User experience primarily consists of four components: brand, functionality, usability, and content. The Skappians. (2014) note that UX has become popular, has multiple definitions, encompasses different topics and issues, and is largely subjective (Komulainen et al., 2008).

According to Kankainen (2002), the versatility of UX can be attributed to the fact that a person has previous experiences that can be changed by new experiences, which increases people's expectations for new experiences. Morville (2004) described the quality of website user experience in seven aspects, including: usability, trustworthiness, accessibility, authenticity, trustworthiness, and effectiveness.

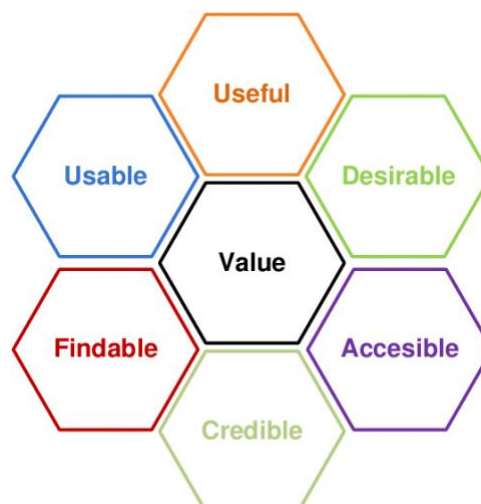


Figure 2: Peter Morville's User Experience Honeycomb (Morville, 2004)

Finally, Hassenzahl et al. (2000) define utility as the quality of use. However, they discovered that this broad definition overlooks the value of perceived pleasure and enjoyment to user satisfaction and preference.

2.7 Anticipated User Experience

Mulgan (2014) describes anticipatory user experience as the process of "*ideation and rapid prototyping of new ideas for products*". Eynard (2016) explains that UX involves comprehending expectations. By doing so, it is also possible to estimate the level of acceptance for a given solution. Marti and Lacono (2019), proposed the following definition of UX: "*Anticipatory UX refers to the period of time before first use and focuses on the expectations a person has of the product, service or system*". Conole and Fill (2005) suggestion, along with Botturi et al. (2007) proposal, is to assess perceived user satisfaction, one of the ways identified by Concannon et al. (2005) to predict user experience.

The general characteristics of the anticipated user experience have already been described by Yogasara et al. (2011).

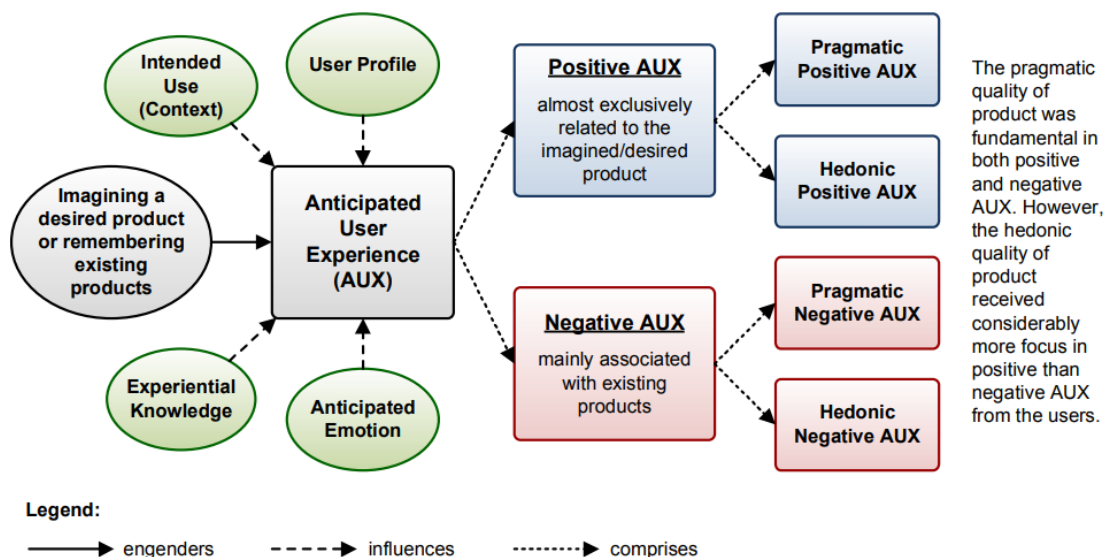


Figure 3: The General Characteristics of Anticipated User Experience (Concannon et al., 2005)

In fact, AUX allows design actors to anticipate the liability of an idea being espoused by the intended followership more directly. The following description explains that the term product can relate to either a physical or virtual object (e.g., a service) or both (e.g., a system): *"AUX is the result of people immersing themselves in a virtual representation of a new idea that leads to a new product that allows them to experience different aspects of the idea and thus predict the degree to which the idea matches their expectations"* (Yogasara et al., 2011).

This definition is analogous to the ISO UX standard from *"Ergonomics of human-system interaction - Part 210: Human-centered design for interactive systems"* (Rapp, 2009); in this standard, UX can be derived from the anticipated use of a product, service or system. A virtual representation of an idea for a software application can be created using different methods, this leads to the creation of a usage scenario.

2.8 Adoption Theories and Models

The desired user expectations manifest in the form of UX Facets and UX Dimensions in research. A user's awareness of satisfaction or UX (second-order structure) holds sway over their "intent to use" in line with the TAM model (Davis et al., 1992). This plan to embrace a product is rooted in three factors: the "intention to adopt," the "preparedness to adopt the application," and the "willingness to recommend the app to others" These facets are meant to help estimate the level of adoption from users.

Through the collaboration of UX aspects, our UX model of choice (Topolewski et al., 2019) delves deeper into the adoption process than TAM. This enables us to grasp a more comprehensive comprehension of UX's potential influence and dimensions. Specific aspects of UX characteristics and dimensions are linked to the evaluated application's unique context, which has required us to adjust our search patterns accordingly.

As depicted in Figure 4, it's composed of UX features (forming factors) that feed into UX aspects that contain UX dimensions, which in turn comprise UX (higher-order constructs), which are conveyed through the "intent to use" and its three criteria of reflection and factors.

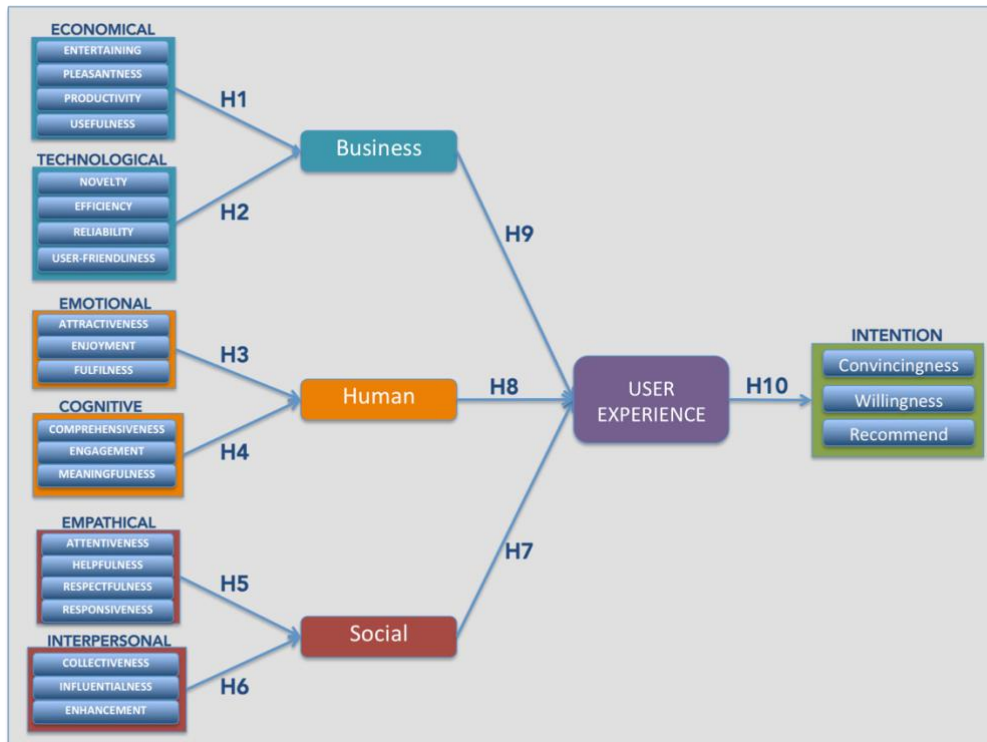


Figure 4: UX Model & Causal Effect on Adoption (Topolewski et al., 2019)

In the investigation carried out, a relevant UX model consisting of 3 fundamental aspects was employed. These are: the economic and technological aspects, which constitute the business aspect; the emotional and cognitive aspects, which make up the human aspect; and the empathetic and interpersonal aspects, which are part of the society aspect. There are several attributes or factors that constitute the UX features, and these have been detailed in Table 2.

