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Developing a sustainably-sourced capsule collection for Hang Eleven

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Jenna Gilbert

Developing a sustainably-sourced capsule collection for Hang Eleven while considering commercial parameters.

By Jenna Gilbert July 2022

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Preface

This design research thesis has been set up and written by Jenna Gilbert, a final-year Fashion & Textile student from Saxion University of Applied Science, as part of the requirement to write a Bachelor Thesis. The thesis is written in collaboration with graduation company Hang Eleven BV. The main scope of this research is to create a sustainably-sourced capsule collection for the Hang Eleven target market. The thesis follows a design model and presents various sustainable garment possibilities for which a final design process is completed, followed finally by the creation of a sustainable collection of garments.

Some acknowledgements are necessary, in particular to Graduation Supervisor Evelyn Lebis who guided the research and provided support and expertise to the design research and to Jop Schuring, my company supervisor, who always provided expertise about the industry and offered support throughout. Honourable mentions are made also to George Franzen and Goste Vanos who also offered emotional and physical support throughout the research process.

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Summary

In this design research a new design thinking model is utilised to create sustainable capsule collection and future roadmap to improve environmental impact for company Hang Eleven BV (Herein after referred to as H11). The design model explores 3 different phases; inspiration, ideation and implementation. Inspiration phase sees in-depth literature study into sustainable supply chain alternatives, expert interviews, comparative study of certifications, in-depth target market research, analysis of consumer perception to previous collections, trend research and fabric quality testing. Supplier cost comparison found Portuguese GOTS (Global Organic Textile Standard) certified supplier to be most feasible for H11. Many more sustainable material & dyeing alternatives such as linen, hemp, eco vera, recycled polyester and natural or low impact dye was found. The consumer research concluded an innovative way to reduce unsold stock would be to create unisex collection due to the ability to meet product MOQ (Minimum Order Quantities) with one design rather than for each gender resulting in less overconsumption and unsold stock. The consumer style research found oversized fits, neutral hues with pops of colour and bold artworks to be of preference.

The ideation phase saw experimentation through natural dyeing and testing different hoody fits on consumers to receive feedback to create the "perfect unisex hoody". A final mood board and concept is created from the input from inspiration and ideation phases and initial sketches are created followed by a collection overview which reflects the trends found in inspiration phase and colours inspired by natural dyeing. The execution of the garments was done by creating technical packs and then creating rough prototypes to create a spec. This spec together with the tech-pack was then sent to suppliers who created the next prototype. Evaluation of the garments through fit and feedback session with consumer was held to evaluate how the garments met the design criteria; it could be concluded the garments met almost all of the criteria.

To implement future sustainable collections a roadmap was created in which recommendations are visualised and explained. The key roadmap findings and recommendations included incorporating a consumer design focused approach during design process of collections, to make conscious choices regarding quality, materials, dyes, and printing. It was also recommended to utilise suppliers within Europe that are GOTS certified to ensure all areas of the supply chain can be overseen and to communicate the conscious efforts to the customer via a transparent impact report on the website.

1 Introduction

H11 is a small lifestyle fashion brand based in Amsterdam. The company was founded by two young surf and travel enthusiasts who wanted to create a brand that represents young, fun and adventurous people who make the most out of what life and our planet has to offer. The brand started selling men's T-shirts and sweat sets with logos and surf-inspired artworks which now forms a integral part of their DNA and is always produced regardless of season; it is also considered the best performing items for H11 (Correspondence, 2022). As they grew, they expanded to women's wear and other product groups such as Outerwear, Denim, Woven wear, Knitwear and Swimwear. As the brand was founded in travel and surf culture the brand identity reflects this as seen in Figure 1 and Figure 2 which visualises and describes the H11 Identity for both men's & womenswear created by the design & marketing team. The core message H11 aims to communicate through their products is to be "the ones who seek" meaning the target consumer is always on the lookout for adventures, good times and creating memories.



Figure 1 H11 Menswear brand identity



Figure 2 H11 Womenswear brand identity

Both founders had no experience in the fashion industry and relied solely on the knowledge and assistance of family business, The Sting (see Figure 3: H11 company structure). This close connection and advantages of having relations to the supply chain of a multimillion-euro-company, catapulted H11 to the kind of success that other small businesses would not have had in such a short period. However, a disadvantage of having such close relations to a fast-fashion giant's supply chain, meant H11's environmental impact was mostly negative; having an almost untraceable supply chain, materials that caused great environmental destruction and transportation methods that released high levels of CO2.

