

Even Elton

The Power of Design: Implementations for Persuading Individuals Towards Sustainable Options

Exploring the Role of Design in Promoting
Sustainable Behaviour

Master's thesis in Interaction Design
Supervisor: Frode Volden
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Faculty of Architecture and Design
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Abstract

This thesis investigates the potential of persuasive design implementations in encouraging individuals to make sustainable fashion choices. The study aims to understand how design implementations can influence user attitudes, preferences, and behaviours towards sustainable options. To achieve this, several methods were employed, including interviews and questionnaires, to gather insights from participants regarding their perceptions of various design interventions. The data collected was analysed to identify key factors influencing user decision-making processes and to develop personas representing different clusters within the target audience.

The findings reveal that persuasive design elements, such as sustainability marks, alternative product suggestions, discounts, and certified labels, can positively impact user behaviour and increase the likelihood of opting for sustainable garments. Participants expressed a preference for clear and visually appealing design implementations that provide relevant information and make sustainable options easily accessible. However, it is important to acknowledge the limitations of the study, including the sample size and recruitment methods, which may have limited the representativeness of the findings.

Despite these limitations, the data collected provides valuable insights into specific segments of the target audience and serves as a foundation for understanding user behaviours and preferences in sustainable fashion. The personas developed from this data offer preliminary understandings of user goals, needs, and pain points, providing a starting point for the design of targeted interventions. However, further research with a more diverse sample is recommended to validate and refine the personas for broader applicability. By leveraging the insights gained from this study and addressing the identified limitations, we can develop more engaging and influential design solutions that facilitate behaviour change towards a more sustainable future in the fashion industry.

Sammendrag

Denne masteroppgaven undersøker potensialet til overbevisende designimplementeringer for å oppmuntre enkeltpersoner til å ta bærekraftige valg innen mote. Studien har som mål å forstå hvordan designimplementeringer kan påvirke brukernes holdninger, preferanser og adferd mot bærekraftige alternativer. For å oppnå dette ble flere metoder brukt, inkludert intervjuer og spørreskjemaer, for å samle inn innsikt fra deltakerne om deres oppfatninger av ulike designimplementeringer. Dataene som ble samlet inn, ble analysert for å identifisere sentrale faktorer som påvirker brukernes beslutningsprosesser og for å utvikle personaer som representerer ulike segmenter innen målgruppen.

Resultatene avslører at overbevisende designelementer, som bærekraftsmerker, alternative produktforslag, rabatter og sertifiseringer, kan ha en positiv innvirkning på brukeradferd og øke sannsynligheten for å velge bærekraftige produkter. Deltakerne uttrykte en preferanse for klare og visuelt appellerende designimplementeringer som gir relevant informasjon og gjør bærekraftige alternativer lett tilgjengelige. Det er imidlertid viktig å erkjenne begrensningene i studien, inkludert utvalgsstørrelse og rekrutteringsmetoder, som kan ha begrenset representativiteten av funnene.

Til tross for disse begrensningene, gir de innsamlede dataene verdifulle innsikter i spesifikke segmenter av målgruppen og fungerer som et grunnlag for å forstå brukeradferd og preferanser innen bærekraftig mote. Personaene som er utviklet basert på disse dataene, gir en foreløpig forståelse av brukernes mål, behov og smertepunkter, og gir et utgangspunkt for utformingen av målrettede implementeringer. Det anbefales imidlertid ytterligere forskning med et mer mangfoldig utvalg for å validere og forbedre personaene for bredere anvendelighet. Ved å dra nytte av innsiktene som er oppnådd gjennom denne studien og adressere de identifiserte begrensningene, kan vi utvikle mer engasjerende og innflytelsesrike designløsninger som fremmer adferdsendring mot en mer bærekraftig fremtid i moteindustrien.

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Abbreviations

B-MAP	Behavioural Model for Persuasive Design
EAI	Environmental Attitudes Scale
KCA	K-means Cluster Analysis

1 Introduction

In recent years, the fashion industry has faced increasing criticism due to its significant environmental and social impacts. As the market for clothing continues to expand, there is an urgent requirement to promote environmentally responsible consumer behaviour and to move towards purchasing patterns that are more responsible. This master thesis aims to investigate the convergence of persuasive design, the fashion industry, and sustainability, with the objective of encouraging environmentally responsible consumer behaviour that is in line with the sustainability goals established by the United Nations (UN).

The UN has established a set of 17 Sustainable Development Goals (SDGs) to address global challenges and promote sustainable development. Within the context of the fashion industry, several of these goals are particularly relevant (Un.org, 2015). For instance:

Goal 6: Clean Water and Sanitation. Within the clothing industry, large quantities of water are used for various processes such as dyeing and finishing garments, leading to pollution and water scarcity in many regions. Through persuasive design, we can raise awareness among consumers about the water-intensive nature of the industry and encourage them to choose water-efficient and environmentally friendly clothing options.

Goal 12: Responsible Consumption and Production. This goal aligns closely with the objective of promoting sustainable consumer behaviour in the fashion industry. Responsible consumption and production are highly relevant to the clothing industry's fast fashion model, characterized by overconsumption and excessive waste generation. By leveraging persuasive design strategies, we can encourage consumers to make conscious purchasing decisions, prioritize clothing longevity, and adopt responsible disposal practices.

Goal 13: Climate Action. Recognizing the significant contribution of the clothing industry to greenhouse gas emissions and climate change, persuasive design can play a vital role in motivating consumers to choose sustainable fashion options. Through persuasive messaging, interactive interfaces, and social influence, we can inspire consumers to embrace sustainable materials, support eco-friendly production processes, and reduce their carbon footprint through their fashion choices.

Goal 15: Life on Land. The fashion industry heavily relies on land resources, such as cotton farming and forest ecosystems. Protecting and restoring terrestrial ecosystems, including forests, is crucial for the clothing industry's raw material production. By integrating persuasive design techniques, we can raise awareness among consumers about the importance of preserving biodiversity, avoiding deforestation, and supporting sustainable land management practices.

This thesis will explore the role of persuasive design in motivating consumers to adopt sustainable fashion practices in line with these UN sustainability goals. By examining existing persuasive frameworks, theories, and techniques, the aim is to identify effective strategies that can nudge consumers towards more sustainable choices within the fashion industry.

Through research, a quantitative approach to user personas, prototypes, and design experiments, this thesis intends to provide valuable insights and practical guidelines for

designers, industry practitioners, and policymakers. But also to leverage persuasive design in promoting sustainable consumer behaviour within the fashion industry, contributing to the overall sustainability agenda set forth by the United Nations.

1.1 Justification, Motivation and Benefits

The fashion industry is currently under significant global scrutiny due to its environmentally harmful supply chain operations. Despite widespread awareness of these environmental impacts, the industry continues to thrive, largely driven by the growth of fast fashion, which relies on cheap production, frequent consumption, and short-lived clothing. The environmental consequences throughout the textile and fashion industry are critical, encompassing water usage, chemical pollution, CO2 emissions, and textile waste. The fashion industry alone generates over 92 million tonnes of waste annually and consumes 79 trillion litres of water (Niinimäki et al., 2020). While it is essential to slow down manufacturing processes and adopt sustainable practices across the supply chain, changing consumer behaviour can also yield significant benefits.

Reducing clothing purchases would be beneficial, but the key lies in purchasing sustainable garments with longer lifetimes. Shifting towards "slow" fashion is urgently needed, and minimizing and mitigating the detrimental environmental impacts from the consumer side would greatly enhance the long-term sustainability of the fashion supply chain.

The knowledge acquired through this master's thesis holds potential for enhancing the design and development of persuasive applications or platforms aimed at promoting sustainable clothing choices. By taking these insights into consideration, future interventions can be used to effectively encourage individuals to make more sustainable choices in their clothing consumption. In turn, this can significantly contribute to the advancement of more sustainable practices in the fashion industry.

The thesis findings can offer guidance in understanding the underlying factors that influence consumer behaviour and decision-making regarding clothing purchases. Additionally, the thesis outcomes can provide insights for industry stakeholders, policymakers, and sustainability advocates seeking to implement strategies and policies. Understanding the consumers behaviour and the factors that influence sustainable clothing choices can inform the development of sustainability initiatives and regulations. By aligning these efforts with consumer preferences and motivations, the industry can foster more widespread adoption of sustainable practices, thereby reducing environmental impacts and promoting a more responsible and ethical fashion industry.

Ultimately, the potential benefits of this master's thesis are to minimizing the gap between research and practice, using established frameworks in a practical application. By applying the findings to the design and development of persuasive implementations, applications, or platforms, the thesis can enhance positive change by allowing individuals to make informed and sustainable clothing choices and driving the industry towards a more sustainable future.

1.2 Research Question

The master thesis project will address the following research and sub-questions:

- 1) How can design implementations help persuade individuals towards sustainable options?
 - a) How can design be used create a positive attitude towards sustainable options?
 - b) How can quantitative data be used to develop accurate and effective personas for specific target user group?

1.3 Limitations

The primary objective of the design is to encourage and promote behaviour change among the population towards more sustainable fashion options. However, it is important to acknowledge that the sample gathered for this study is limited in scope and may not be fully representative of the broader population. The recruitment of individuals for the questionnaire, which formed the basis for developing personas, was primarily conducted through the publication of the questionnaire on personal social media accounts and by reaching out to individuals within the researcher's social circle.

While this recruitment method offers convenience and accessibility, it introduces potential biases and limitations in terms of the diversity and representativeness of the sample. The respondents who participated in the study may have shared similar backgrounds, interests, or perspectives, which could influence the findings and personas developed based on their responses. Therefore, it is important to interpret the results and personas with caution, recognizing that they may not capture the full range of attributes, goals, needs and behaviours within the wider population.

Despite these limitations, the gathered data still provides valuable insights and serves as a starting point for understanding specific segments of the target audience. The personas developed from this data offer a preliminary understanding of the behaviours, needs, goals, and pain points of different user groups within the context of sustainable fashion. However, it is essential to further validate and refine these personas through additional research and a more diverse sample to ensure their broader applicability and generalizability.

One important limitation of this study is that it primarily serves as a proof of principle rather than a controlled experiment. The design efforts and interventions implemented in this research were aimed at showcasing the potential of persuasive design in promoting sustainable clothing choices, rather than conducting a rigorous experimental study with a control group. Therefore, while the findings provide valuable insights into the persuasive elements and their impact, it is important to interpret the results within the context of a proof-of-principle study.

Furthermore, it is essential to acknowledge that the goal of the design efforts was not to reduce overall clothing purchases but to increase the likelihood of individuals opting for sustainable clothing options. The focus of the persuasive design interventions was to raise awareness, provide information, and influence decision-making processes related to sustainable fashion. The study aimed to explore the effectiveness of these interventions in encouraging individuals to consider and choose sustainable garments. However, the broader impact on overall clothing consumption patterns or long-term behavioural changes related to sustainable fashion remains beyond the scope of this study.

1.4 Thesis Outline

The master thesis is structured into six chapters, each serving a specific purpose. A brief overview of each chapter is provided below:

Chapter 1 serves as an introduction to the master thesis, presenting the key themes and discussing the justification, motivation, and benefit of the project. The chapter also acknowledges the study's limitations and outlines the research question.

Chapter 2 establishes the necessary background and theoretical framework that are relevant to the master thesis. This chapter encompasses two main themes: sustainability in the fashion industry and the principles of persuasive design.

Chapter 3 describes the methodology of the thesis.

Chapter 4 presents the findings derived from the data gathering process, including the cluster analysis, personas and scenarios, the design approach, as well as the outcomes of the interviews.

Chapter 5 discusses the research findings, focusing on strategies to effectively reach the targeted audience. Additionally, this chapter addresses the limitations encountered during the study and proposes avenues for future research.

Chapter 6 provides a summary of the master project, highlighting the key themes and outcomes.

2 Background and Theory

2.1 The End Consumer

While the fashion industry has a big part to play, the consumer plays a detrimental role in the consumption of clothing, and its environmental impact. However, consumers demonstrate a strong dedication to promoting environmental protection through their purchasing decisions, prioritizing the adoption of sustainable practices. A survey completed by Ciasullo et al. (2017) revealed that a significant majority of respondents expressed a willingness to pay an upward of 20% above the regular price to support sustainable fashion brands as opposed to regular fast-fashion retailers. This highlights the growing awareness and commitment among consumers to prioritize sustainability in their consumption patterns. The willingness to invest in sustainable products despite the higher cost demonstrates a genuine desire to contribute to environmental preservation and endorse brands that uphold responsible practices throughout their supply chains.

Nevertheless, there are persistent barriers hindering consumers from making more conscious decisions, primarily stemming from a lack of education, information, knowledge, and transparency. These factors are, according to Pereira et al. (2021), commonly cited by consumers as significant hurdles that undermine their motivation to engage in sustainable practices.

The scale of textile waste, amounting to 98 million tons annually (Igini, 2022), underscores the need for consumer action. The average consumer in the US discards approximately 37 kg of textiles each year. Furthermore, there has been a significant decline of 36% in the number of times a garment is worn before it is discarded over the past 15 years. This trend, combined with the exponential growth of fast fashion brands, which have doubled their clothing production since the year 2000, highlights the role that consumers play in limiting their clothing consumption.

2.2 Persuasive Strategies

According to Gass and Seiter (2018) persuasion is the act of attempting to create, reinforce, modify, or extinguish beliefs, attitudes, intentions, motivations, and/or behaviours within the constraints of a given communication context. It is important to distinguish between *persuasion* and *coercion* or *deception*, while persuasion signify voluntary change, coercion involves the use of force or threats, while deception is the act of hiding or altering the truth in some manner (Fogg, 2002).

Cialdini, a well-known social psychologist who is noted for his work on the topics of influence and persuasion, came up with six fundamental principles of persuasion are applied in various fields (Cialdini, 2007). The following is an explanation of each principle:

- **Reciprocity:** According to the concept of reciprocity, people feel bound to return others in kind for what they have received. When someone does us a favour, gives us a present, or makes a kind gesture, we feel obligated to return the favour. Reciprocity is frequently utilised in marketing and sales to establish a sense of duty and boost the chance of a favourable reaction by delivering free samples, trials, or small gifts.
- **Commitment and Consistency:** This principle highlights the human desire to be consistent in our thoughts, beliefs, and actions. Once we make a public commitment

or take a stand on an issue, we tend to act in ways that align with that commitment. Persuasion techniques that leverage commitment and consistency involve obtaining small initial commitments, fostering voluntary actions, or encouraging public declarations to increase the likelihood of subsequent compliance or behaviour.