Table 2. Description of factors

UX Property	Description
Entertaining	Degree to which the App idea entertains users
Pleasantness	Degree to which the App idea looks like pleasant to use
Productivity	Degree to which the App idea could help users to be more productive
Usefulness	Degree to which the App idea allows users to carry out specific tasks
Novelty	Degree to which the App idea looks new to the user

Efficiency	Degree to which the App idea allows users to be more efficient
Reliability	Degree to which the App idea looks reliable enough
User-Friendliness	Degree to which the App idea looks easy-to-use and intuitive enough
Attractiveness	Degree to which the App idea is emotionally attractive
Enjoyment	Degree to which the App idea looks enjoyable enough
Fulfillment	Degree to which the App idea allows users to feel satisfied
Comprehensiveness	Degree to which the App idea allows users to better understand this proposed concept
Engagement	Degree to which the App idea allows users to better engage in this proposed concept/area
Meaningfulness	Degree to which the App idea could turn into meaningful results
Attentiveness	Degree to which the App idea brings users a sense of community
Helpfulness	Degree to which the App idea brings users a sense of helping
Respectfulness	Degree to which the App idea allows users to be respectful of others
Responsiveness	Degree to which the App idea allows users to be responsive to others
Collectiveness	Degree to which the App idea allows users to undertake wiser decision
Influentialness	Degree to which the App idea allows users to be influenced
Enhancement	Degree to which the App idea allows users to feel enhanced

2.9 Identified Research Gaps

In this section, we use existing research and compare it with my research to define the research gaps that the topic brings. The first relevant research is called "*A novel approach to calculate individuals' carbon footprints using financial transaction data - App development and design*" by David Andersson in 2020. This research aims to calculate the carbon footprint of individuals in financial transactions. This carbon footprint is calculated with an application available on the Swedish market and had about 15 000 users in December 2019. This research is conducted like this with primary data. Unlike my research, this one was conducted in Sweden, while my research was conducted on data collected in France. My research could therefore fill the research on an application that calculates the carbon footprint, but on a different country.

The second relevant research is called "*Carbon footprint tracking apps. What drives consumers' adoption intention?*" written by Hoffmann, S., Lasarov, W., & Reimers, H. in 2022. This research aims to define the usage intention of an application that tracks individual carbon footprint consumption. The application would report carbon emissions to help individuals monitor and reduce their carbon footprint. As for my research study, these aims to define the intention of use of an application on carbon footprint. It looks like it could be studied on all consumer segments. Contrary to this research study, mine is conducted on a single segmentation of potential users:

Generation Z. This study therefore has an added value by studying a more precise segmentation of users and more concerned by the technology.

2.10 Research Framework

The UX Design Framework is highly relevant to the topic of studying the degree to which the French generation Z would adopt an app specialized in carbon footprint. This framework provides a structured approach to designing an app that caters to the needs and preferences of the French generation Z, by emphasizing the importance of user-centered design, iterative design, usability, and visual design. By designing an app that is easy to use, visually appealing, and tailored to the needs of the French generation Z, the app is more likely to be adopted and used by this demographic, thereby promoting carbon footprint management among this group.

Climate change is a pressing issue that affects the world today, and many individuals, particularly the younger generation, are becoming more conscious of their carbon footprint. Technology has played an essential role in this regard, as it provides a platform for people to monitor and manage their carbon footprint. The purpose of this theoretical framework is to explore the degree to which the French generation Z would adopt an app specialized in carbon footprint.

We can apply the concept of User Experience (UX) to explore the factors that influence the adoption of an app specialized in carbon footprint management among the French generation Z. The UX approach focuses on the user's experience with a product or service, and how this experience influences their perception, attitude, and behavior towards that product or service.

The UX Design Framework provides a structured approach to designing products and services that cater to the needs, preferences, and expectations of the target audience. The framework involves several stages, including user research, ideation, prototyping, testing, and implementation.

We can identify key concepts about this theory. The usability aspect of an app underscores its learnability and ease of use. In the case of our target audience—French Gen Z, the theoretical framework should delve into how effortless it is for them to navigate the app and grasp the features linked to tracking carbon footprint. The usefulness of the app is referred to as its utility, which is determined by how effectively it caters to the target audience. The theoretical framework

of the app could explore the way it aids users in minimizing their carbon footprint, along with the users' perception of its practicality. The success of the app relies on its ability to captivate users and maintain their interest. The research framework should delve into the app's elements that drive engagement, such as personalized recommendations, social features, and gamification.

Trustworthiness is a crucial aspect of any app, with users' faith in its security and reliability being of paramount importance. Researchers may delve into the app's security components, privacy protocols, and user reviews to determine how trust impacts its adoption rates. The concept of accessibility is central to app development. A well-designed app should be accessible to users of different languages and abilities. One theoretical framework worth exploring is how the app's accessibility features impact its uptake among the intended user base.

2.11 The Global-Footprint App-Idea

In this section, the author illustrates his work on an application made during the Innovation Management Track course at Jyväskylä University of Applied Sciences (JAMK). The creation of this application was done in group with other students through several workshops. We decided to create an application idea related to the environment. The workshops were dedicated to brainstorming our ideas to build the most solid idea of this application, step by step. We were able to make a PowerPoint and a teaser (Appendix 2), to present our idea to the other groups within the course. Our application as said before, aims to be interested and find solutions for the environment. So, we decided to focus on the carbon footprint and create an application around that. The application aims to scan (barcodes), the products we consume daily to give us the carbon footprint of it. Some applications with the same modus operandi (scan) already exist on the market. This application could be simple to use because its only purpose for the user would be to scan. But the idea goes much further than that. It could allow to educate the younger generations on a very important subject in our society. Coming from a very connected generation, we know that the use of smartphones and applications is almost daily among young people.

The Global-Footprint app-idea could therefore be a more rational way to change the consumption pattern of this generation. In addition, it would aim to educate about carbon footprint.

How does it look

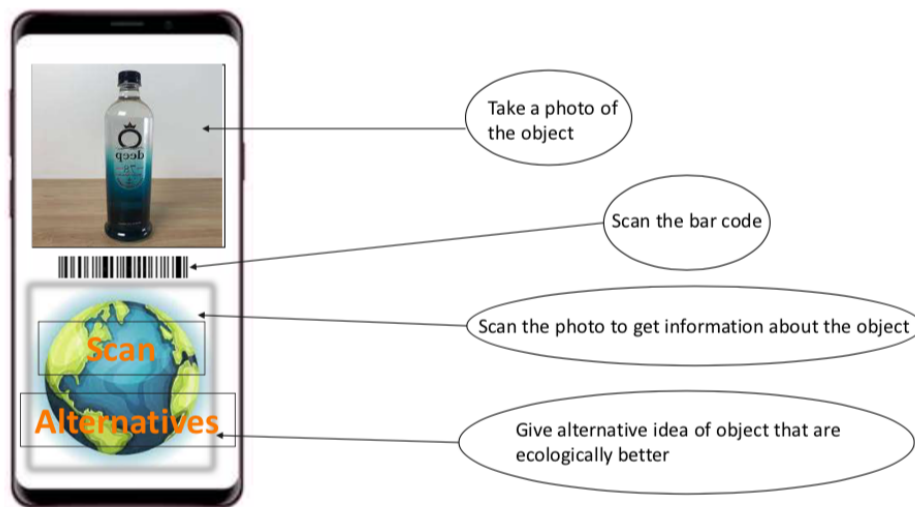


Figure 5: Carbon Footprint App-Idea's User Interface

2.12 The proposed Conceptual Model of the Global-Footprint App-Idea User Experience

In our exploration, the author place emphasis on a select few of the previously stated UX Characteristics that are particularly relevant to the Carbon Footprint App-Idea. As our intended audience is the Generation Z, our attention is drawn to the following UX Characteristics: Efficiency, Usefulness, Novelty, Reliability, User-Friendliness, as well as Helpfulness.