As H11 started as a men's wear brand and was successful, the women's range however has struggled to emulate their success. As a small business still in the early phases of its growth, the company often has to meet Minimum Order Quantities (MOQs) with their suppliers which means ordering roughly 250-300 pieces per style/colour of a garment. This creates plentiful unsold stock (especially women's wear) at the end of the season as the company currently only has one store in Amsterdam and an online shop which aren't enough distribution and sales channels for all the stock. This adds to the negative environmental and unsustainable practices H11 faces as these unsold garments either gets sold for 1 euro to a resale company (resulting in financial loss for H11) or ends up in landfill.

To bring supply In line with the brand ethos of H11, a company that knows the importance of making ethical and responsible choices to protect the planet and people, this design research will create a roadmap to improve H11's future environmental impact by creating a sustainable capsule collection in which the consumer needs of both men and women are thoroughly explored and determined and by considering these needs through all three aspects of "the Triple Bottom Line" (TBL) referring to the equal balance of People, Planet & Profit (Elkington, 2004).



Figure 3: H11 company structure

1.1. Align H11 Impact Goals

To determine what a sustainable collection would look like for H11, it is important to ensure the entire team is on the same page about the ultimate goal of this research. This was done by including the founder; George Franzen and brand manager; Jop Schuring whom has years of experience and knowledge of sustainability and supply chains. And brainstorming what the long-term and the near-term goals of sustainability would look like and what will be viable for the scope of this research.

The H11 team was gathered, and participants were asked to write on a post it notes what the goals are for this research as well as H11 and its future sustainable goals. The ideas were placed in a ladder format from long term and hard-to-reach goals moving toward immediate, easy-to-achieve goals which will form the scope of this design research.



Figure 4: H11 Impact Goals ladder

As can be seen in Figure 4 the long-term goal for H11 is to position themselves as an eco-brand which means they want to drastically improve their environmental and ethical impact. For the immediate future the dark blue points and light blue points are most realistic and fall under the scope of this design research. The goals are as follows from most realistic (1) to implementation of this research in (7);

- 1. Create a capsule collection for SS23 Men & Women
- 2. A collection both men and women would wear
- 3. Capsule collection that fits H11 Identity
- 4. Reduce future unsold stock
- 5. Create high quality garments that will last
- 6. Use recycled & natural organic materials
- 7. Use eco-dyes and sustainable printing techniques

1.2. Design brief

This research will determine a roadmap for H11 to follow for future collections by producing H11 first conscious capsule collection in which sustainable and ethical choices are made based on the people, planet and profit matrix while ensuring target market needs are met. The end products will include a roadmap for H11, a collection of 20 items (roughly 10 ladies and 10 men styles) for the Spring Summer 2023 collection (of which at least 3 items will be produced within this research).

To create such a collection; design criterion is needed to form a scope for the collection and research. This was done together with the H11 team and keeping in mind the impact goals from Figure 4.

	Criteria	Explanation
1.	Meets needs of H11 consumer	The research will define what exactly H11 is missing from current collections and what they hope future collections will include. The consumer will be involved in the beginning of the design process so as to create a new business model that has a circular process.
2.	Comfortable	The collection needs to be comfortable for the target consumer to wear.
3.	Casual fits and silhouettes	The brand identity is casual and laidback therefore the collection needs to match these silhouettes and fit.
4.	Easy to wear and care for	The H11 consumer is on the go and therefore garments cannot be complicated to wear or care for.
5.	Durable quality	The garments must be of a good quality and last over time.
6.	Appropriate for everyday life & travel	The garments need to be able to be appropriate for everyday casual life and travelling.
7.	Fits H11 brand identity	The collection needs to fit the H11 brand image as set by the company and target consumer.
8.	Visually appealing	The collection needs to be visually appealing for the consumer.
9.	Has some trend influences	The collection needs to have some trend items or influences in the designs.
10.	Collection must have sustainable choices based on People, Planet & Profit matrix	The collection needs to incorporate commercially-feasible sustainable choices considering people, planet, and profit. This concerns materials, production of materials, location of production and ethical production (see Appendix 1 Table 7 People, Planet, Profit matrix)
11.	Entire capsule collection needs to be coherent so that styling pieces together can create full looks.	As a capsule collection the pieces need to be able to be worn together to create a "mini" wardrobe. The choice of colours, patterns and product silhouettes need to complement each other.