- **Social Proof:** Social proof implies that individuals seek to others for clues on how to behave or what decisions to make, especially in unclear situations. When people observe that others, particularly like others, are participating in a specific behaviour or making certain decisions, they are more likely to emulate them. Testimonials, reviews, endorsements, or showcasing the popularity or widespread acceptance of a product or concept are all examples of social proof.
- **Liking:** The liking principle holds that individuals are more readily persuaded by those they know, like, and trust. Someone is more likely to comply with requests or recommendations made by someone they find attractive, similar to them, or who make praises or create rapport with. Building relationships, finding common ground, and incorporating likeability elements can all help to improve persuasive attempts.
- **Authority:** The authority principle suggests that people have a natural tendency to comply with requests or instructions from perceived experts or figures of authority. Symbols, titles, certifications, or credentials that indicate expertise or authority can significantly influence persuasion. By emphasizing one's qualifications, showcasing expert endorsements, or leveraging recognized authorities, the persuasive impact can be enhanced.
- **Scarcity:** According to the scarcity principle, individuals value and desire things more when they believe them to be limited or in great demand. Creating a perception of scarcity or exclusivity may have a powerful influence on persuasion. Techniques like limited-time offers, limited-edition items, or emphasising the uniqueness of an opportunity can create a feeling of urgency and encourage compliance or acceptance.

These six principles offer insights into how people might be influenced and convinced, and they are frequently utilised in marketing, sales, negotiations, and other persuasive situations. By understanding and utilizing these concepts one's message can help improve persuasive communication and its effectiveness.

2.3 Persuasive Design

The B-MAP model, or the Behaviour Model for Persuasive Design, was established by BJ Fogg. Through persuasive design strategies, the B-MAP model provides a framework for understanding and influencing human behaviour (Fogg, 2022). Each of the components of the B-MAP model is described below:

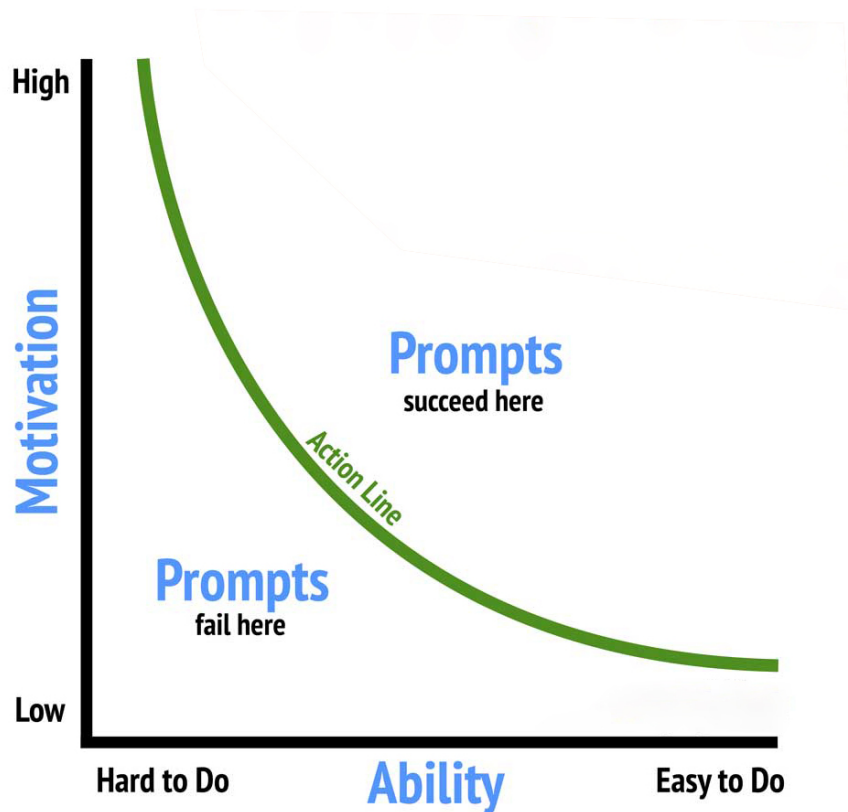


Figure 1: The B-MAP Model (Fogg, 2022).

- **Behaviour:** The target behaviour that you want to elicit, or influence is at the heart of the B-MAP model. Any action, such as clicking a button, signing up for a service, or forming a new habit, can be considered behaviour. Specific, measurable, and observable behaviour is required.
- **Motivation:** Motivation is the degree of desire or readiness to engage in the desired behaviour. Fogg outlines three fundamental motivators that might influence behaviour: feeling (pleasure or pain), anticipation (hope or fear), and belonging (acceptance or rejection). To improve the possibility of behavioural change, persuasive design should appeal to one or more of these motivators.
- **Ability:** The ease or difficulty of accomplishing the goal behaviour is referred to as ability. It includes time, effort, money, and skills necessary to perform the behaviour. To increase the feasibility of the goal behaviour, persuasive design should make it as easy, convenient, and accessible as feasible.
- **Prompts:** Prompts are triggers or cues that prompt individuals to perform the target behaviour. They can be external (such as notifications, reminders, or visual cues) or internal (such as thoughts, emotions, or habits). Effective prompts should be timely, relevant, and well-designed to prompt the desired behaviour.

According to the B-MAP model, behaviour change is most likely to occur when motivation and ability overlap enough and are reinforced by effective prompts. According to the model, boosting motivation or ability can compensate for inadequacies in the other aspect. By understanding the B-MAP model, designers and practitioners can leverage its insights to

create persuasive design interventions that are tailored to specific behaviours and target audiences. The model helps guide the identification of effective strategies to motivate and facilitate behavioural change, ultimately improving the chances of successful behaviour adoption or modification.

2.4 Sustainable Clothing

Although there is great effort put into presenting brands, not just in fashion, as sustainability conscious, there is no such thing as sustainable production, leaving the most environmentally friendly action to do as a consumer abstinence from purchasing altogether. As awareness on global warming, pollution, and environmental impact increases, changing consumers behaviour is more than plausible. The fashion industry accounts for up to 10% of global carbon dioxide output, more than the aviation and shipping industry combined (Howell, 2023), it is also responsible for enormous water consumption, mainly for the growth of natural fibres such as cotton, use of toxic chemicals in dyeing and finishing processes, and the generation of huge amounts of textile waste. With garment production doubling since the year 2000 (Remy et al., 2016). Among the various segments within the fashion and textile realm, dyeing and finishing processes (Hudd, 2022), responsible for applying colour and chemicals to fabrics, emerge as the foremost contributors to climate change.

Unsurprisingly, these processes rank among the most polluting industrial procedures known to mankind. Statistics reveal that dyeing and finishing operations alone account for three percent of global CO₂ emissions, a figure projected to exceed ten percent by 2050. This surpasses the combined CO₂ emissions from the shipping and aviation sectors. Furthermore, these processes are responsible for more than 20 percent of worldwide water pollution. The wastewater generated during dyeing permeates the water table, contaminating rivers, oceans, and even water utilized for irrigation purposes. This predicament poses significant challenges for countries like China, Bangladesh, Thailand, and Indonesia, which dominate the dyeing industry and suffer from its detrimental consequences. Despite these grave concerns, several countries have made commendable strides towards adopting sustainable practices within the textile industry. In Bangladesh, the government has enacted legislation mandating the installation of water treatment plants in factories. Similarly, China's government has adopted stringent measures to curb pollution from high-polluting textile facilities, showcasing their commitment to addressing this critical issue.

Producing polyester requires a significant amount of energy, and in 2015, the production of polyester for clothing resulted in emitting 282 billion tons of carbon dioxide, which is triple the amount emitted during the production of cotton. Moreover, synthetic textiles such as polyester shed small plastic particles, known as microplastics, during washing and wearing, which pollute oceans, freshwater, and land, and pose a risk to animals that ingest them, hindering their growth and reproduction. Microplastic in higher doses has shown evidence of DNA alteration and damage in mussels (Masiá et al., 2021). Researchers in Australia have estimated that between 9.25 to 15.86 million tons of microplastics exist on the ocean floor, and globally, 35% of microplastics found in oceans can be traced back to textiles, making textiles the leading source of microplastic pollution in the world's oceans (Barrett et al., 2020).

2.4.1 Sustainable Fibres

In the effort to create apparel that is more responsible and sustainable, various types of fibres have developed as viable alternatives to their counterparts that are more harmful to the environment. These fibres offer significant environmental benefits, address plastic pollution

concerns, conserve resources, and promote ethical practices throughout the supply chain. From recycled polyester and nylon that repurpose waste materials to organic cotton and linen that reduce water consumption, these fibres exemplify the positive strides being made in sustainable textile production. Additionally, materials like hemp, natural rubber, and alpaca provide alternatives that are resource-efficient, soil-friendly, and support local communities (SustainYourStyle, 2014).

The alternatives offer significant benefits in terms of waste reduction, energy conservation, and greenhouse gas emissions. For example, recycled polyester (rPet) reduces CO2 emissions by approximately 45% and requires less energy for production compared to virgin polyester. Recycled nylon repurposes fishing nets to combat ocean plastic pollution. Recycled cotton helps conserve water resources, saving approximately 2783 litres of irrigation water per kilogram. Recycled wool significantly reduces CO2 emissions, water usage, and land use compared to virgin wool. Sustainable options like organic cotton, linen, hemp, and natural rubber provide eco-friendly alternatives with lower environmental impacts (SustainYourStyle, 2014).

Animal-based sustainable textiles also play a role. Alpaca, silk, and sustainable wool offer alternatives to cashmere and conventional wool, considering factors such as animal welfare and soil health. Moreover, sustainable options for materials like cashmere, leather, and down are being developed to mitigate their environmental impacts. By adopting these sustainable textile alternatives, the industry can make strides towards more responsible and environmentally conscious practices, reducing its ecological footprint and contributing to a more sustainable future (SustainYourStyle, 2014).

2.4.2 Unsustainable Fibres

The clothing industry is not without its share of problematic fibres, each carrying their own set of environmental and social concerns, from water-intensive cotton cultivation and chemical-laden leather tanning to the ecological consequences of wool farming and synthetic fibres derived from petroleum, the impacts of these materials on our planet are far from insignificant. Furthermore, the production processes for certain fibres involve harmful chemicals and practices that pose risks to both human health and animal welfare. Understanding these issues is essential as we strive towards more responsible and conscious choices in the realm of fashion. The list below highlights some of the fibres that are particularly bad for our environment (SustainYourStyle, 2014).

Cotton, despite its widespread use, poses significant concerns due to its high water consumption, reliance on chemicals and genetically modified seeds, and production in countries with inadequate labour regulations. Wool, considered a natural fibre, contributes to environmental issues through extensive sheep farming, leading to desertification and methane emissions. Leather production involves harmful tanning chemicals and waste disposal practices that harm ecosystems. Cashmere production, primarily concentrated in China and Mongolia, has led to land desertification due to goat overgrazing. The sourcing of down feathers from live birds raises animal welfare concerns. Synthetic fibres like polyester and other petroleum-derived materials have substantial environmental impacts, including oil dependency, microplastic pollution, and slow decomposition. Rayon and bamboo fibres, while potentially sustainable, involve chemical-intensive processes and deforestation. Vegan leather, often made from PVC or polyurethane, shares similar environmental drawbacks to polyester (SustainYourStyle, 2014).

3 Methodology

3.1 Defining the user

To gather insight into the potential user group and their behaviour towards sustainability, a questionnaire was compiled through the means of *convivence sampling*. The questionnaire measured how certain behaviours and actions regarding sustainability, environmental attitude, and online buying habits were linked to specific demographic variables in the population sample. The questionnaire included 17 questions, six of which were to gather demographic insight into the respondents. All the questions were close ended with either multiple choice or a Likert scale, two of which were presented in a matrix. 53 individuals responded to the questionnaire, with an almost equal representation of women (51,7%) and men (48,3%), a high representation of respondents were between the ages 26–35 (55,2%), followed by 20,7% being between the ages 56–65, 12,1% being between 18–25, 6,9% being between 36–45, 3,4% being between 46–55, and 1,7% being over the age of 65. One respondent was removed from the study due to their answers being deemed inappropriate and to not be reflective of their true experiences or attitudes. The questionnaire was developed using the tool “Nettskjema” (www.nettskjema.no) and distributed through the social media channels LinkedIn, Facebook, and Instagram.

To measure environmental attitudes a modified and translated framework developed by Milfont and Duckitt (2010) called the Environmental Attitudes Inventory (EAI) was used. The EAI contains a set of twelve scales linked to environmental attitudes or beliefs designed to measure subjects outlook towards either preservation or utilization of environmental resources or policies. The EAI originally contained ten questions for each of the twelve scales, for a total of 120 questions or statements regarding environmental attitudes. The modification for this questionnaire were reduced to twelve statements overall, based on the category of scales from the original EAI by Milfont and Duckitt (2010). The EAI was modified to reduce the time consumption of the questionnaire, as the original scale was measured in and of its own, this questionnaires aim was to cluster responses and link the results to behavioural clothing habits, actions, and beliefs, as well as certain demographic variables. The twelve modified scales were formed in a matrix with 5 variable options ranging from *strongly disagree* to *strongly agree*.

Scale label	Definition
Scale 1. <i>Enjoyment of nature</i>	Belief that enjoying time in nature is preferred to spending time in urban areas.
Scale 2. <i>Support for conservation policies</i>	Support for conservation policies regulating industry and support for alternative eco-friendly energy sources and practices.
Scale 3. <i>Environmental movement activism</i>	Personal readiness to support or get involved in organized action for environmental protection.
Scale 4. <i>Conservation motivated by anthropocentric concern</i>	Support for conservation policies and protection motivated by anthropocentric concern for human welfare.
Scale 5. <i>Confidence in science and technology</i>	Belief that human ingenuity will solve all environmental issues and avert or repair future harm to the environment.

Scale 6. <i>Environmental fragility</i>	Belief that the environment is fragile and easily damaged by human activity, and that this activity soon could have catastrophic consequences.
Scale 7. <i>Altering nature</i>	Belief that humans should and have the right to change or alter nature to satisfy human goals and objectives.
Scale 8. <i>Personal conservation behaviour</i>	Taking care to conserve resources and protect the environment in personal everyday behaviour.
Scale 9. <i>Human dominance over nature</i>	Belief that nature exists primarily for human use.
Scale 10. <i>Human utilization of nature</i>	Belief that economic growth and development should have priority rather than environmental protection.
Scale 11. <i>Ecocentric concern</i>	A nostalgic concern and sense of emotional loss over environmental damage and loss.
Scale 12. <i>Support for population growth policies</i>	Support for policies regulating the population growth and concern about overpopulation.