Table 3. Description of UX factors proposed for the Global-Footprint App-Idea

UX Property	Description
Usefulness	Degree to which the App Idea allows users to carry out specific tasks
Novelty	Degree to which the App Idea looks new to the user
Efficiency	Degree to which the App Idea allows users to be more efficient
Reliability	Degree to which the App Idea looks reliable enough
User-Friendliness	Degree to which the App Idea looks easy-to-use and intuitive enough
Helpfulness	Degree to which the App Idea brings users a sense of helping

3 Research methods and implementation

In this part, the author explains through different aspects, the research methods and implementations that has been used to conduct the research study.

3.1 Research context

The author decided to see in a broader way, how an application on the carbon footprint could impact a purchase on the French generation Z. With the emergence of the carbon footprint problem, the author thinks that this application could be a progress in terms of consumption. It could allow to deepen the knowledge of consumers on a current topic that will impact the future. The aim of these is to measure the potential of such an application on a defined generation, here the generation Z. This research was done in co-creation with other students during a course. The goal of this course was to create an innovative application through several workshops. A presentation of the application was made during these courses. This allows to share opinions, ideas and discuss with other students. Moreover, this process of sharing and interaction led to the use of an approach called "*user experience (UX) aspect and attribute*" (Pallot & Pawar, 2012). As a result, a storyboard was created to highlight what the application is, how and why to use it. In addition, a one-minute trailer was made. The students could then give feedback on it, allowing the author to have a first approach on a targeted audience.

3.2 Research design

In this part, the author shows the methodological choices that have been made to conduct the research.

3.2.1 Research philosophy

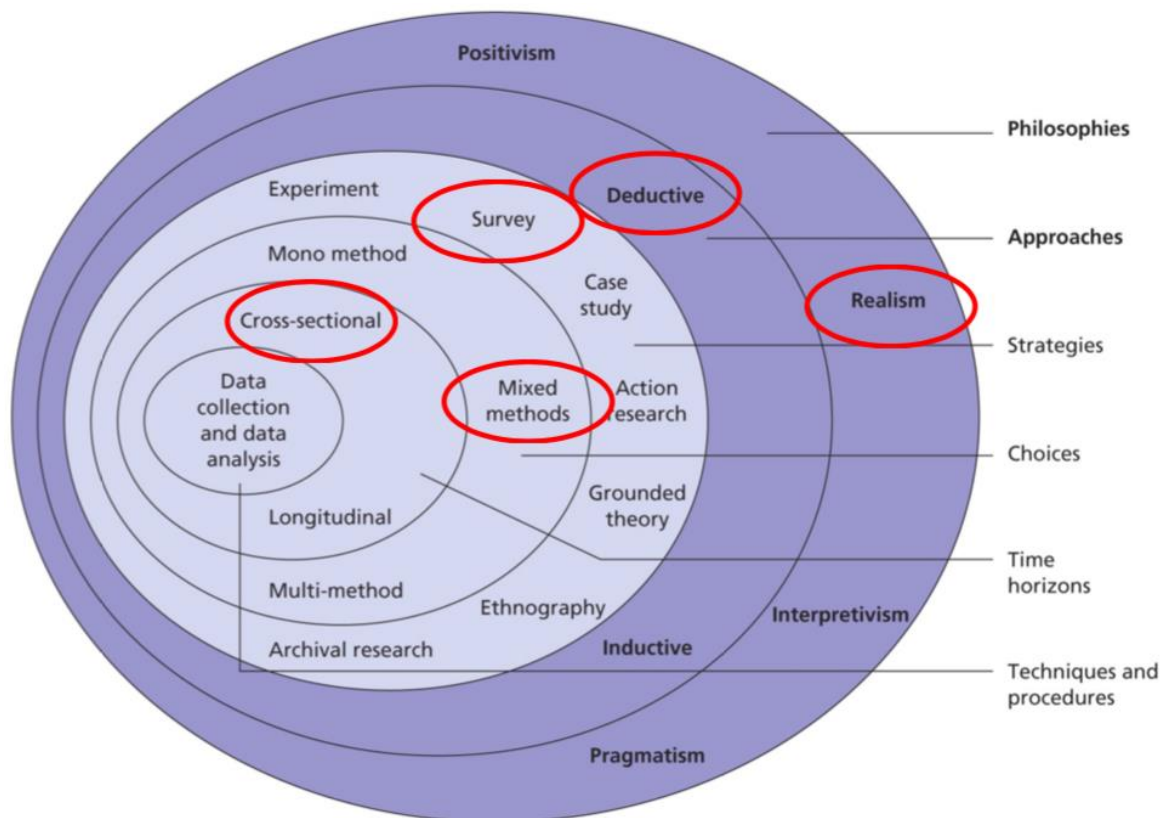


Figure 6: The research onion (Saunders et al., 2007)

The collection of data and their analysis are to be therefore different depending on the problem to be studied. The figure show before express all the process that the author passes through to conduct the investigation. On the first phase of this diagram is the philosophical research. The author has chosen for this phase, the realism philosophy. Considering the creation of an application, the author relies on his investigations conducted by himself.

3.2.2 Research purpose

The purpose of this investigation is to study the degree to which the French generation Z would adopt an app specialized on carbon footprint. Therefore, the main goal of this study is to better comprehend elements providing value to a mobile application and to illustrate their potential influence on the adoption of this app. The author accomplishes this by scrutinizing respondents' feedback through a survey questionnaire that assesses the impact of these elements. This

investigation is expected to reveal insights into which value elements carry more significance for app adoption. The type of research work can be classified as explanatory research.

3.2.3 Research approach

There are two main approaches in terms of research that are deductive and inductive. We can resume the two main approaches by this representation:

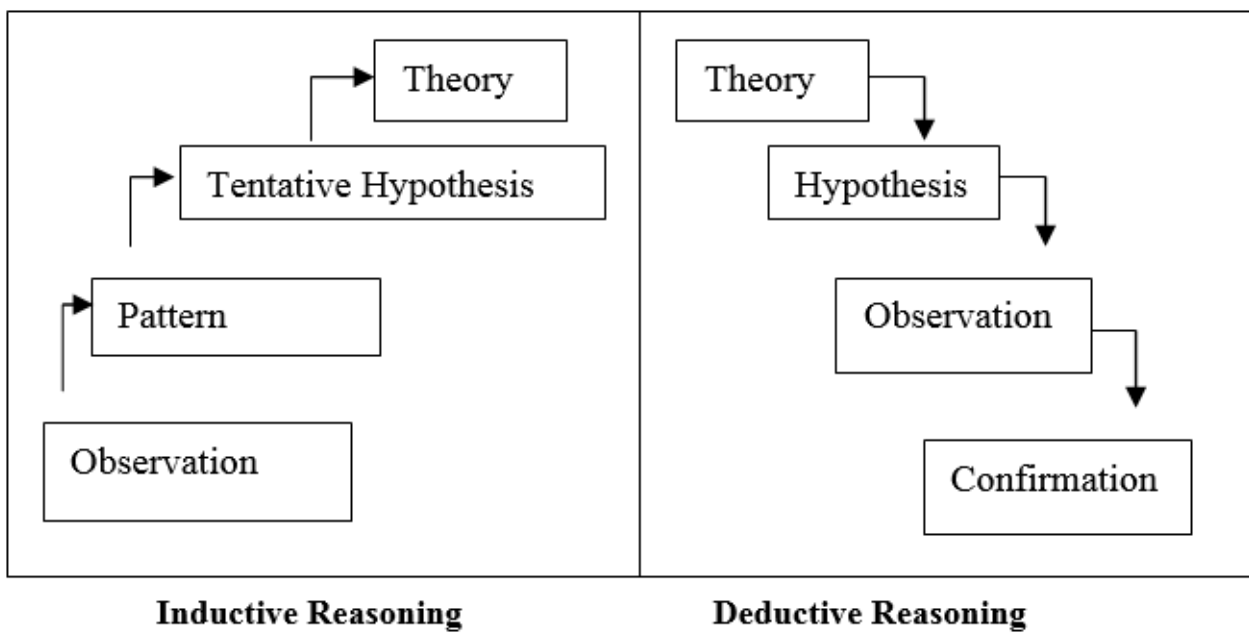


Figure 7: Deductive and Inductive approach (Trochim & Donnelly, 2006)

The author chooses to use a deductive approach to conduct his research. A deductive approach typically involves using a set of hypotheses to draw a specific conclusion. The conclusion is arrived at through logical reasoning and the use of evidence to support the hypotheses. The hypotheses help the author to know if app users have the intention to use/adopt a new app idea. In figure 7, we can see the deductive approach process

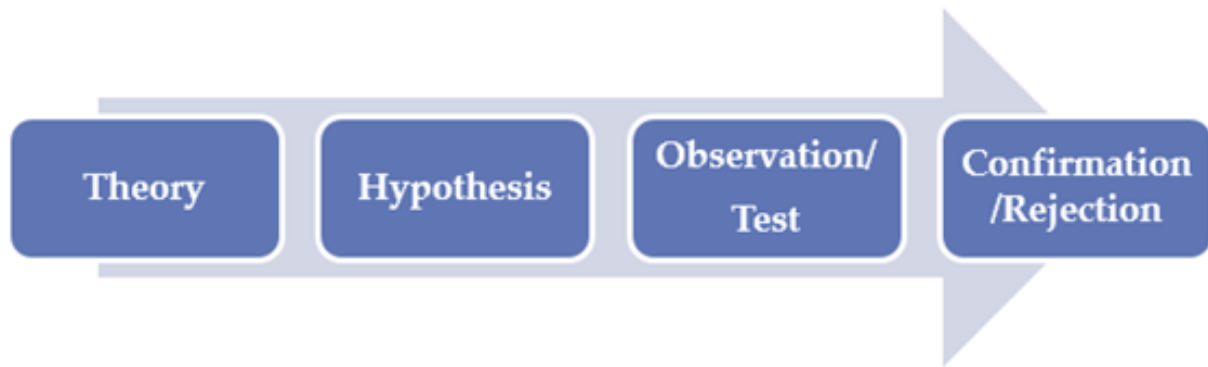


Figure 8: Deductive approach process (Gulati & PM, 2009)

The deductive approach is often used in research, where the researcher starts with a theory or set of hypotheses and then collects data to test them. The data is then analyzed and used to infer conclusions about the hypotheses being tested. A user experience survey questionnaire has been created, tested, and analyzed by the author. The objective with the data collect is to test the hypotheses expressed before: the intention to use the app or not.

3.2.4 Research strategy/method/s

In this research, a survey questionnaire has been selected as a method for qualitative and quantitative data. The research strategy is a mix method design that simultaneously captures the qualitative and quantitative data.

In contrast to quantitative data, which is numerical and can be analyzed using statistical methods, qualitative data is analyzed through methods such as analysis or interpretive analysis.

The goal of analyzing qualitative data is to identify patterns, themes and meaning within the data.

3.2.5 Methodological choice

The author chooses a mix method to reach the objective of studying and answering the research question. This method allows the collection of both qualitative and quantitative data. The purpose of the survey questionnaire was to interview young French people who have a smartphone and regularly use applications on it. The survey questionnaire was sent and distributed to young

people to collect a maximum of answers. This allows the author to have different points of view to analyze them and to have a relevant analysis.

3.2.6 Time horizon

A cross-sectional study is an observational study that examines a population at a specific time, to observe relationships between variables. It is used to examine associations between a particular exposure and outcome, without determining causality.

All the primary data that has been used, were collected during Autumn 2021, which is mean at a specific point in time. That's why the author decided to define the study as cross-sectional.

3.3 Data collection

The data were collected through a survey questionnaire. This questionnaire was first addressed to all people who own a phone and use applications. This questionnaire is divided into different parts, each with a series of questions that are: Demographic questions, Profiling questions and UX Bipolar questions.

Moreover, a semantic scale of 5 different rating items has been used. The respondents after the rating, must justify it in order to obtain a qualitative data. In this empirical study, the author collects 64 responses, that allows to analyze and discuss them to answer the research questions.

3.4 Data analysis

The author analyzes collected data using a deductive approach.

According to Gulati (Gulati & PM, 2009, p. 42), a deductive approach is concerned with deductive conclusions from promises or propositions.

3.4.1 Quantitative data analysis

Quantitative data analysis refers to the process of understanding and interpreting numerical data using statistical and mathematical methods. This involves collecting, organizing, transforming, and

summarizing data, followed by applying statistical techniques to deduce conclusions and make decisions. The primary aim of quantitative data analysis is to detect patterns, correlations, and tendencies in the data and generalize about the population from which the data was collected. Some common techniques used in quantitative data analysis include regression analysis, hypothesis testing, and factor analysis. Quantitative data analysis is a systematic and objective approach to examining numerical data. It allows for the testing of theories and hypotheses, identification of patterns and relationships in data, and the drawing of meaningful conclusions and insights from data.

The process of quantitative data analysis typically involves several steps, including the collection and organization of data, the cleaning and preprocessing of data to ensure accuracy and consistency, and the application of appropriate statistical methods to uncover meaningful relationships and patterns.

The use of appropriate software and tools, such as statistical software packages, can greatly aid in the process of quantitative data analysis, making it more efficient and allowing for the handling of larger data sets. The results of quantitative data analysis can then be used to make data-driven decisions and inform policies and practices in various fields.

3.4.2 Qualitative data analysis

The research process uses certain methods to analyze qualitative data to achieve the stated objectives. This method is sentiment analysis. According to Liu (2009), sentiment analysis is a technique that focuses on extracting subjective information from language expressions. Sentiment analysis can also be done with a questionnaire, where the text data is collected through questions asked to the participants. This type of sentiment analysis is commonly used in market research, customer satisfaction surveys, and political polls. The questionnaire can ask questions that elicit a response in the form of a statement, an opinion, or a rating, which can then be analyzed to determine the sentiment expressed.

The sentiment can be analyzed using techniques such as text classification, sentiment scoring, or sentiment lexicon-based approaches. The results of the sentiment analysis can provide valuable insights into the opinions and attitudes of the participants, which can be used to inform decision-making and improve customer satisfaction.

Rambocas and Gama (2003, as cited in Montero, 2020, pp. 34-35), noted that by applying sentiment analysis, it is possible to learn about customer feelings and attitudes regardless of the data volume and structure. In Figure 9, in presented the sentiment analysis process.



Figure 9: Sentiment analysis process (Rambocas & Gama, 2003)

Sentiment analysis reveals why they made a rating decision based on specific user experience attributes. This approach allows us to compare the rankings of all reviewers on UX properties (quantitative data) and convert textual justifications (qualitative data) into polarized opinions.

The classification of feeling polarity can be broken down into three categories: binary, ternary, and ordinal. In binary classification, we assume that subjects are objective. Therefore, this type of classification is based on the idea of whether the evaluation is positive or negative. The polarity can then be identified as "positive" or "negative". The three-way classification includes "neutral" polarity as a transition category between "positive" and "negative".