Table 1: Modified EAI scales and their definition (Milfont and Duckitt, 2010).

In addition, participants were asked a series of questions regarding their online clothing buying habits including frequency of purchasing, preferred methods of purchasing, type of clothing, and importance of criteria concerning price, quality, brand, sustainability, production, and the longevity of clothing purchased.

To determine similarities in the data set, a K-means cluster analysis (KCA) was conducted in the statistical software SPSS, with a basis in the modified EAI scale, with the purpose of creating groups, or clusters, based on their similarity or dissimilarity, the resulting clusters were then interpreted on their characteristics and variables used to group them. Three scales in the EAI were removed as they were not statistically significant to the formation of the clusters, or a high variance between the responses within each cluster, this was done through an analysis of variance (ANOVA), meaning there was a high variance in the scales within the individual clusters formed. The removed scales were Scale 1 (*Enjoyment of nature*), Scale 4 (*Conservation motivated by anthropocentric concern*), and Scale 7 (*Altering nature*). The KCA specified a separation into three groups, leaving N=27 in group 1, N=15 in group 2, and N=10 in group 3 based on their responses on the nine remaining EAI scales.

3.2 User Persona and Scenarios

One persona was developed for each of the user groups, and the modified EAI scale cluster analysis served as the basis for each persona's creation. The demographic information such as age, occupation, gender, family status, and location were specified in the survey, and data was drawn from the replies given in the questionnaire in line with the clusters that the responses were placed in. In addition, the personas provide a description of their attributes, focusing on their overall attitude on environmental concerns. This stance was derived from the respondents' answers to the EAI-scale. The identities also included statements about the subjects' needs, goals, and pain points. The goals indicated what is necessary for them to attain a lifestyle that is more ecologically sustainable, whereas the needs showed their overall perspectives towards sustainability. The personas "production values" and "key info"

represented the individual clusters responses in the questionnaire. Adobe InDesign was used to create the personas, while Hexatar (Sujono, 2023) was used to create the vector avatars.

3.3 Design and Prototype

Three designs were made targeting the different personas each with different persuasive techniques with the intention of increasing ability and motivation to choose sustainable options. The persuasive implementation was made with theory from Fogg's B-MAP model and Cialdini's six fundamental persuasive principles in mind. Firstly, a low fidelity prototype was sketched out on a ReMarkable tablet, taking primarily design inspiration from Zara's mobile application (Zara, 2020) and Zalando's website (Zalando, 2023). The inspiration was solely for aesthetic reasons, as these services are state of the art applications, giving opportunity to implement persuasive elements while presenting a familiar prototype for the individuals giving feedback on the presented prototype. The low fidelity prototypes can be found here: Appendix 1: Low Fidelity Prototype. The high-fidelity prototypes were made using Figma (Figma, 2023), creating three separate documents, each containing different strategies to persuade potential users towards sustainable options. The high-fidelity prototypes were constructed with limited functionality but allowed potential testers to complete the scenario accompanied with the persona for each of the prototypes. The images used in the prototype is from Unsplash (Unsplash, 2023), with the exception of the second scenario, where the images were gathered from Zalando (Zalando, 2023).

3.4 Interviews

To gain valuable insights into the design suggestions and their persuasive elements, a series of interviews were conducted. Participants in the interviews were initially presented with a brief description of the three different personas developed in the study, with the aim of getting subjects that represented the three initial clusters. They were then asked to identify which persona they most closely identified with, and their choice determined the first design prototype they were shown. A total of six individuals participated in the interviews, with three participants identifying as the Technological Optimists, two as the Environmentally Concerned, and one as the Economic Realist.

Subsequently, participants were guided through all the design prototypes, following a scenario description that provided context for each design. Throughout this process, participants were encouraged to provide feedback, share their thoughts, and express their reactions to the persuasive elements embedded in each design. After completing the evaluation of the design prototypes, participants were posed a series of questions relating to their experiences and perceptions.

These questions focused on exploring participants' impressions of the persuasive techniques employed in the designs and their effectiveness in promoting sustainable garment choices. Participants were asked to reflect on their level of persuasion and their likelihood of engaging in sustainable behaviour as a result of the design interventions. Furthermore, participants were encouraged to provide insights into specific design elements or strategies that resonated with them and influenced their decision-making process.

In addition to evaluating the individual design prototypes, participants were also engaged in a discussion about the broader theme of highlighting sustainable options within the fashion industry. This included exploring their perspectives on which design implementations worked best in guiding them towards sustainable choices. Moreover, ethical considerations

surrounding the use of persuasive design techniques to influence behaviour towards sustainable options were addressed, with participants given the opportunity to express their thoughts on this matter. The interview guide is included in the Appendix 3: Interview Guide.

4 Results

4.1 Cluster Analysis

The aim of the KCA was to distinguish the respondents of the questionnaire into three clusters based on the EAI scale. The KCA shows the means within each cluster and their stance on the different scales. Cluster 1 distinguished themselves with a belief in that the environment is fragile and easily damaged by human activity (*Scale 6*), and they were in higher support of policies for population growth (*Scale 12*) than the other two clusters. Cluster 2 distinguished themselves by not being in favour of supporting organized action for environmental protection (*Scale 3*) or having a concern of feelings of personal loss over environmental loss (*Scale 11*). They also had a higher belief than the other two clusters that nature is primarily for human utilization (*Scale 9*) and the belief that economic growth and development should have priority over environmental protection (*Scale 10*). The third cluster had a higher confidence in that science and technology could solve all environmental issues including averting or repairing eventual future damage to the environment. They were also less likely to support population growth policies. All three of the clusters were fairly similar in their support for conservation policies regulating industry and support for alternative eco-friendly energy sources and practices.

	Cluster		
	1	2	3
Scale 2. Support for conservation policies	3.85	3.27	4.00
Scale 3. Environmental movement activism	2.85	1.87	3.10
Scale 5. Confidence in science and technology	2.96	3.00	3.90
Scale 6. Environmental fragility	4.04	3.33	3.40
Scale 8. Personal conservation behaviour	3.52	2.80	4.10
Scale 9. Human dominance over nature	1.44	3.00	1.60
Scale 10. Human utilization of nature	1.85	3.33	1.90
Scale 11. Ecocentric concern	3.22	2.20	3.40
Scale 12. Support for population growth policies	3.41	2.60	1.50

Table 2: Cluster Analysis (means of the different clusters, Likert scale from 1 to 5)

4.1.1 The three clusters

The result of the cluster analysis revealed three distinct types who show the respondents similarities or dissimilarities on beliefs regarding environmental viewpoints. The three clusters were named before connecting them to the rest of the findings of the initial questionnaire. The clusters were:

- **Cluster 1: The Environmentally Concerned**
Is deeply concerned about environmental issues and support policies such as regulating population growth to protect the environment but may not be inclined to support or get involved in organized action for environmental protection.
- **Cluster 2: The Economic Realists**
Believe that economic growth is more important than environmental protection and is not willing to support organized action for its protection.
- **Cluster 3: Technological Optimists**
Believes in the power of human ingenuity to solve environmental problems and takes personal responsibility for conserving resources and protecting the environment but does not support policies that regulate population growth.

4.2 Basis for Personas

The cluster analysis determined the types for the basis of the personas, to further expand on the initial clusters the rest of the responses from the questionnaire was paired with the result of the KCA. As shown in **Figure 2** the different clusters importance of criteria, ranging from 1 (*not important*) to 5 (*very important*), when purchasing clothes online.

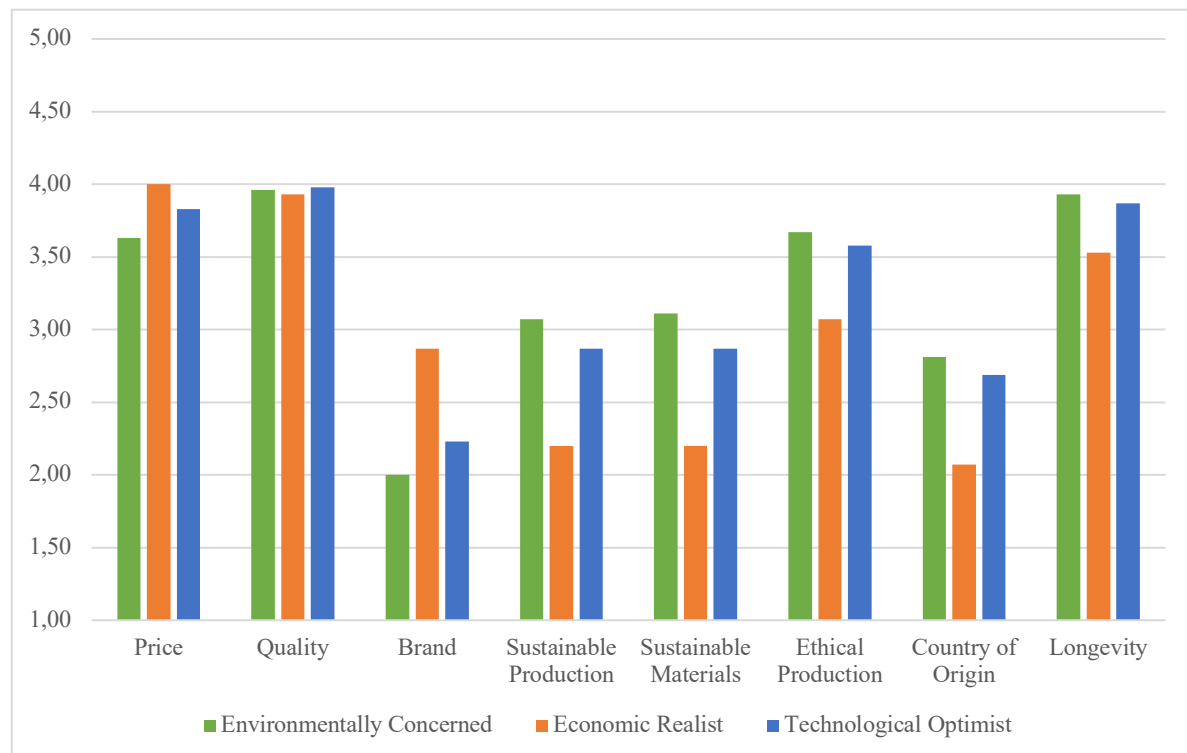


Figure 2: Importance of criteria when buying clothes online.

For all the cluster's price and quality were important criteria, although for the Economic Realists the brand of clothing was slightly more important than the other two clusters. The Environmentally Concerned (cluster 1) and the Technological Optimists (cluster 3) find longevity, country of origin, ethical production, and sustainable production and materials as more important when buying clothes online than cluster 2, the Economic Realists. The Technological Optimists and the Environmentally Concerned shows similar signs of criteria when purchasing clothes, even though their views and approach to climate change differ.

When respondents were queried about the personal significance they attribute to the climate issue, it is observed that the Environmentally Concerned and Technological Optimists exhibit a minimal disparity in their responses. Conversely, the Economic Realists indicate a relatively lower level of importance attributed to this matter. **Figure 3** graphically represents these divergences, with the assigned numerical values ranging from 1 to 4, wherein 1 signifies no importance and 4 denotes a high level of importance.

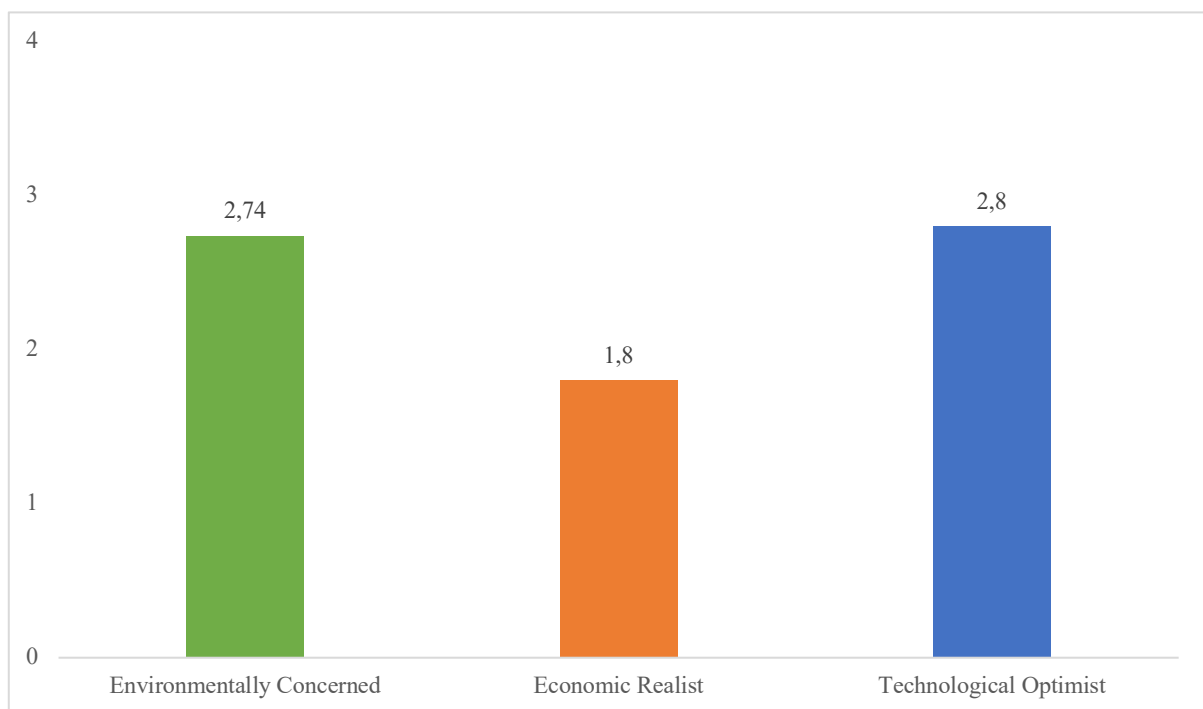


Figure 3: Importance of climate issue

When posed with inquiries concerning their degree of concern regarding global warming, an examination of responses indicates that individuals identified as the Environmentally Concerned cluster display a slightly higher level of worry in comparison to the other two clusters. Suggesting that individuals within this cluster possess a greater awareness and sensitivity towards the environmental implications of global warming, leading to an elevated sense of worry and urgency surrounding this issue. **Figure 4** shows the differences between the clusters from *not worried* (1) to *very worried* (3).

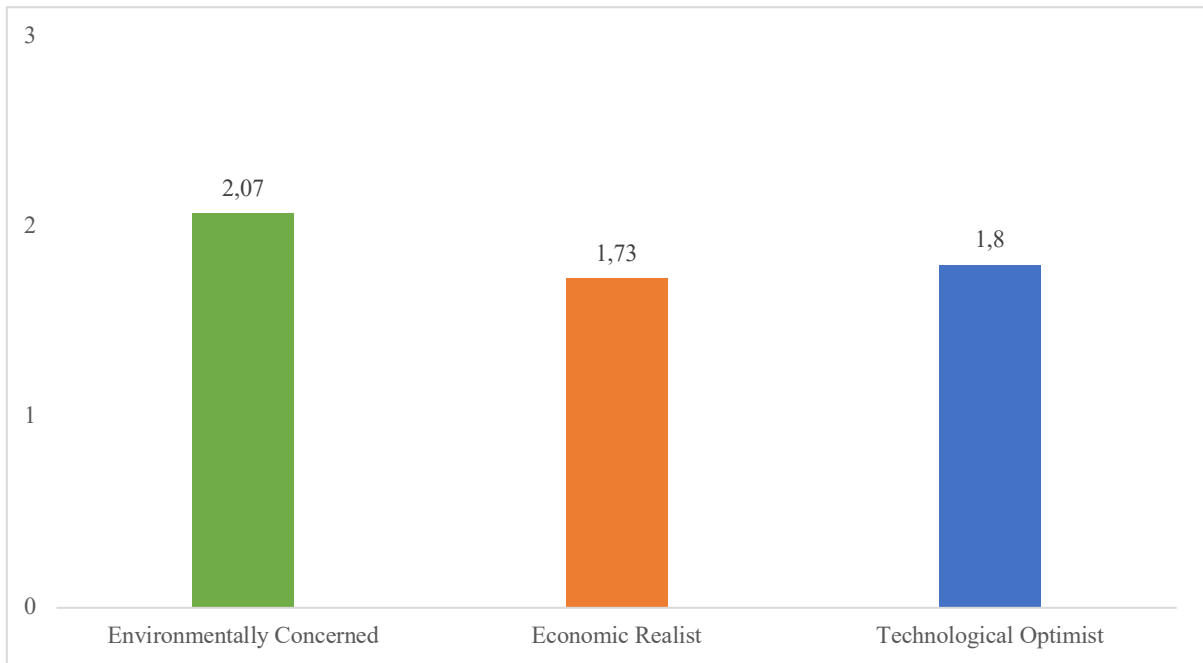


Figure 4: Concern about global warming

4.2.1 Purchasing Habits

When posed with questions about their purchasing habits all the clusters had about the same frequency of purchase in the last 6 months with 1 to 3 times, although the Environmentally Concerned had a slightly lower average than the two other clusters with 1,74, where 1 represents 0-1 times, 2 1-3 times, and so on. Preferred location and device were measured using mode between the clusters since the scales were nominal, both the Environmentally Concerned and the Technological Optimist preferred to purchase clothing physically, while the Economic Realist preferred to do it online.

	Environmentally Concerned	Economic Realist	Technological Optimist
Preferred Location	Store	Online	Store
Preferred Device	PC/Laptop	Mobile	Mobile
Frequency of Purchase	1-3 times (1,74)	1-3 times (2,2)	1-3 times (2,2)

Table 3: Preferred purchasing methods and frequency of purchase.

When posed with their reason for refraining from purchasing when that occurs, all the clusters were more motivated to refrain when price was the determining factor as opposed to the environment, however the Environmentally Concerned and the Technological Optimists were more likely to refrain from completing a purchase due to the environment than the Economic Realist as shown in **Figure 5**.

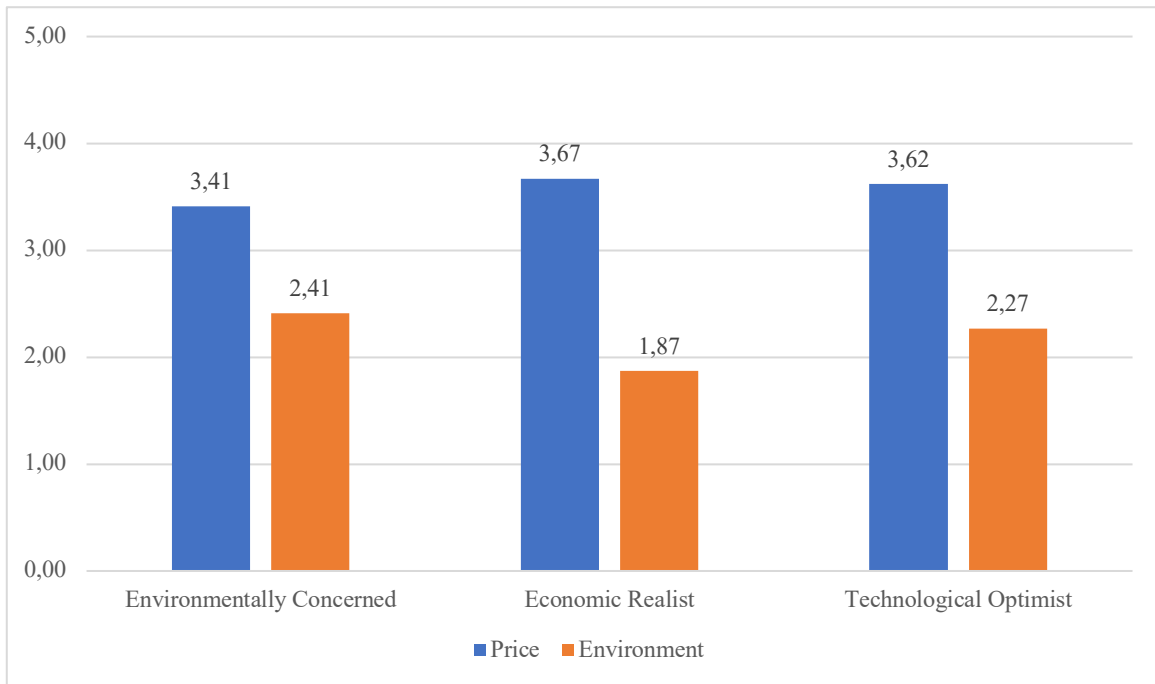


Figure 5: Reason to refrain from purchasing.

When asked what types of clothes the respondents usually purchased there were some differences across the clusters, the Economic Realists purchased more fashion and hiking clothes than the other two clusters, although hiking clothes were similar across the clusters, they were however the only cluster who preferred to do most of their shopping online. The Technological Optimist purchased more sporting, hiking, and work clothes than the other two, although the two latter were small in sized compared to hiking, sports, and fashion clothes. The respondents had the option to choose multiple entries in **Figure 6**.

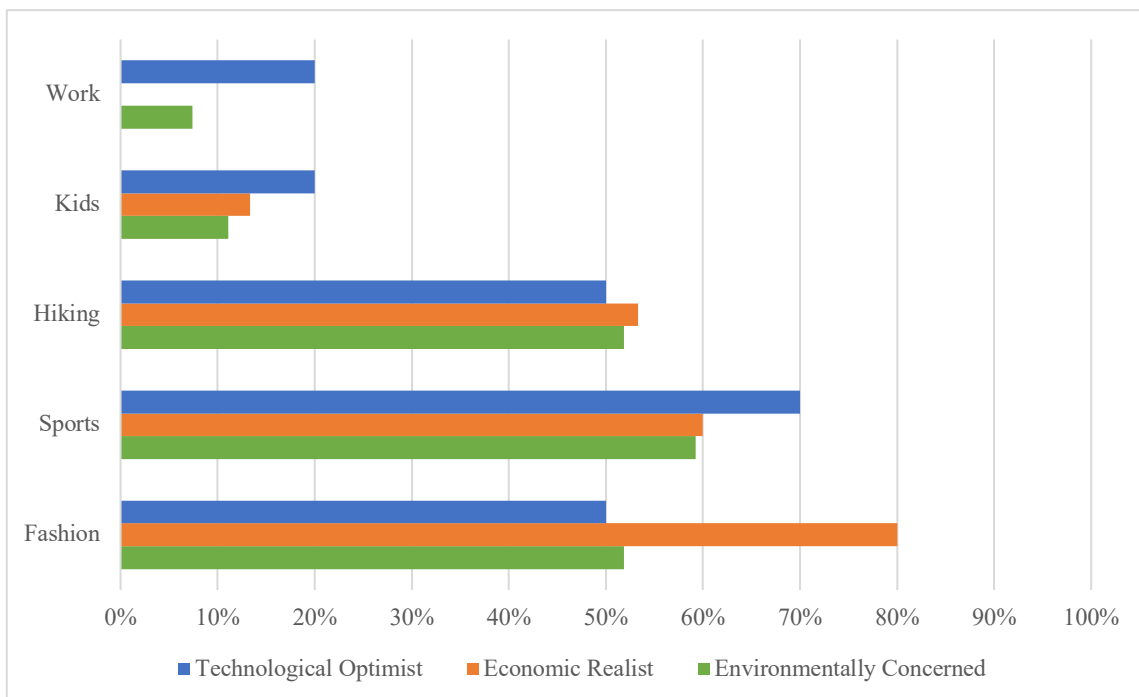


Figure 6: Types of clothing most purchased online.

4.2.2 Demographic Variables

The demographic variables for each of the clusters gathered from the questionnaire is presented in **Table 4**. The mean age between the clusters were quite similar, most due to the majority of the respondents age being between the ages 25–36, nevertheless the Economic Realists were on average slightly older than the Environmentally Concerned, with the Technological Optimist being youngest on average. The gender distribution among respondents was fairly balanced overall, although slight variations were observed among the clusters. Specifically, the Environmentally Concerned and the Economic Realists clusters were predominantly composed of female respondents, whereas the Technological Optimists cluster exhibited a higher proportion of male respondents. Most individuals within the Environmentally Concerned and Economic Realist clusters reported being either married or living with a cohabitant. In contrast, the Technological Optimist cluster consisted predominantly of individuals who lived alone. The measurement of living arrangements was conducted using mode since the scale used for this variable was nominal. Both the Environmentally Concerned and the Technological Optimists had a majority living in urban areas, whereas the Economic Realist tended to live more rural. All the clusters had similar education and were full time employed. It should be noted that the demographic variables are distorted due to a sample that is not representative of the population.

	<i>Cluster 1</i> Environmentally Concerned	<i>Cluster 2</i> Economic Realist	<i>Cluster 3</i> Technological Optimist
Age	36–45	36–45	26–35
Gender	Female	Female	Male
Residential Situation*	Married/Cohabitant	Married/Cohabitant	Lives Alone
Urban/Rural	Urban	Rural	Urban
Education*	BA	BA	BA
Occupation	Full Time Employed	Full Time Employed	Full Time Employed

Table 4: Demographic variables between the clusters (measured using mode*).

4.3 Personas and Scenarios

The personas were built to get a sense of each clusters motivations to eventually alter their behaviour towards purchasing more sustainable option or enhance their consciousness towards a sustainable lifestyle. Each of the personas was built with the cluster analysis and the questionnaire in mind. Each persona is presented with their name and type (i.e., environmentally concerned) at the top, followed by a quote. The demographic information, age, occupation, family status and location, is presented at the lower left under the persona's avatar. Their attributes, goals, needs and pain points are presented in the middle on all personas. On the right in the boxes, the production values are presented, these are criteria that are the most important to each archetype when purchasing clothing, with their online buying habits presented below. There is one scenario representing each of the personas.

Amara, Environmentally Concerned

"The environment is fragile and needs to be protected"



AGE 25
OCCUPATION Student, Part-time
Employed
FAMILY STATUS Single
LOCATION Gjøvik, Norway

ATTRIBUTES

Is deeply concerned about environmental issues and support policies such as regulating population growth to protect the environment but may not be inclined to support or get involved in organized action for environmental protection.

GOALS

To live a sustainable lifestyle and reduce their environmental impact.

NEEDS

Information and tools to help them make sustainable choices and access to eco-friendly products and services.

PAIN POINTS

Difficulty finding affordable environmentally-friendly products, frustration with companies that engage in "greenwashing" or make false environmental claims, feeling overwhelmed or powerless in the face of large-scale environmental problems.

PRODUCTION VALUES

LONGEVITY

ETHICAL PRODUCTION

KEY INFO

- Purchased 2 clothing items online in the last 6 months.
- Usually purchases sports clothing.
- Prefer to do her online shopping on a laptop.
- Is the most concerned about the environment.

SCENARIO 1

Amara has just gotten her pay check for the month, and is in need of a new dress. She opens up Javas to look if they have something available to her liking, and makes a purchase.

Figure 7: Persona 1 – Environmentally Concerned

Aria, Economic Realist

"It's more important to protect the economy than the environment"



AGE 36
OCCUPATION Hotel Receptionist
FAMILY STATUS Married, 2 kids
LOCATION Fusa, Norway

ATTRIBUTES

Believe that economic growth is more important than environmental protection and is not willing to support organized action for its protection.

GOALS

To ensure economic growth and stability.

NEEDS

Information and evidence to support the economic benefits of sustainability, strategies for minimizing costs while still protecting the environment, and opportunities to participate in sustainable practices without sacrificing economic growth.

PAIN POINTS

Feeling torn between the desire for economic growth and concern for the environment, skepticism of environmental policies that may have a negative impact on economic growth.

PRODUCTION VALUES

PRICE

BRAND CLOTHES

KEY INFO

- Purchased 3 clothing items online in the last 6 months.
- Usually purchases fashion clothing.
- Prefers to do her online shopping on her phone.
- Is the most likely to refrain from purchasing because of high prices.

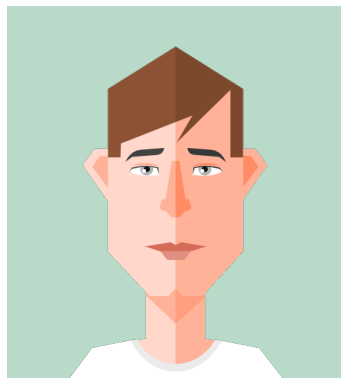
SCENARIO 2

Aria has some free time to search for new clothes for her kids, and while listening to one of her hotel guests mention a new app called Javas, she decides to install and open it to search for and purchase a pair of jeans for her youngest son, Robert.