3.5 Ethical considerations

Ethical considerations are important in any research study. These considerations may include issues related to privacy, informed consent, potential harm to participants, and the responsible use of data.

The author decided to make a survey questionnaire, this one being anonymous for the respondents. This allows to obtain answers without giving any opinion to guarantee the privacy of the participants and a fair analysis. All the answers used were deleted at the end of the analysis and writing of the study. In addition, the author wanted to ensure that the data collection was

ethical and that other research that had been done, and the sources used for the literature would be properly cited.

4 Research results

To properly implement the App-Idea, a presentation and teaser are needed. This is done so the panel of participants can understand how the app could work and what it can contain. After gathering this data, we have an opportunity to analyze the idea and its effects on the carbon footprint app. The team has gathered both quantitative and qualitative data as part of their research. The usability of the product is measured by quantitative and qualitative data.

Quantitative data encompasses average rating, total ratings, and intent to use, while qualitative data presents an overview of reviewers' opinions and divergent perspectives on each usability attribute and intended use. The analysis performed by UX Properties helps authors understand how app ideas can be useful to potential users. The idea of this application is to provide a guide of good practices to guide users to improve their knowledge and understanding of new concepts, here the impact of the carbon footprint.

The author has collected 64 responses, which make a good average to conduct a quantitative and qualitative analysis. To begin this analysis, we look at the demographic target with the Table 4.

Table 4. Average in Pourcentage of the Demographic Target

Questions	Max	Pourcentage	Min	Pourcentage
DQ1 - How old are you?	16-24	98,40%	25-34	1,60%
DQ2 - What's your gender?	Women	54,80%	Men	45,20%
DQ3 - What's your professional situation?	Student	95,20%	Research of employment	1,60%

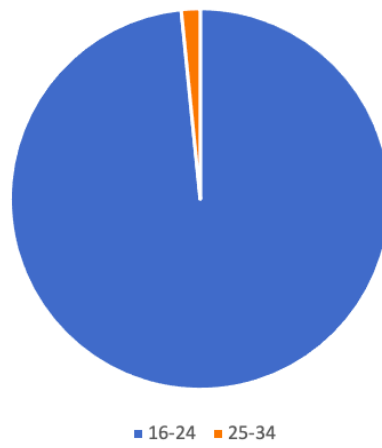


Figure 10: Diagram of the question DQ1



Figure 11: Diagram of the question DQ2

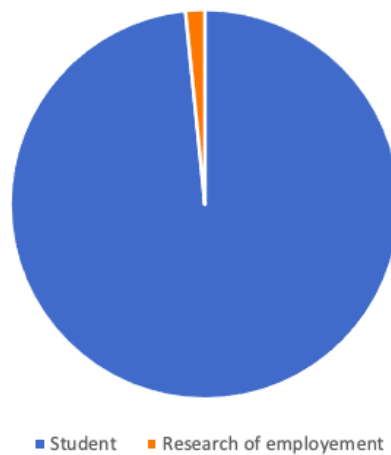


Figure 12: Diagram of the question DQ3

We can see that most of the people interviewed are between 16 and 24 years old, they represent 98,40% of the responses. This allows us to focus on this generation which corresponds to the Z generation. To compare, the minority of respondents are between 25 and 34 years old and represent only 1.60% of the responses.

For the question on gender, we can almost see a parity because 54.80% of respondents are women and 45.20% are men. However, we note that it is the female gender that answered the most.

Finally, this analysis shows that 95.20% of the answers were given by people who were students. This supports the analysis on the generation Z.

In addition, to conduct his research and to have a more accurate analysis with respect to the creation of the application, the author decided on 6 UX properties.

These 6 UX properties are: Efficiency, Helpfulness, Usefulness, Reliability, Easiness to use and Newest.

These 6 UX properties belong to 3 UX facets which are: Empathical, Economical, and Technological.

4.1 Quantitative results analysis

Table 5 summarizes the 64 responses that the author obtained with respect to the 6 UX properties.

The app's key factors are listed in columns Min, Max and Mean. This reads as follows: 64 people evaluated different of the carbon footprint app idea. The lowest possible score is -2 out of 2 and the highest possible score is 2 out of 2. The average votes can be found column "Mean".

Table 5. Descriptive Statistics of the UX Properties

UX Property	N	Min	Max	Mean
Usefulness	64	-2	2	0,765625
Novelty	64	-2	2	0,777777778
Friendliness	64	-2	2	1,03125
Reliability	64	-2	2	1,0625
Helpfulness	64	-2	2	1,285714286
Efficiency	64	-2	2	0,619047619

We can see in Table 5, for the mean, that all the UX properties are between 0.61 and 1.28.

This shows that all items have been scored quite high. Helpfulness is the UX property with the highest mean with a 1,28. Next, we can see that "Reliability" and "Friendliness" also had a mean above 1, with a score that is respectively 1.06 and 1.03.

As for "Novelty" (0.77) and "Usefulness" (0.76), these two items had a mean very close to each other with a difference of 0.01. The item with the lowest score is "Efficiency" with a mean value of 0.6.

This shows that people don't have various opinions about UX Properties.

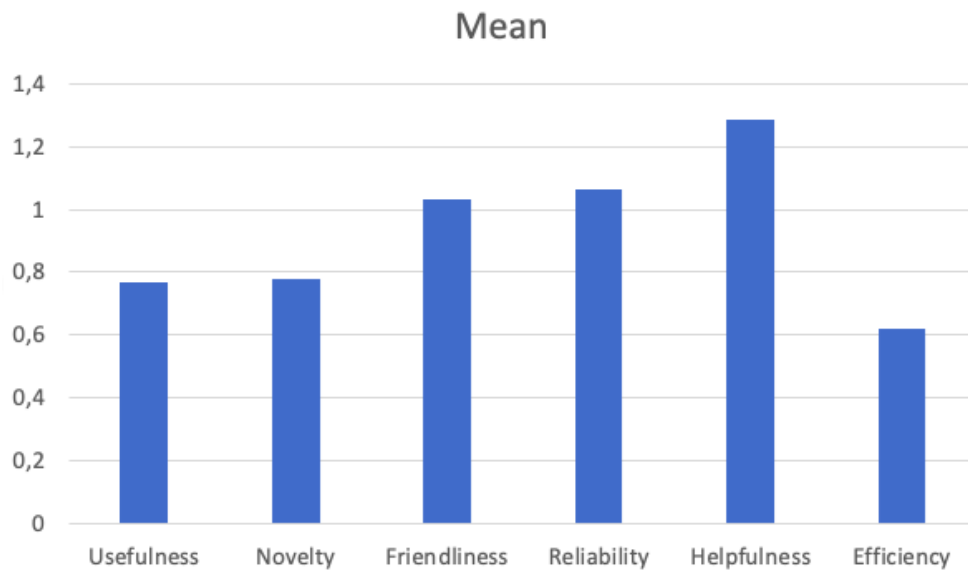


Figure 13: Average Rating and Mean Values of UX Properties (-2 to +2)

The overall score for Figure 13 is represented by a bar graph, which sums responses from -2, -1, 0, 1, and 2. A curve is used to represent the average of the responses. Positive and negative answers both increase or decrease the score, respectively. Choosing 0 as an answer leaves the score unchanged. On the Appendices 1, you can see all different scales depends on the questions. On average, the answers averaged between 0 and 2. This can be interpreted as most of the answers are positive and it indicates that most of the UX Properties were deemed useful by the reviewers.