Figure 8: Persona 2 – Economic Realist

Jasper, Technological Optimist

"I believe in the power of human ingenuity to solve problems"



AGE 24
OCCUPATION Software Developer
FAMILY STATUS Single
LOCATION Oslo, Norway

ATTRIBUTES

Believes in the power of human ingenuity to solve environmental problems and takes personal responsibility for conserving resources and protecting the environment.

GOALS

To use technology to solve environmental problems and improve quality of life.

NEEDS

Access to the latest technological solutions for environmental problems and information on how technology can be used to promote sustainability.

PAIN POINTS

Frustration with companies that prioritize profit over sustainable technology development, feeling overwhelmed by the pace of technological change and the complexity of environmental problems.

PRODUCTION VALUES

ETHICAL PRODUCTION

PRODUCT LONGEVITY

KEY INFO

- Purchased 3 clothing items online in the last 6 months.
- Usually purchases sports clothing.
- Prefers to do her online shopping on her phone.
- Takes personal responsibility for the environment.

SCENARIO 3

Jasper is going to a gathering with his friends this weekend and is looking for a new shirt to wear for the occasion. He opens the new application, Javas, he has installed on his phone to look at what products they have available.

Figure 9: Persona 3 – Technological Optimist

4.4 Persuasive Implementations

All the design followed the same structure, with different persuasive techniques for each of the personas and scenarios. To develop the high-fidelity prototypes Figma was employed, enabling the creation of three distinct documents, each presenting unique strategies to encourage prospective users towards sustainable choices. Although the high-fidelity prototypes featured constrained functionality, they facilitated the completion of the designated scenarios in conjunction with the corresponding personas, in turn providing a comprehensive user experience for potential testers. Figma links to all the designs can be found here: [Appendix 2: High Fidelity Prototypes Links](#).

4.4.1 Targeting the Environmentally Concerned

All the design's had the same landing page, with the same menu. The menu gave the option to search, go to an overview menu, see the user profile, and see the checkout. The landing page also had the option to horizontally scroll to see the different selections for women, men, and kids, see **Figure 10: Landing Page – Scenario 1**. The first scenario, made for the Environmentally Concerned, depicts a user journey for Amara purchasing a dress. The importance of highlighting sustainable products was deemed most important for this scenario, as the Environmentally Concerned already has a high motivation to live a more sustainable life, when in need of clothes, the more sustainable product is more likely to be purchased. By increasing the availability of sustainable clothes, the target behaviour has an improved chance of success.

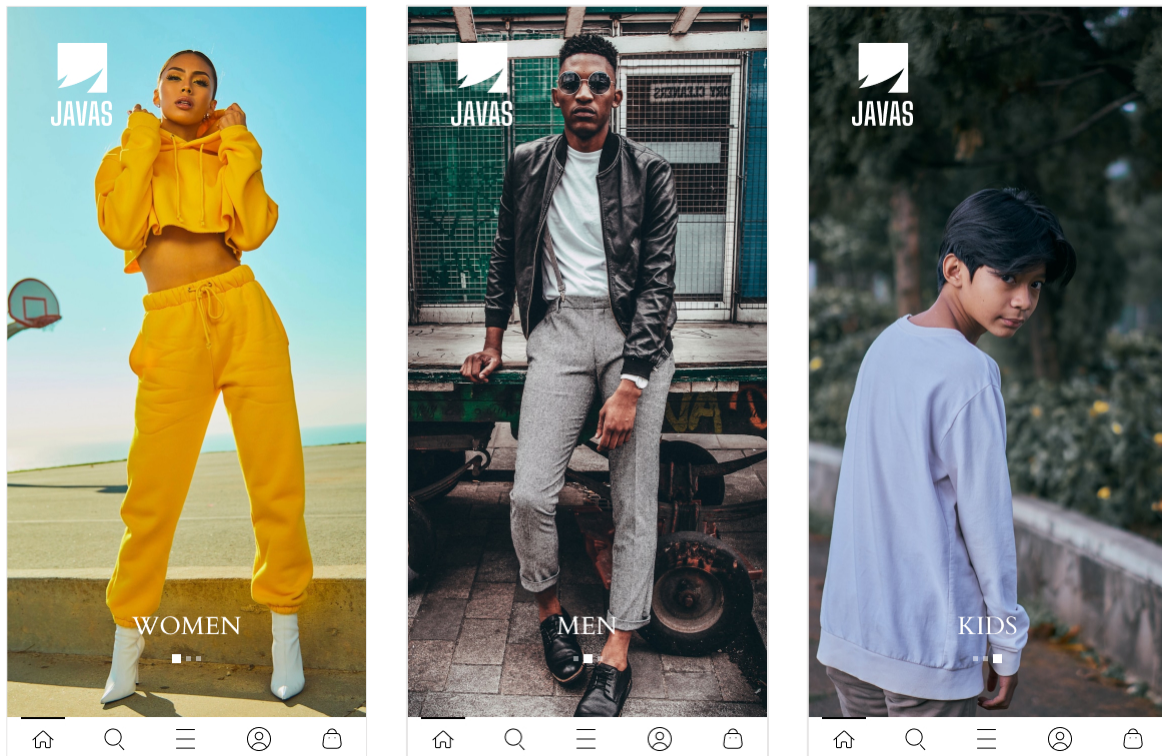


Figure 10: Landing Page – Scenario 1

Navigating to the menu gives the user options for all the different main categories, women, men, and kids, with appropriate sub-categories (see **Figure 11:** Menu – Scenario 1). Scrolling horizontally or clicking on the main categories on top changes the following sub-categories. Considering that the Environmentally Concerned already is highly motivated to engage in the desired behaviour, purchasing sustainable clothing, the ease of accomplishing that behaviour has been made readily available, containing a sub-category with a “sustainable” label. The “sustainable” label also acts an external trigger in the form of a visual cue.

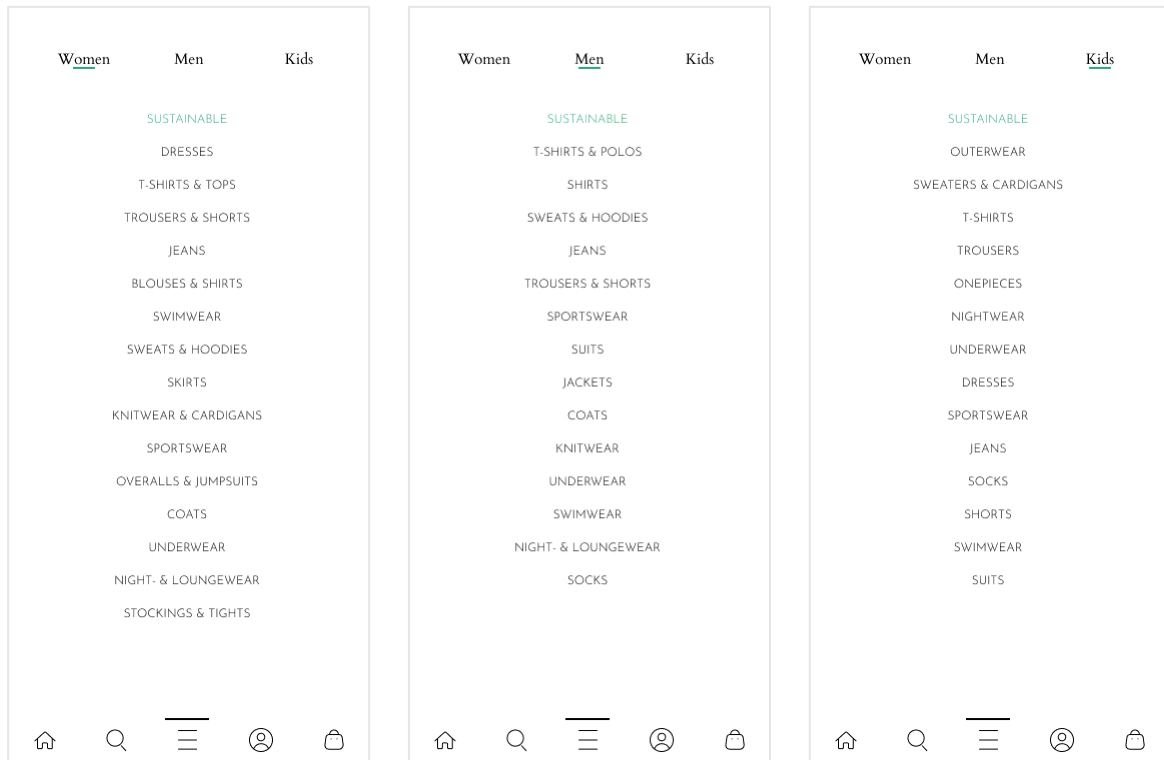


Figure 11: Menu – Scenario 1

After navigating through the menu, the selection of clothing for the desired sub-category is shown (see **Figure 12: Selection – Scenario 1**). Depending on what they interacted with in the menu, one of two alternatives will be made available. If the user clicked on “dresses”, as the scenario depicts, all the dresses would be made available, as shown in the design to the left, the first option for filters in this state would then be sustainable options, followed by types of dresses, again to leave the user with the ability to complete the desired behaviour. If the user clicked on the sustainable option, all sustainable clothing from all the sub-categories would be made available in the selection, as shown in the middle design. To achieve the goal of purchasing a dress, the user can use the filter option at the top to navigate to all options for sustainable dresses, as shown in the right-most design. All sustainable options would be marked with a small vector icon depicting two leaves, symbolising a greener product.

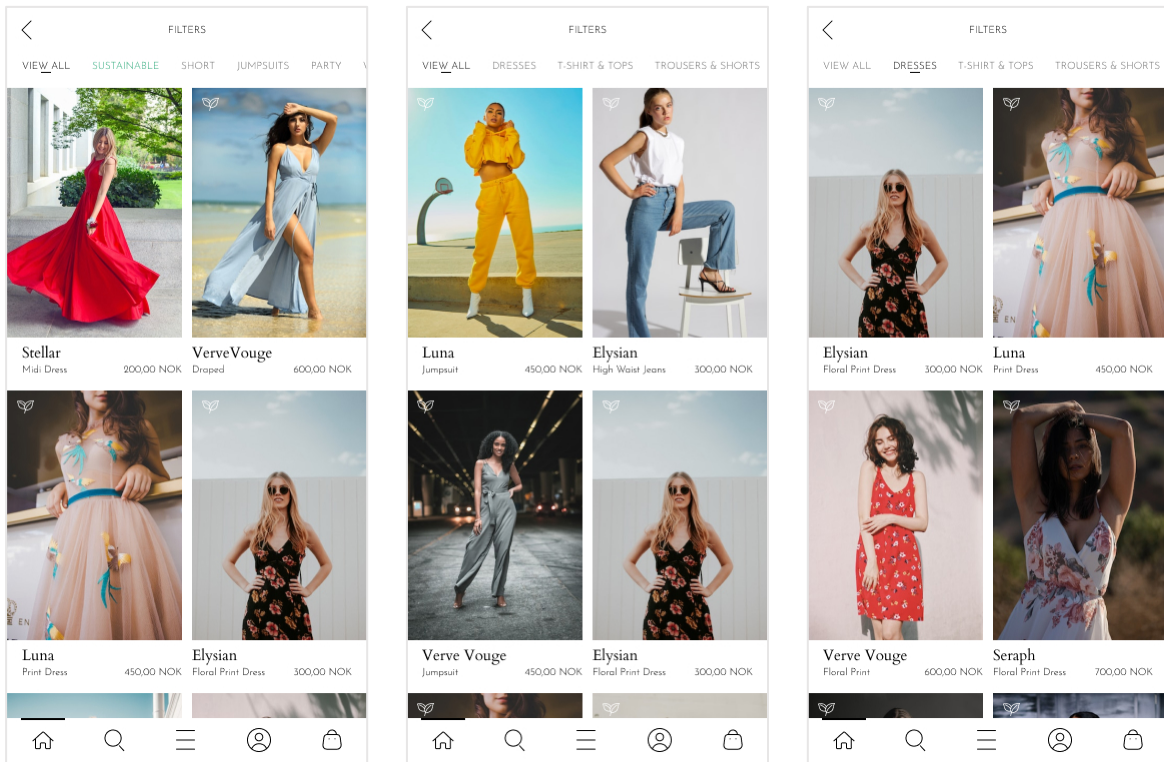


Figure 12: Selection – Scenario 1

Figure 13 shows the individual product sites, with the only difference between choosing a sustainable piece of clothing and a “non” sustainable piece being a “sustainable” icon. The design is scrollable, giving information about materials used below the “add to bag” button.

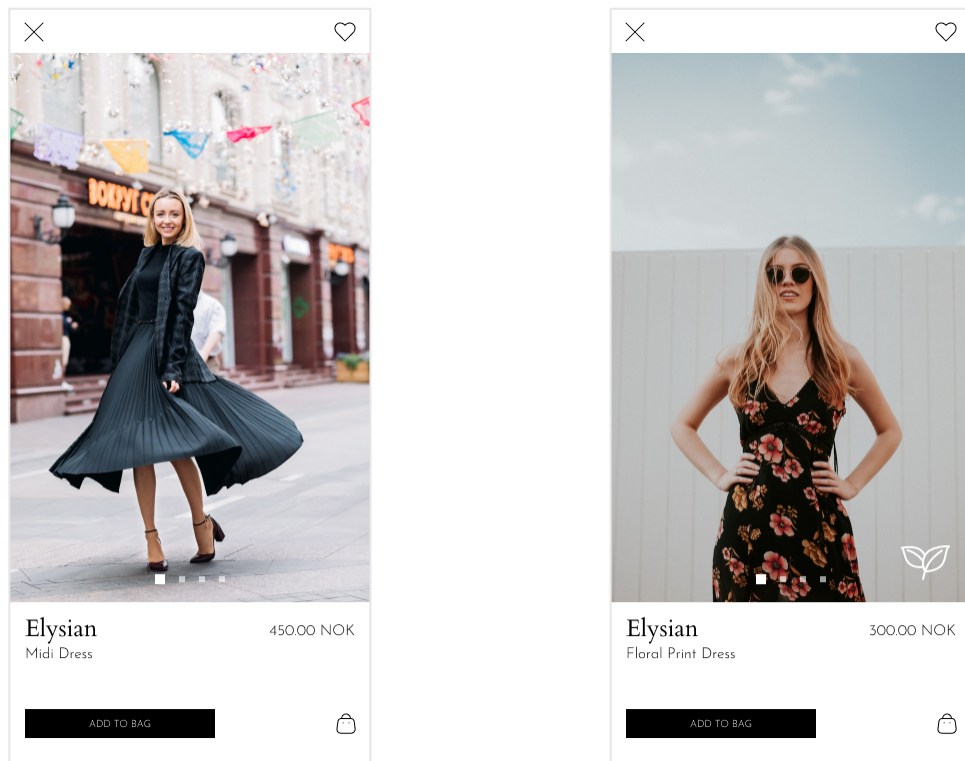


Figure 13: Product Site – Scenario 1

The checkout, shown in **Figure 14**, would appear if a user decides to add an item to the bag and getting ready to purchase. If the user chose a non-sustainable product, alternatives to swap the chosen product with a similar, more sustainable one would be made available, giving the user an opportunity consider before going through with the purchase. Again, by giving the user the ability to accomplish the desired behaviour in choosing a more sustainable product. If the user chose a sustainable product, other alternatives for sustainable options would appear, but instead of swapping non-sustainable products for sustainable ones, other options for sustainable clothing would be made available to add to the shopping bag.

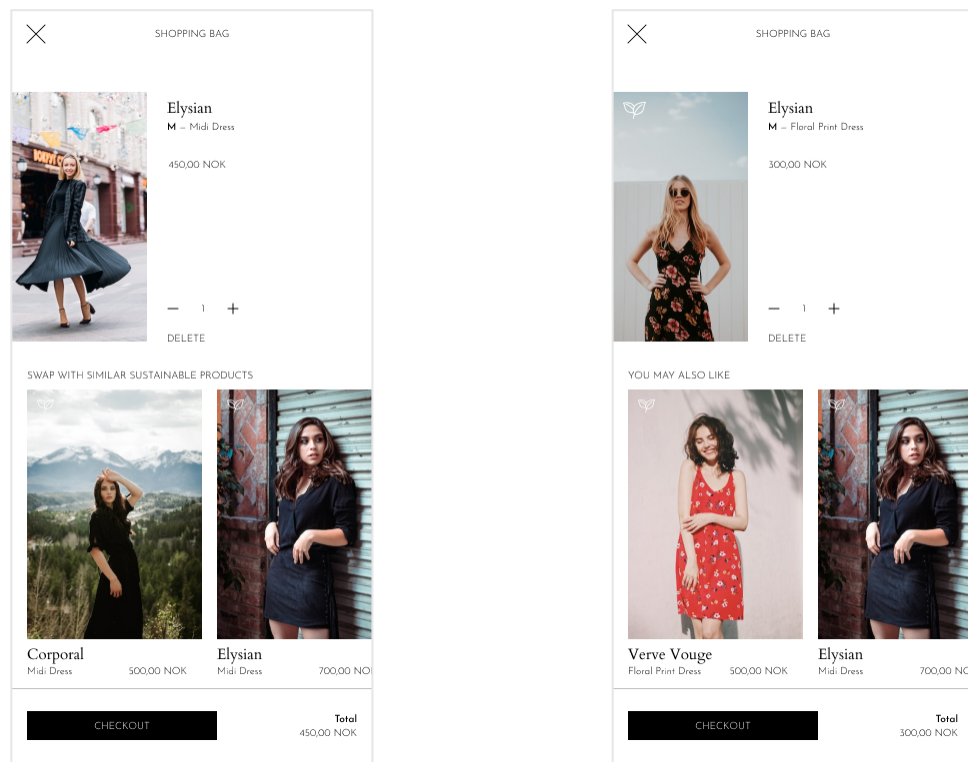


Figure 14: Checkout – Scenario 1

4.4.2 Targeting the Economic Realist

The Economic Realist is the least motivated of the three personas to reach the target behaviour but is more concerned about price. The second scenario relies on Cialdini's principle of reciprocity, making the Economic Realist feel bound to return in kind for what they have received, in this case a discount on sustainable clothing. It also enhances the ability to purchase sustainable, by reducing the price on sustainable products, it would be easier for the Economic Realist to accomplish the desired behaviour. The user is met with a prompt indicating a discount on clothing marked with a sustainability icon, that shows up on the front page, as shown in the left-most image in **Figure 15**. When that icon along with a reduced price appears at a later time in the application, the user might be motivated enough to go through with the desired behaviour in this case, purchasing a more sustainable pair of jeans for a child. The menu does not contain a sustainable sub-category in this scenario, but a price reduction appears in the selection of clothing, as shown in the design to the right, when selecting a sub-category, hopefully increasing the ability for the targeted user to select a sustainable option.

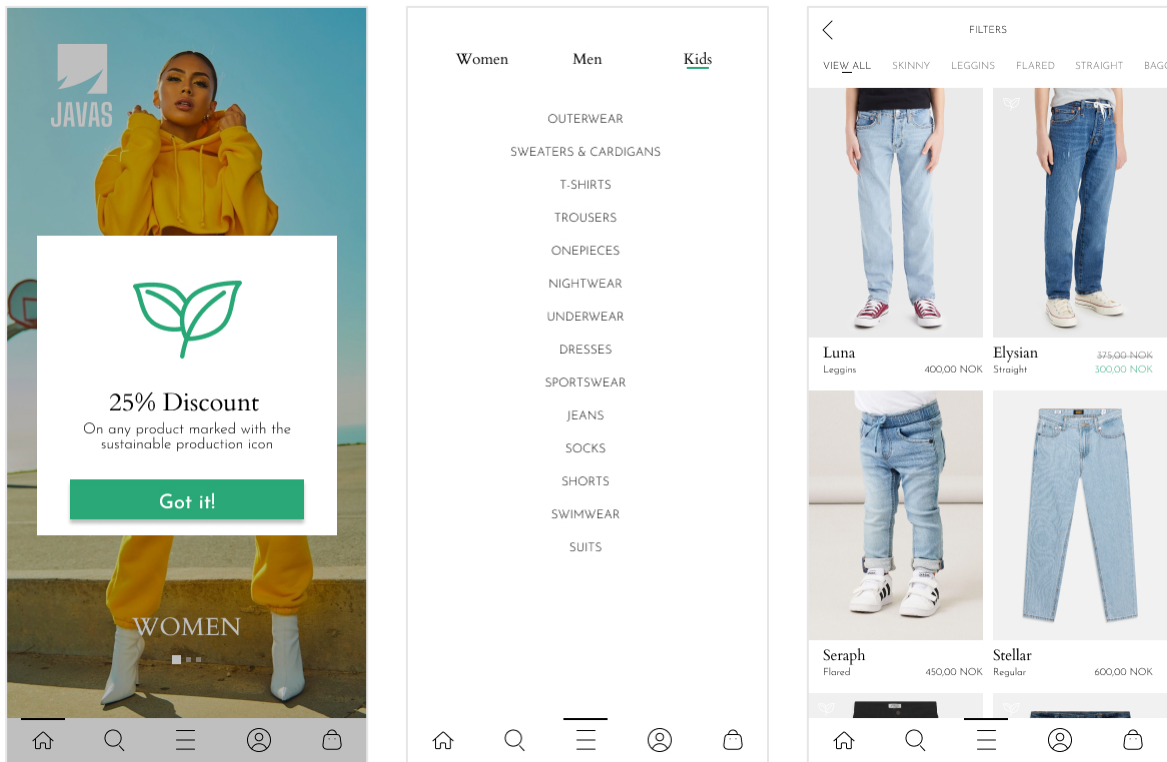


Figure 15: Home, Menu and Selection – Scenario 2

As in scenario 1, the product site varies depending on selecting a sustainable option in the selection. When choosing a sustainable option, as shown in the design to the right in **Figure 16**, the icon and price-reduction in present, as opposed to the left-most design.

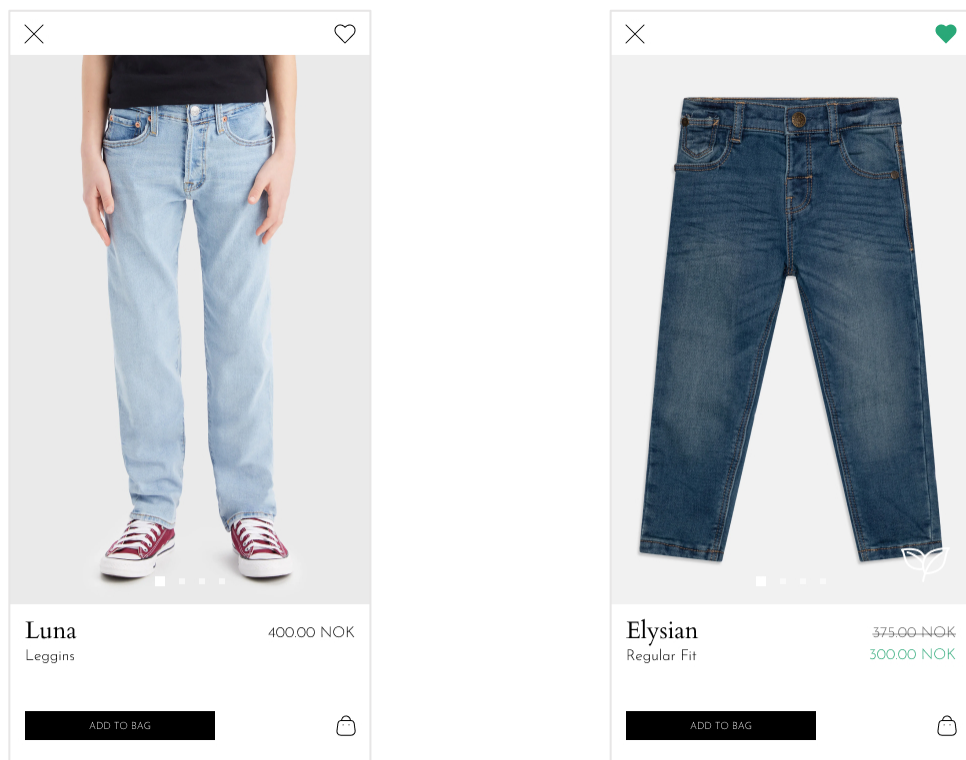


Figure 16: Product Site – Scenario 2

The checkout is similar to that of scenario 1, with options to change to a more sustainable option if that was not chosen in the selection, to increase the ability for the user to select a more sustainable product. Whatever was chosen in the selection the checkout will only suggest sustainable options.

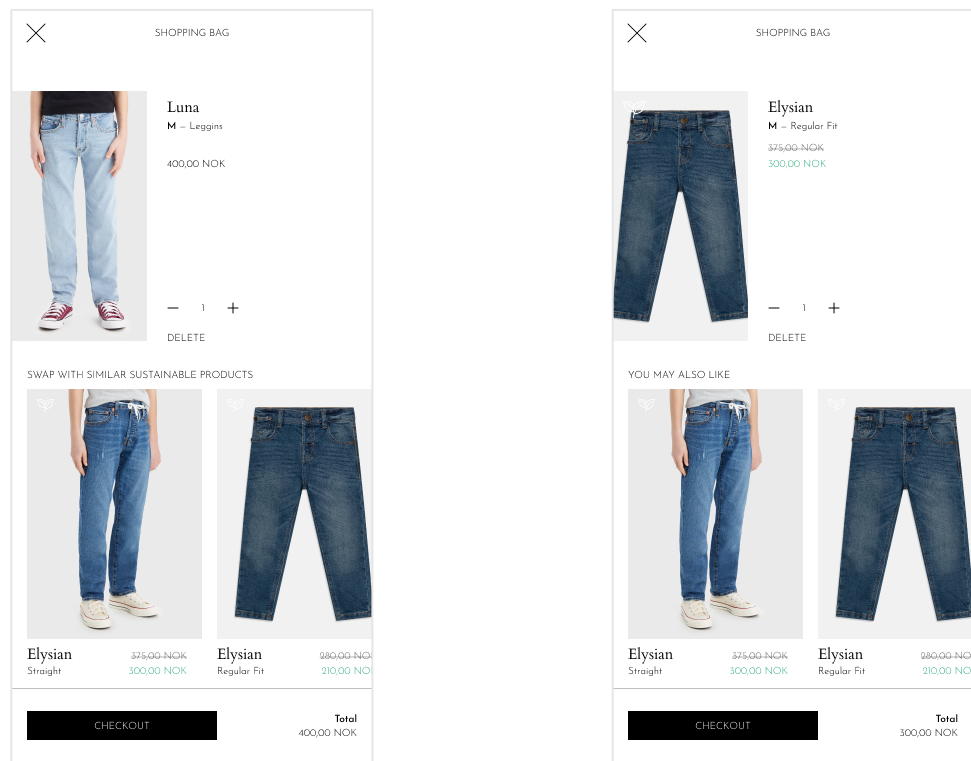


Figure 17: Checkout – Scenario 2

4.4.3 Targeting the Technological Optimist

In the third scenario, similar markings are present as in the other two scenarios. However, instead of utilizing a vector to signify sustainable options, a fashion certification approach is employed. Specifically, FairWear (Natives, 2023), an independent multi-stakeholder organization dedicated to collaborating with clothing brands, garment workers, and industry influencers to improve labour conditions in garment factories, is utilized. Additionally, the Global Organic Textile Standard (GOTS) certification is employed (Global-Standard, 2023), which provides reliable assurance of responsible manufacturing with minimal chemical inputs, ensuring the provision of high-quality organic fabric for end consumers.

When users navigate to the clothing selection section within the application, they are presented with a prompt that appears regardless of the chosen sub-category, as illustrated in the right design of **Figure 18**. This prompt highlights the offer of free shipping when purchasing certified clothing, specifically those bearing certifications such as FairWear and GOTS. The aim of this prompt is to enhance user motivation and their ability to engage in the desired behaviour of choosing certified garments.

The persuasive strategy employed in this prompt aligns with Cialdini's principle of authority (Cialdini, 2007). According to this principle, people tend to be more influenced and motivated to comply with requests or adopt specific behaviours when they perceive the source of the information as authoritative or credible. In the context of sustainable clothing, certifications such as FairWear and GOTS act as symbols of authority, representing

recognized standards and ethical practices within the industry. By prominently displaying these certification logos throughout the design and associating the offer of free shipping with certified garments, the persuasive message taps into the user's perception of authority.

Furthermore, on the product page, the certification information is prominently displayed whenever a product meets the requirements of a particular certification. This can be seen in the middle and right designs of **Figure 19**, with additional information about the certification available for users who scroll down to the 'product details' section. By providing clear and accessible information about the certifications, the application establishes itself as a reliable and trustworthy source of sustainable clothing options. This, in turn, enhances the user's perception of the application's authority in promoting and facilitating sustainable choices.