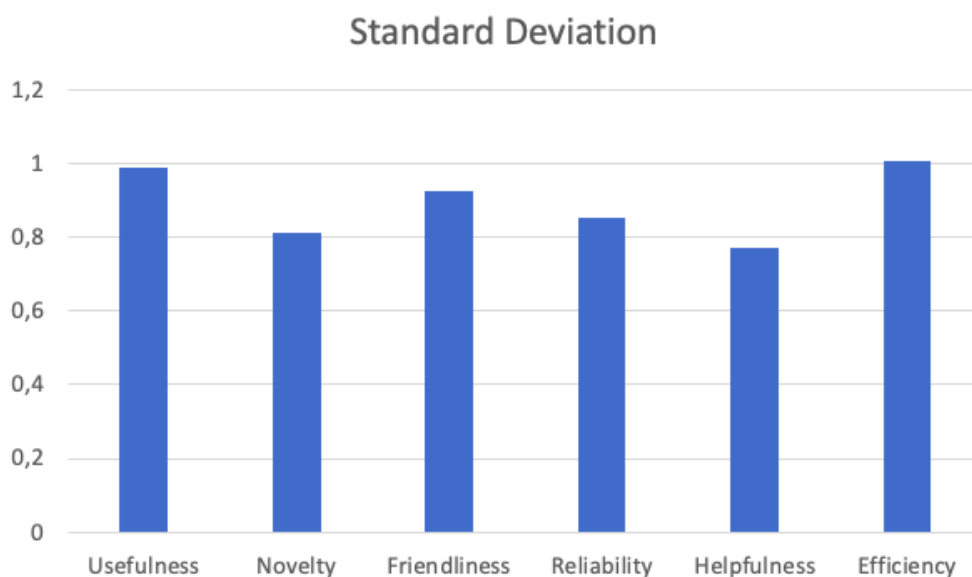


Figure 14: Average Rating of Standard Deviation of UX Properties (-2 to +2)

The standard deviation is a measure of the variance of the data from the mean. A low standard deviation indicates that the data is all clustered around the mean, and a high standard deviation indicates that the data is more scattered. It is therefore important to look at Figure 14 in a little more detail, to see if the responses really tend towards the positive.

We can see that the standard deviation is between 0,6 to 1, which means that that there is a rather moderate standard deviation because it is not so far from the mean. The lowest standard deviation is near 0,8 and refer to “Helpfulness”, closely follow by “Novelty”. The highest is equal to 1, and refer to “Efficiency”, closely follow by “Usefulness”.

The quantitative analysis tends to say that in general, the answers to the questions (see annex 1) are rather positive towards the 6 UX Properties used. The standard deviation shows however that the opinions are somewhat divergent. However, the answers remain in the same trend.

The 3 UX Properties showing the highest means scores are: “User-Friendliness”, “Reliability” and “Helpfulness”.

4.2 Qualitative results analysis

The Table 6 represent the Outcomes of the sentiment analysis.

Table 6. Outcomes of the sentiment analysis

UX Facet	UX Property	Average Value of the rating (Scale from -2 to 2)	Quantitative Sentiment	Qualitative Seentiment	Similarity or Divergence
Empathical	Helpfulness	1,285714286	Positive	Positive	Similarity
Economical	Usefulness	0,765625	Positive	Positive	Similarity
Technological	Reliability	1,0625	Positive	Positive	Similarity
	Easiness to use	1,03125	Positive	Positive	Similarity
	Newness	0,777777778	Positive	Positive	Similarity
	Efficiency	0,619047619	Positive	Positive	Similarity

We can notice that the columns "Quantitative sentiment" and "Qualitative sentiment", the results tend towards positive.

Moreover, the answers are always similar and therefore show no difference.

Since, as previously stated, more than most of the responses were given by Generation Z youth, the author decided to compare the data by gender with the Table 7.

Table 7. Outcome of the sentiment analysis between gender

UX Facet	Gender	UX Property	Average Value of the rating (Scale from -2 to 2)	Quantitative Sentiment	Qualitative Seentiment	Similarity or Divergence
Empathical	Men	Helpfulness	1,56194	Positive	Positive	Similarity
	Women		1,85215	Positive	Positive	Similarity
Economical	Men	Usefulness	0,765625	Positive	Positive	Similarity
	Women		0,68455	Positive	Positive	Similarity
Technological	Men	Reliability	1,0625	Positive	Positive	Similarity
	Women		1,2511	Positive	Positive	Similarity
	Men	Easiness to use	1,03125	Positive	Positive	Similarity
	Women		0,95252	Positive	Positive	Similarity
	Men	Newness	0,777778	Positive	Positive	Similarity
	Women		0,9525566	Positive	Positive	Similarity
	Men	Efficiency	0,57865	Positive	Positive	Similarity
	Women		0,632251	Positive	Positive	Similarity

The author notes that in Table 7, the average value between women and men has a difference tending to 0.01.

However, for the UX properties "Newness" and "Reliability", the writings are a little higher tending towards 0.02. For "Reliability", the average value rating is 1.06 for men and 1.25 for women. For "Newness", the average value rating is 0,77 for men and 0,95 for women. We can see that the average value rating is higher for women than for men. Moreover, this is a finding that the author has noticed on other UX properties which are: "Efficiency" and "Helpfulness". For "Usefulness" and "Easy to use", however, men have a higher average value.

More globally, we can notice that the differences between men and women are not very important. In addition to the average value rating column, the author decided to look at the qualitative sentiment column. We notice that 5 out of 6 UX properties, between men and women, have the same qualitative sentiment which is positive. The only UX property that does not have the same result is the "Easy to use". Men and Women are on the positive side. We can deduce here, that men think (positive) that the application is easy to use, and women have a positive

opinion too on this UX property. To further the qualitative analysis, essential UX features are highlighted to improve with Table 8.

Table 8. Necessary improvements through UX Facet and UX properties

Improvement priority number	UX Facet	UX property on which the improvement is applied
1	Technological	Efficiency
2	Economical	Usefulness
3	Technological	Novelty

In this Table, the first column represents the order of importance of the UX properties to improve. The second column shows the UX facets, and the last column shows the UX properties in which the improvement is applied. The first UX facet is Technological and is related to the Efficiency. After the analysis of the answers ("justify your answer"), the author deduced that the application should allow to have efficient data about the product. For the second UX facet, it is about Economical which is related to Usefulness. After analysis, the author notes that it would be necessary to add new features that allow the consumer to have discounts on his purchases. This observation is further explained with the last UX facet. The third UX facet is technological and is related to Novelty. The analysis of the responses showed that features should be added.

After buying his products, the consumer could scan his receipt and the application would give him a note about his friendliness regarding the carbon footprint. The more friendly he would be, the more discount he would get. To support the statistical analysis of the quantitative analysis, the author conducted a survey questionnaire that allowed respondents to give their opinions. For example, for "Usefulness", respondent 15 said, *"It's really useful because it will reduce environmental problems in a very easy way"*.

Respondent 62 said *"It is a very useful application, it helps to develop environmental awareness"*.

For "Novelty", respondent 37 said *"I don't think there is an application similar to this one"*.

Respondent 4 said *"It's a little bit of a new app because we haven't seen an app like this before"*.

We can therefore see that the statistical analysis and the analysis of the responses are consistent.

After this analysis, the author can conclude by saying that in a general way the application is seen from a positive point of view through the UX properties. The respondents' opinion about their UX degree of satisfaction is positive.

However, improvements were mentioned by respondents in order to satisfy even more their UX and allow this app-idea to be more relevant for consumers caring about products' footprint.

5 Discussion

5.1 Limitations, reliability and validity

During the analysis of the data that the author carried out, he noted two major limitations to this research. The first limitation is the number of responses that the author obtained to his survey questionnaire. The author obtained 64 responses, allowing for a quantitative and qualitative study. However, this only represents a small part of the French Generation Z, knowing that not all the responses came from people of this generation. The survey questionnaire should have been distributed on a larger scale to young people of Generation Z (in high schools, or to students). The goal was for the author to collect as much data as possible to derive a fair and representative analysis.

The second limitation is related to the first one. The author notes that his target, here the generation Z, is quite limited in terms of number of respondents. The people younger or older than this generation are only slightly represented in the analysis. However, to analyze the potential UX satisfaction of an app, it would be necessary to obtain as many characteristics as possible about future consumers. This would allow to increase the number of potential users and to better understand the positive and negative aspects of this app-idea in order to improve it.

People today face pressure to alter their routines due to the impact humans have on the environment. Therefore, our goal through this survey is to examine the feasibility of the "Carbon footprint App Idea" among the younger demographic. This innovative concept has the potential to aid individuals in minimizing their carbon footprint regularly.

The inquiry we conducted utilized an already-existing, validated model and survey tool for UX-based adoption that was put forth by Topolewski et al. (2019). This model looked at the causal impacts UX has on adoption (as illustrated in Figure 4), incorporating UX properties selected from the three dimensions: business, social, and human. It is crucial to note that our discoveries may not be universal in their application to forthcoming generations, yet they impart knowledge into what modern generations may require to excel in the realm of innovation.

5.2 Answering the research questions

The study was conducted with the intention of determining the potential users' thoughts and opinions on the "The Carbon Footprint App Idea". This new application is designed to allow consumers to know the carbon footprint of the products they consume by using scanning technology. The UX-based adoption model and its survey instrument were selected and applied to a sample of 64 participants. The majority of respondents were people from the generation Z, so the author chooses to focus on them. The survey allowed for the assessment of the participants' intention to adopt the app by analyzing their responses based on causal effect factors.

Additionally, the study assessed the degree of satisfaction with the UX of the app by analyzing the different responses based on UX properties. The results showed that the participants had mostly positive opinions towards the app idea and its usability, with user-friendliness, reliability, and helpfulness being the most significant contributors to user satisfaction. Despite some aspects having a negative impact on the willingness to adopt, the participants overall had a positive attitude towards the app and its potential for reducing their carbon footprint.

In conclusion, the results of the study provide valuable insights into the potential adoption of the "The Carbon Footprint App Idea" and suggest that it has a real potential for adoption by the Generation Z in the future. The findings confirm the viability of the app and provide a foundation for future research and development efforts.

5.3 Dialogue between key results and knowledge base

In this section, we discuss the results found in the research presented in the identified gaps and compare them with my own. The research done by Andersson (2020), was carried out on a specific

country, Sweden. She discusses an application that calculates the individual carbon footprint using financial transaction data. This application is already on the Swedish market. The research shows that a carbon footprint calculator application is at a high adoption rate. The central theme of this publication is the search for innovative ways to involve people in the movement towards a greener society. Carbon calculators have been presented as a tool that can be used to engage individuals in more sustainable practices. The paper presents a method for determining a user's carbon footprint through the amalgamation of EE-MRIO models and financial transaction data. Svalna's methodology is praised in the text for its simplicity and use of current systems. So we can say, despite the research differences, that my study agrees. My results allowed me to say that an application that calculates the carbon footprint was invented on the market because few people offer this type of application. This study being made in France (contrary to the one of Andersson D. made in Sweden), that the French market proposes less or no application of this kind. Like Andersson (2020), our application idea has been identified as simple and easy to understand which makes it attractive to the largest number of people. Finally, the adoption of use is also high, showing an interest of people for this kind of idea.

The second research was conducted by Hoffmann et al. (2022). This research aims to find out the usage adoption of an app that tracks carbon footprints. The conclusion of this study shows that some elements lead to usage intention. The desire for perceived enjoyment, social benefit, and belief in technology as a solution are all key drivers behind the intention to adopt - collectively known as hedonic, social, and utilitarian aspects. Moreover, from a general aspect, the results tend to a positive relationship with the intention to adopt such an application. The results I obtained and analyzed tend to agree with this previous research study. I could see that, indeed, some elements are involved in the intention to use. Also, for me, the playfulness and the social aspect are part of this intention. Moreover, these two researches tend to say that from a general point of view, are often positive.

Comparing these two research studies results with the results of my empirical study leads to an overall agreement that an application on carbon footprint is seen from a positive point of view by respondents. The intention to use a Global-Footprint app on this topic also tends to be positive. From a critical point of view, we can say that the above-presented results confirm the previous results by Andersson (2020) and by Hoffmann et al. (2022).

5.4 Compliance with research ethics guidelines

To carry out her study, the author had to gather data in accordance with specific ethical codes. To do so, she referred to various work such as research studies. All these materials are listed in the "References" section of this report.

Survey questionnaire uses action lines to create a sense of trust among respondents. This creates a welcoming environment where people can answer questions without fear of being judged. To ensure anonymity, the survey notified participants that their names would never appear.

Respondents quoted answers are done on their respondent's reference number instead of giving their name in order to ensure their anonymity.

6 Conclusions

The research was focused on gathering the views and perceptions of potential users towards the "The Carbon Footprint App Idea". The application is a new tool aimed at enabling consumers to determine the carbon footprint of the products they purchase by using scanning technology. To gather data, a UX-based adoption models and related survey tools were employed and administered to a panel of 64 individuals.

The results showed that most Generation Z participants held positive attitudes towards the app and its usability, with aspects such as user-friendliness, reliability, and helpfulness being the most significant factors contributing to their satisfaction. Although some elements were found to have a negative effect on the willingness to adopt, the overall outlook was favorable, with many expressing their intent to recommend the app.

In conclusion, the research provides valuable insights into the potential of the "The Carbon Footprint App Idea". The findings suggest that the app has high potential for adoption in the future and supports the idea that an application designed with user-friendliness and sustainability in mind can be well-received by consumers. This empirical study provides a foundation for further research and development efforts in this area.

6.1 Managerial implications

From a general aspect, we can say that the young generation Z have a positive opinion on the adoption of the application. This shows that if the application is put on the market, the generation Z could change their way of consuming products thanks to it. So, this usage could have a big impact on the individual carbon footprint, but also from a broader perspective. If more people use it, perhaps more dramatic results could be seen on a national level. Research has tended to show that it is the fact that this application can be helpful, reliable, and friendly, that has the most impact on the people surveyed.

6.2 Recommendations for future research

For future research, the author suggests surveying a larger panel of people who may be younger and older than just targeting Generation Z. As Generation Z is very connected, we can assume that the next generations will also be connected and in a much more active way. This would allow us to know if, potentially, more people would be interested in this carbon footprint app idea.

The topic of carbon footprint is likely to become more and more important in the near future, and this research could provide potentially important help on each person decision to consume goods based on their carbon footprint.

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Appendices

Appendix 1. Survey in form of Qualitative Questionnaire among French Generation Z User App on their intention to adopt a Global FootPrint App

Global footprint is an app that gives you the opportunity to make better choices on what you're buying. It gives you information about the footprint of the product you want to buy. Moreover, it gives you product alternatives which better respect the planet.

Link to the teaser: <https://www.youtube.com/watch?v=98N8xg4BrzY>

Demographic questionnaire

DQ 1: What's your gender?

- Male
- Female

DQ 2: What's your nationality?

Votre réponse

DQ 3: What's your age?

- 18-22
- 23-42
- 43-54
- 55+

DQ 4: What's your personal situation?

- Student
- Employee
- Unemployed
- Prefer not to answer

Profiling questionnaire

PQ 1: how often do you use smartphone?

- Always
- Often
- Neutral
- Sometimes
- Never

PQ2: How often do you use app ?

- Always
- Often
- Neutral

- Sometimes
- Never

PQ3: Do the ads bother you on the application?

- A lot
- Somehow
- Neutral
- Not much
- Never

Bipolar survey questionnaire

XQ 1: How would you rate the usefulness of the app?