By incorporating Cialdini's principle of authority into the design strategy, the application leverages the power of credibility and expertise associated with recognized certifications. This not only enhances the persuasiveness of the prompt and product information but also increases user trust and confidence in the application's commitment to sustainability. Ultimately, it strengthens the motivation and likelihood of users adopting the desired behaviour of choosing certified clothing, thus promoting sustainable practices in the fashion industry.

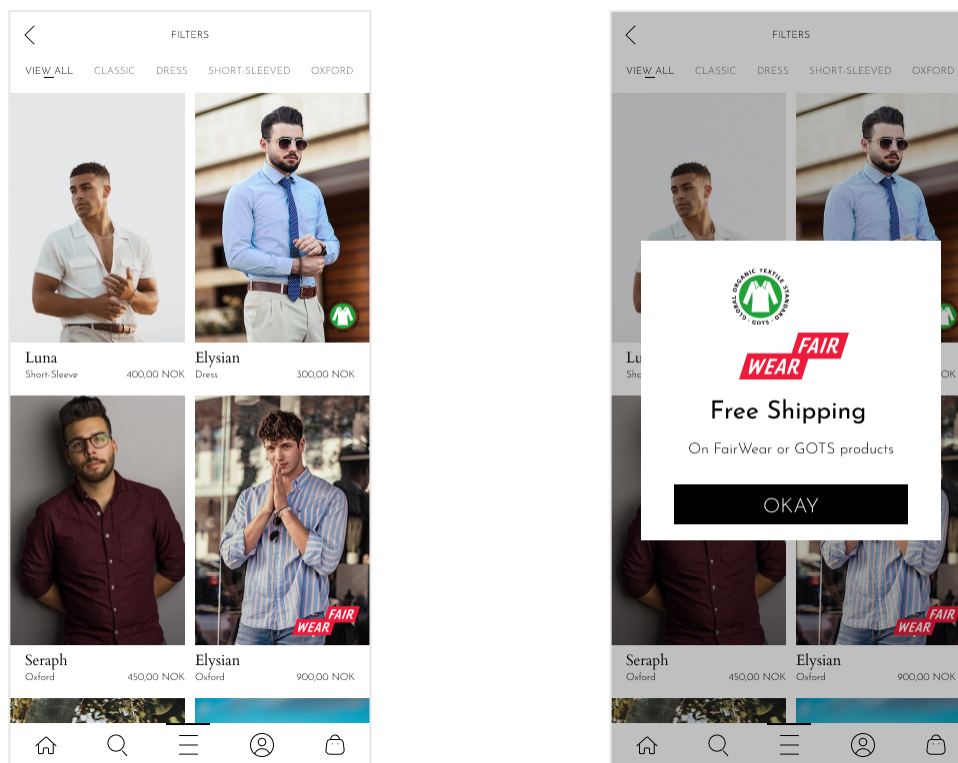


Figure 18: Selection – Scenario 3

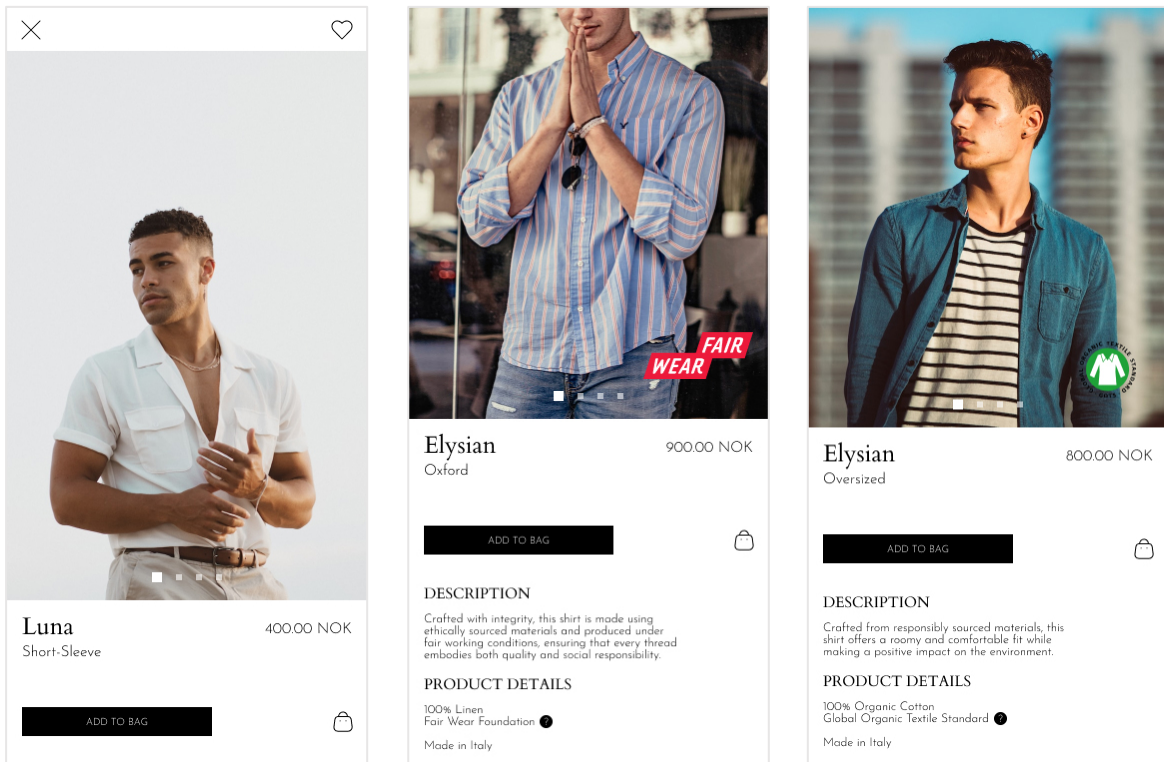


Figure 19: Product Site – Scenario 3

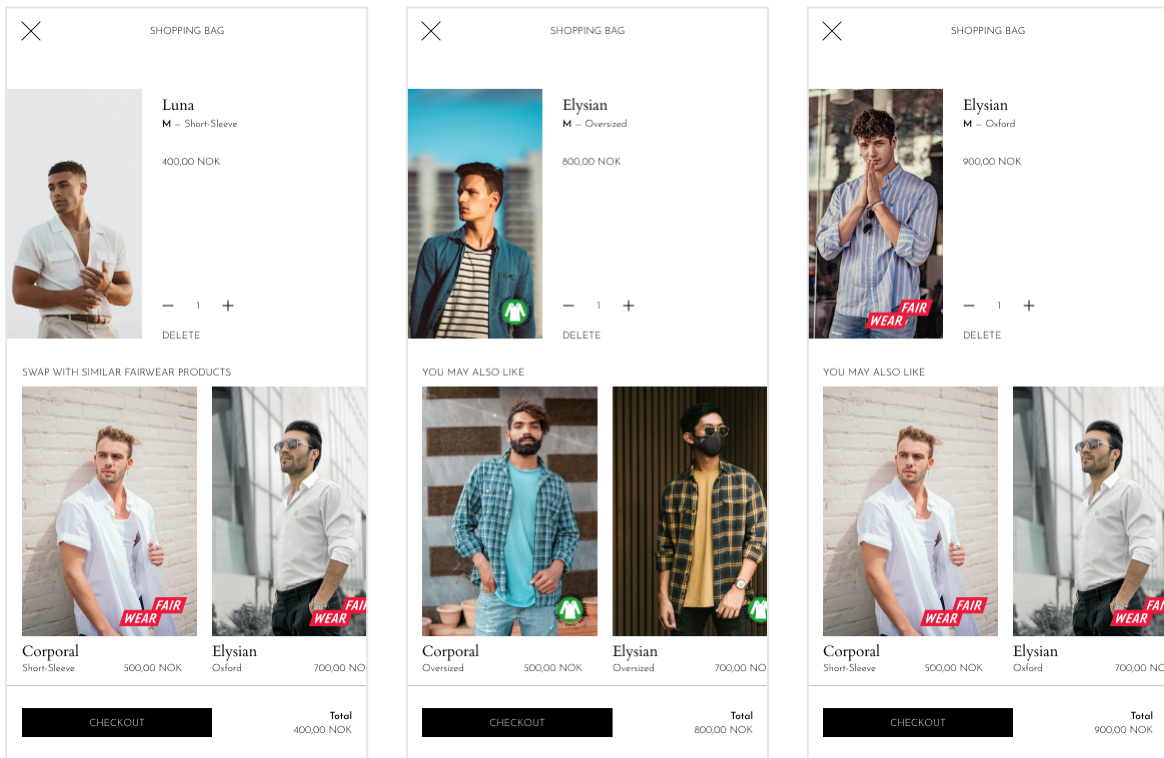


Figure 20: Checkout – Scenario 3

4.5 User Feedback

4.5.1 The Economically Concerned

The participants categorized as *Environmentally Concerned* had positive attitudes towards the sustainability initiatives presented in the scenarios. In Scenario 1, they found the "Sustainability Mark" helpful in identifying more environmentally friendly products. The alternatives presented at the checkout were not bothersome and were seen as a good idea, potentially influencing their choice if they liked the sustainable option. Highlighting sustainable products was not viewed as intrusive; instead, participants welcomed the assistance in finding sustainable options, as it is currently challenging in the market. The implementation of these strategies could potentially influence their purchase decisions, taking price into account.

In Scenario 2, the participants had mixed reactions to the "discount" prompt shown when opening the app. While they usually found similar prompts annoying, they suggested a more subtle approach throughout the app journey with the option to dismiss it. The reduced prices for sustainable products raised some concerns, as they believed sustainable products should not have discounts but rather be priced higher to incentivize their selection.

In Scenario 3, the participants shared similar sentiments regarding the "free shipping" prompt, preferring it to be visible but not intrusive, with the option to dismiss it. Implementing certified sustainability labels, particularly the "FairWear" label, was appreciated as it provided clarity during the purchasing process. These implementations were perceived as potentially influencing their choice of purchase, especially when price, branding, and free shipping were considered.

Overall, the participants expressed a desire for an app or service that highlights sustainable options, as it is lacking in the current market. They particularly liked the availability of more sustainable alternatives at the checkout. The pop-up prompts in Scenarios 2 and 3 were seen as a bit intrusive and could be made more subtle. The participants believed these solutions could help change their shopping behaviour, making them more conscious of sustainability factors, although the final decision would still depend on personal preferences and price. Motivations for making more sustainable purchases included the negative environmental impact of the fashion industry, price considerations, and access to factual information about products. The participants regarded the ethical aspects of these initiatives positively, seeing them as a relief as opposed to the usual profit-driven approach.

4.5.2 The Economic Realists

The participant, categorized as *Economic Realists*, had varied responses to the different scenarios presented. In Scenario 1, the participant found the "Sustainability Mark" too small and suggested having the certified mark on the product site with further explanation. The alternatives presented at the checkout were not bothersome as long as they were within the same price range. Highlighting sustainable products was seen as a positive and non-intrusive approach, encouraging sustainable choices. The participant expressed a likelihood of choosing sustainable options if the price and quality were comparable.

In Scenario 2, the participant liked the "discount" prompt, actively seeking discounted prices. They found it helpful rather than intrusive and suggested implementing it on the front page. Reduced prices for sustainable products were seen as very good and positively influenced their choice of purchase, especially when affordability was a factor.

In Scenario 3, the participant had mixed responses to the "free shipping" prompt, clicking it away without much notice. However, they appreciated the implementation of certified sustainability labels as it provided a better understanding and increased the likelihood of choosing a more sustainable product.

Overall, the participant expressed that positive incentives like discounts and price reductions, rather than negative reinforcement, motivated them to make more sustainable purchases. They emphasized the importance of reliable icons and assurance from companies regarding the sustainability and ethics of their products throughout the production and sales process. While not actively seeking sustainable options, they would consider using an app or service that highlights sustainability if offered by a well-known brand or an established site.

4.5.3 The Technological Optimists

In the interview of the *Technological Optimists*, the participants expressed a generally positive attitude towards the implementations aimed at promoting sustainable choices. They found the "Sustainability Mark" on certain products to be subtle and liked the idea, although it could be more visible. The alternatives presented at the checkout were not bothersome, and the participants suggested incorporating them into an application. Highlighting sustainable products was not perceived as intrusive and provided a choice rather than being forced. The participants indicated that these implementations would increase the likelihood of purchasing highlighted sustainable products.

Regarding the "discount" prompt in the application, the participants found it helpful, not intrusive, or bothersome. They suggested adding a sustainable option in the menu section. Reduced prices for sustainable products were seen as a positive incentive, encouraging them to make more sustainable choices and contributing to a better conscience. The "free shipping" prompt, presented in scenario 3, on specific products was found helpful, but the participants suggested presenting it at the beginning to avoid annoyance when browsing. The certified sustainability labels were liked for their attention-seeking nature.

Overall, the participants expressed a positive outlook on an application or service that highlights sustainable options, as it makes purchasing sustainable products easier. They particularly liked the cheaper options for sustainable products and the availability to swap to similar sustainable options. The only drawback mentioned was the difficulty in seeing the icons clearly. The participants believed that these solutions would positively influence their shopping behaviour by providing an opportunity to choose better options easily. However, they emphasized that a mix of price and longevity would be the motivating factor for making more sustainable purchases, rather than solely environmental considerations. The participants did not perceive it as ethically wrong; however, they mentioned that if the implementation indirectly increase sales, it would be counterproductive.

5 Discussion

This chapter will discuss the interpretations of the findings, mainly to discuss the process of persona building from a quantitative standpoint, but also the more qualitative approach of the user interviews, then followed by the implementation of the different techniques required to reach the different personality types. Lastly, the limitations of the thesis will be presented.

Persuasive design can be a powerful tool to influence and change the targeted user's behaviour, something that has been done mainly to increase revenue for the fashion industry for decades. Shifting the goal of persuasive technology to increase a behaviour that is immensely better for the environment can be an opportunity for global corporations to showcase their commitment for a better future, not just through "greenwashing" advertisement campaign and hollow statements.

5.1 Interpretations of findings

Design implementations have a significant role in influencing individuals towards sustainable options. The incorporation of clear and visible sustainability marks or labels on products enhances awareness and facilitates the identification of sustainable choices. By highlighting sustainable products and alternatives at the checkout, along with reduced prices or discounts, design can incentivize individuals to opt for the more sustainable options. Additionally, design can contribute to a positive user experience by ensuring the implementation is subtle and non-intrusive. When these design elements are integrated effectively, individuals are more likely to be persuaded and motivated to choose sustainable options.