- Usefull
- Slightly usefull
- Neutral
- Slightly unusefull
- Unusefull

Please justify your answer

XQ 2: Please, rate the degree of novelty of this app idea

- New
- Mostly new
- Neutral
- Mostly not new
- Not new

Please justify your answer

XQ 3: Please rate the degree to which you find friendliness this app idea

- Friendly
- Mostly friendly
- Neutral
- Mostly unfriendly
- Unfriendly

Please justify your answer

XQ 4: Please rate the degree to which you find reliable this app idea

- Reliable

- Mostly reliable
- Neutral
- Mostly unreliable
- Unreliable

Please justify your answer

XQ 5: Please rate the degree to which you find helpful this app idea

- Helpful
- Mostly helpful
- Neutral
- Mostly unhelpful
- Unhelpful

Please justify your answer

XQ 6: Please rate the degree to which you find efficient this app idea

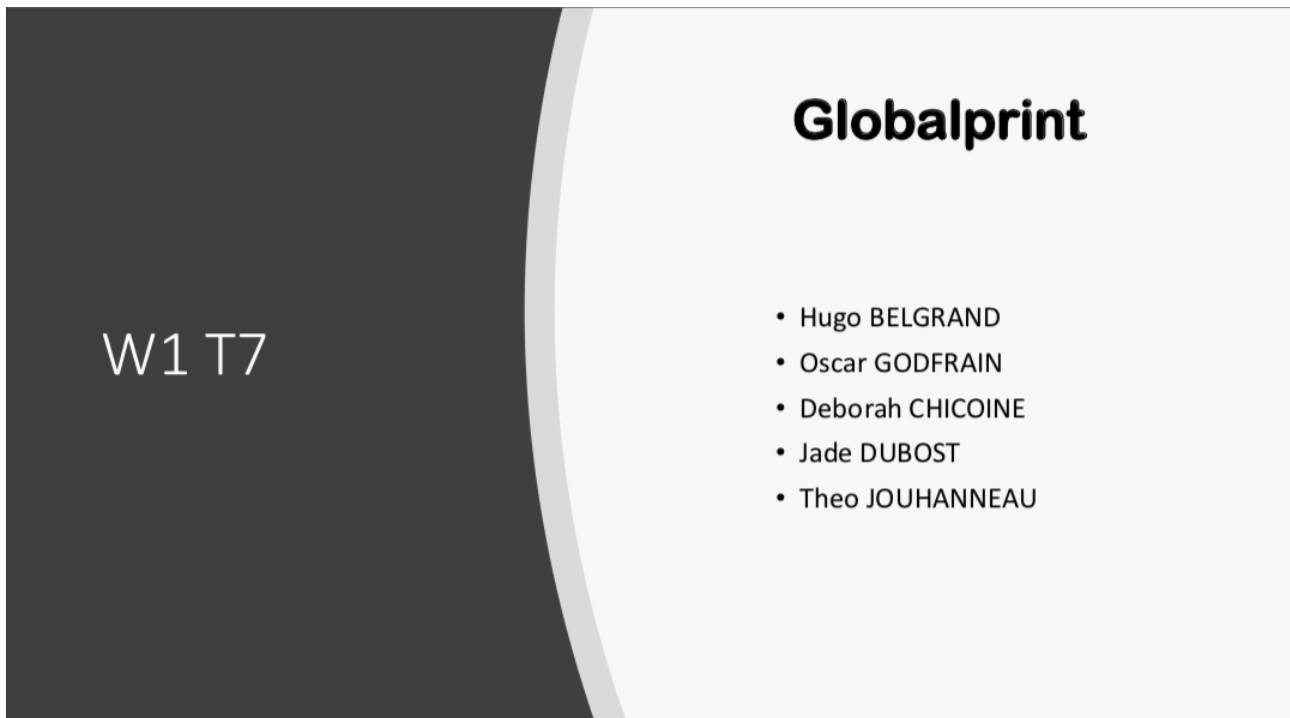
- Efficient
- Mostly efficient
- Neutral

- Mostly inefficient

- Inefficient

Please justify your answer

Appendix 2. PowerPoint Presentation of Global Footprint App Idea

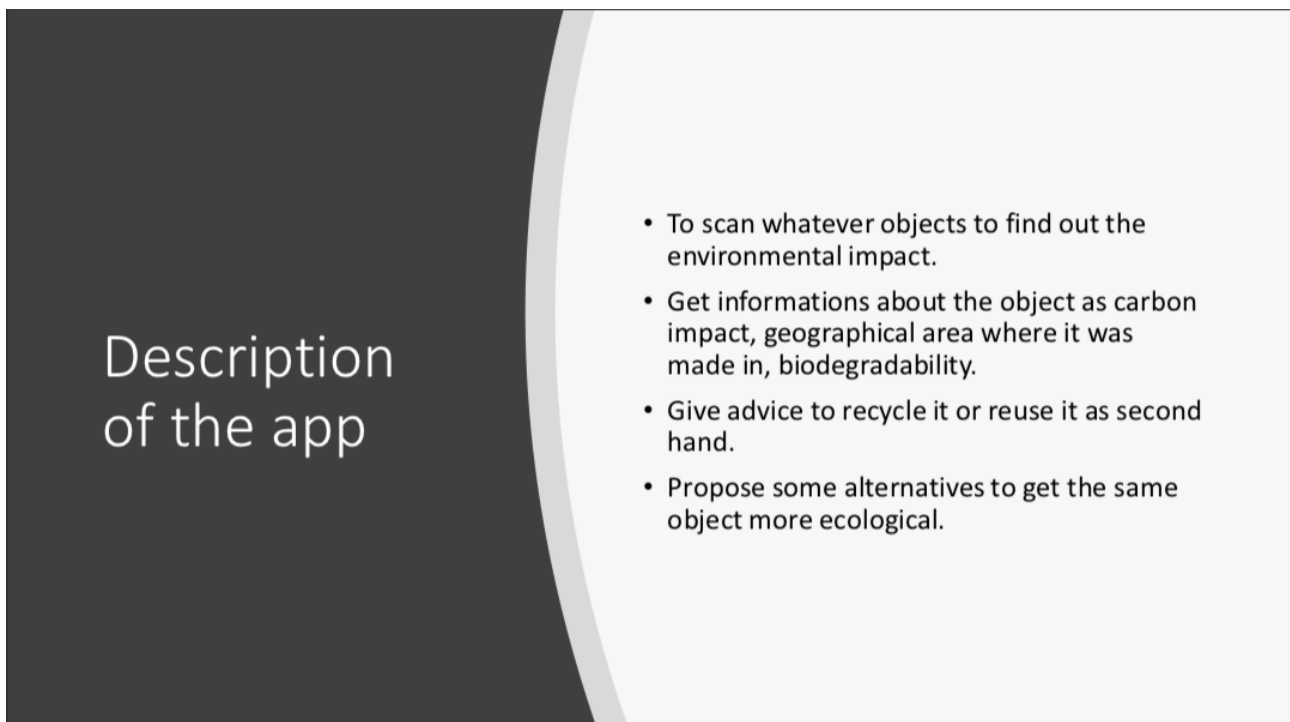


W1 T7

Globalprint

- Hugo BELGRAND
- Oscar GODFRAIN
- Deborah CHICOINE
- Jade DUBOST
- Theo JOUHANNEAU

This slide features a dark grey background on the left with the text 'W1 T7' in white. The right side has a light grey background with the title 'Globalprint' in bold black font and a bulleted list of five team members.



Description of the app

- To scan whatever objects to find out the environmental impact.
- Get informations about the object as carbon impact, geographical area where it was made in, biodegradability.
- Give advice to recycle it or reuse it as second hand.
- Propose some alternatives to get the same object more ecological.

This slide features a dark grey background on the left with the text 'Description of the app' in white. The right side has a light grey background with a bulleted list of four app features.

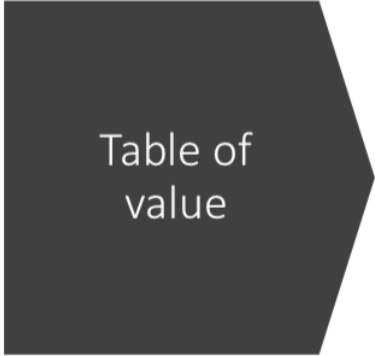


Table of
value

Value dimension	Value elements	Value justification
Technologic	QR code	Everyone have access to a mobile phone
Economic	Publicity, partenership, financement	The app will be free for customers but still profitable.
Environmental	Environmental impact	Give information about carbon print, recycling and reusing