Design plays a critical role in fostering a positive attitude towards sustainable options. By utilizing visually appealing and attention-grabbing sustainability marks or labels, design can effectively communicate the environmental benefits of choosing sustainable options. The use of recognizable icons or visual cues associated with sustainability helps create a positive perception. Moreover, by providing transparent information about the sustainability credentials of products, design can build trust and credibility, further enhancing the positive attitude towards sustainable options. User-friendly interfaces, intuitive navigation, and personalized experiences contribute to overall user satisfaction and create a positive perception of sustainability initiatives.

Quantitative data can serve as a valuable resource in the development of accurate and effective personas for specific target user groups. By analysing data on demographics, behaviours, preferences, and purchasing patterns, researchers can identify distinct segments within the target audiences. The quantitative data provides insights into the characteristics, needs, and motivations of these segments, enabling the creation of personas that represent their traits. However, ensuring a representative sample of a given population is important.

5.2 Reaching the Clusters

To reach the targeted clusters and effectively promote sustainable clothing practices, it is crucial to have a comprehensive understanding of their unique characteristics, motivations, and behaviours. While the initial phase of this research utilized a quantitative approach to identify and analyse the clusters, a perhaps deeper understanding can be achieved through a user-centred design approach that incorporates additional qualitative methods. For instance, conducting workshops or interviews can provide valuable insights into users' motivations, preferences, and current behaviours related to sustainable clothing.

In implementing the design suggestions, a gradual de-implementation strategy can be employed. This involves initially introducing multiple persuasive techniques within the application to stimulate behaviour change. These techniques can range from prompts targeting the different clusters, or an increase in the ability to perform the desired behaviour. Over time, the effectiveness and impact of these techniques can be evaluated, allowing for the gradual removal or refinement of less influential elements while retaining those that have proven to be most effective in encouraging sustainable lifestyle choices for each individual user committed to the application.

Another approach is to prompt users to make a commitment during the registration process. By including specific questions related to the Environmental Attitudes Inventory (EAI) scale or other relevant indicators, users can explicitly express their stance or level of commitment towards sustainable practices. Subsequently, the persuasive design techniques implemented within the application can be tailored and aligned with the user's response. This approach capitalizes on the user's initial interest and commitment to the application, increasing the likelihood of desired behaviour change.

By combining quantitative insights from the clustering analysis with qualitative understanding gained through user-centred design methods, and strategically implementing persuasive design techniques tailored to individual users, the application can effectively engage and motivate users towards adopting more sustainable clothing practices. This comprehensive approach ensures that the design interventions are relevant, engaging, and capable of driving meaningful behaviour change in the context of sustainable fashion.

5.3 Limitations and Future Research

The study acknowledges certain limitations associated with the sample size and recruitment methods employed. The recruitment process involved distributing questionnaires primarily through personal social media accounts and within the researcher's social circle, which may introduce biases and limit the diversity and representativeness of the sample. It is important to approach the findings and personas developed from this restricted sample with some restraint, recognizing that they may not fully capture the full range of attributes, goals, needs, and behaviours present in the broader population.

Nevertheless, the gathered data still offers valuable insights into specific segments of the target audience, serving as a valuable starting point for understanding their behaviours and preferences regarding sustainable fashion. It provides a preliminary understanding of their needs, goals, pain points, and purchasing habits.

By acknowledging the limitations of the sample and recognizing the need for future research, this study lays the foundation for further exploration and refinement of personas, allowing for a more comprehensive understanding of the target audience's behaviours and motivations. This will support the development of effective persuasive design strategies and interventions that can truly drive behaviour change towards sustainable fashion on a larger scale. Conducting testing on a commercial level has the potential to provide valuable insights into user behaviour and buying habits. By implementing the persuasive elements in a real-world commercial setting, it becomes possible to observe how individuals interact with the system, make purchasing decisions, and respond to the implementations.

6 Conclusion

In conclusion, this thesis has explored the potential of persuasive design implementations in promoting sustainable fashion choices, targeting the consumer. Through an examination of user preferences, behaviours, and attitudes, valuable insights have been gained regarding the effectiveness of various design implementations in encouraging individuals to opt for sustainable options. The research findings have demonstrated the importance of incorporating persuasive elements such as sustainability marks, alternative product suggestions, discounts, and certified labels to influence user decision-making processes positively.

However, it is important to acknowledge the limitations of this study, including the sample size and recruitment methods, which may have restricted the representativeness and diversity of the participants. These limitations highlight the need for future research to validate and refine the personas developed in this study with a more diverse sample.

Nonetheless, the findings from this research contribute to the growing body of knowledge on persuasive design in sustainable fashion and provide a valuable starting point for the development of implementations. The personas developed offer preliminary insights into user preferences and behaviours, serving as a foundation for further research and the design of persuasive strategies tailored to specific user segments.

Moving forward, it is recommended to conduct larger-scale studies with more diverse samples to enhance the reliability and generalizability of the personas. Additionally, exploring the long-term impact of persuasive design implementations on overall clothing consumption patterns and sustainable behaviour change would provide a more comprehensive understanding of the effectiveness of such implementations.

This research underscores the significance of persuasive design in fostering sustainable fashion choices and offers practical implications for designers, retailers, and policymakers. By leveraging the insights gained from this study and addressing the identified limitations, we can create more engaging and influential design solutions that drive meaningful behavioural change towards a more sustainable future in the fashion industry.

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Appendices

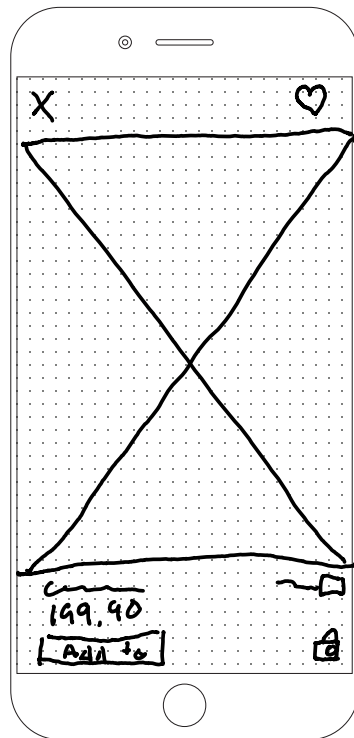
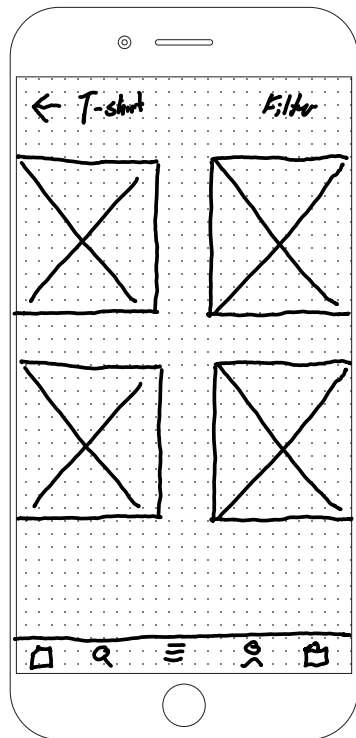
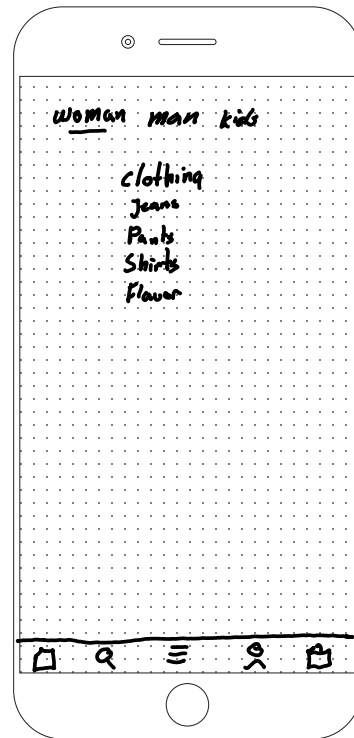
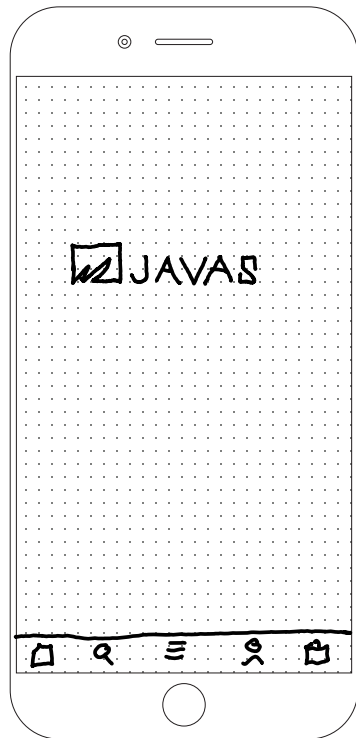
Appendix 1: Low Fidelity Prototype

Appendix 2: High Fidelity Prototypes Links

Appendix 3: Interview Guide

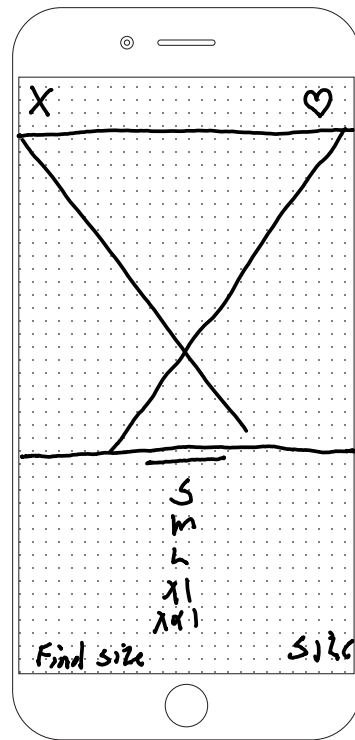
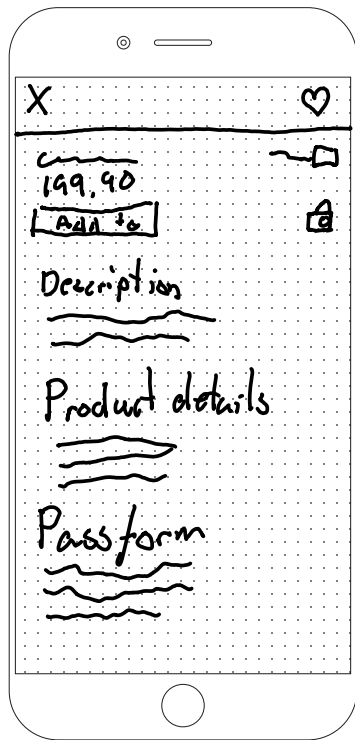
Appendix 1: Low Fidelity Prototype

MOBILE



☐ SNEAKPEEKIT

PROJECT



Appendix 2: High Fidelity Prototypes Links

The Environmentally Concerned:

https://www.figma.com/file/pldHG6V3wnPBV9oRHvkN9Q/Javas_CL-1?type=design&node-id=0%3A1&t=MqVoQhe2w9Jjadqd-1

The Economic Realist:

https://www.figma.com/file/un8TYAwpIAs3DJnaANeGoO/Javas_CL-2?type=design&node-id=0%3A1&t=Nxh7W6bv71amP0cd-1

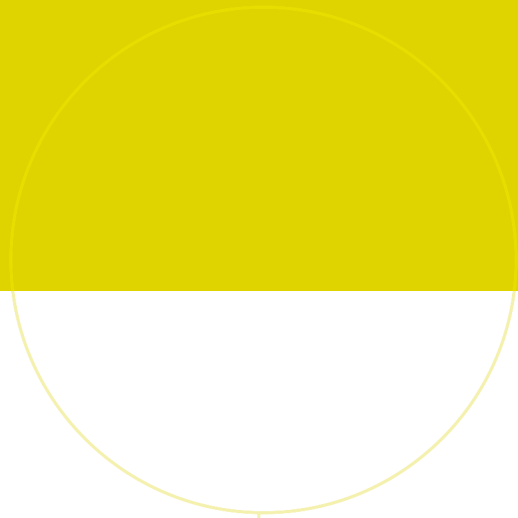
The Technological Optimist:

https://www.figma.com/file/Jiv3Y3fRB7gh1OrGmT1NVo/Javas_CL-3?type=design&node-id=0%3A1&t=bYK3EooPDhcXRCaf-1

Appendix 3: Interview Guide

Date	Participant: Name: Age: Gender:
Pre-test	<p>I'm hoping to learn a bit about people's buying habits, and I have prepared three different scenarios for you to complete, in a prototype with limited functionality, so every element is not clickable. There will also be some questions at the end.</p> <p>I will be taking some notes during the test but do feel free to ask questions. The test and the interview may be used in my thesis.</p> <p>Which of these "persona" do you most identify with?</p> <ul style="list-style-type: none"> - Environmentally Concerned - Economic Realist - Technological Optimist
Test 1	<p>Notes During Test</p> <hr/> <p>Questions After Test</p> <ul style="list-style-type: none"> - How do you feel about the "Sustainability Mark" added to certain products? Do they make sense? - How do you feel about the alternatives presented at the checkout? Are they bothersome in any way? - What do you think about highlighting sustainable products? Does it feel intrusive? - Would any of these implementations have any effect on your choice of purchase?
Test 2	<p>Notes During Test</p> <hr/> <p>Questions After Test</p> <ul style="list-style-type: none"> - What do you think of the "discount" prompt shown when opening the "app"? - Does it feel intrusive or bothersome or helpful? - Could it be implemented in another way, or at another time, if so, where? - What do you think of the reduced prices for sustainable products? - Would any of these implementations have any effect on your choice of purchase?
Test 3	Notes During Test

	<p>Questions After Test</p> <ul style="list-style-type: none"> - What do you think of the “free shipping” prompt on specific products like the one presented? - What do you think about implementing certified sustainability labels like the ones presented? - Would any of these implementations have any effect on your choice of purchase?
<p>Post-test</p>	<ul style="list-style-type: none"> - How do you feel about an app or service that highlights sustainable options like this one? - Is there any of the elements presented that you particularly like? - Is there any of the elements presented that you particularly dislike? - Would any of these solutions help change your shopping behaviour? In a positive or negative way? - What would motivate you to make a more sustainable purchase? - How do you feel about the ethical consideration of persuading individuals to make more sustainable choices?



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