Table 1 Design Criteria for Sustainable Capsule Collection



Figure 5 Design Thinking model

In this design research report a sustainable capsule collection is designed for company Hang Eleven BV. In the first section the design model is defined, and preliminary literature research is explored about current solutions on the market. Section 2 defines the target consumer and asks them for input and feedback; trend analysis is also performed. Section 3 experiments with different ideas and concepts resulting in the final collection. Section 4 relates to the garment execution, and Section 5 sees how the collection will be implemented. Section 6 and 7 are reflections on the entire process followed by an afterward from the company

In the Appendix A (this document) supporting information can be found such as consumer research, quality tests and tech packs. Please note there is a separate Appendix B for interview transcriptions and survey results as well as Appendix C Collection book containing the final photoshoot and collection overview.

2.1. Literature Research

2.1.1. Sustainable Design

To define how H11 can implement a more responsible collection, existing literature needs to be analysed to determine the current market possibilities and define areas for exploration. To further define areas for exploration, Andersson of Design School Kolding, Denmark provides an online toolkit to "unravel ways to work with sustainability in product design of different kinds based on what we is called 'sustainable design cards'" (2018). These sustainable design cards were analysed and cross-referenced with the design criteria of the collection. The following cards are relevant for the criteria and will be explored further within this research.



Figure 6 Sustainable design cards relevant to design criteria

The Environmentally Friendly materials card relates to materials and production methods that are mindful and intend to reduce or cancel environmental impact. Ethical supply chain relates to initiating responsible labour practices within a product's life cycle. Mono Material is when a product consists of a single material that can be recycled or can biodegrade at the end of its lifecycle. Technical durability relates to product functional properties and optimizing the lifespan of the product; this can be achieved by performing quality tests on the collection items. User Understanding is about understanding the end consumer related to their values, economic resources and practical life. By understanding the user, a product can improve their daily life and promote a longer product lifespan. Labelling is used to communicate relevant information to the consumer about the product; this will be important to inform the user about how to care for the product as well as providing extra information about the sustainable efforts being made (Andersson, 2018).

2.1.2. Materials & Dyes

To define the sustainable design card *Environmentally friendly materials* for the capsule collection the focus of your literature research is based on the most common materials that H11 uses and what sustainable alternatives could be utilised in this research.



Figure 7 SS22 Collection Material Composition distribution

Currently H11 uses mostly conventional cotton. This is a commonly-used fibre in the industry and continues to have a harsh environmental impact. It is grown using insecticides, pesticides, herbicides, defoliants and fertilizers, and in addition requires heavy water usage in conventional farming (Benetto, Gericke, & Guiton, 2017). Conventional cotton production necessitates a large number of insecticides. Pesticides can contaminate local waterways, causing environmental damage and animal harm. Pests develop resistance to the chemicals used over time, necessitating the development of new formulas, which could result in increased pesticide use and spiralling costs for farmers. According to a recent joint Food & Agriculture Organization (FAO), United Nations Enviromental programme (UNEP), and World Health Organisation (WHO) publication, between 26 and 77-million agricultural workers worldwide suffer from acute poisonings, with at least one million requiring hospitalisation every year. (Indhu Kavi, Amarnath, & Sivasankari, 2018) Cotton is sometimes referred to as "white gold" due to its high value in some low- and middle-income countries (LMICs), such as Uzbekistan, Pakistan and China. It is known as "the thirsty crop" because a single garment necessitates thousands of litres of water. Furthermore, it is primarily grown in arid environments, contributing to the drying of sea basins (McFarlane, 2022).

H11's second most-used fibre is PE (Polyester) - polymers produced by mixing ethylene glycol and terephthalic acid. PE dominates the clothing industry and results in annual production of 52-million metric tonnes worldwide. Most PEs are not biodegradable and need special dyes to colour successfully. These are known as disperse dyes and are insoluble in water and do not readily decompose. Wastewater from textile factories is highly difficult to treat and when it enters the environment its toxicity causes serious problems to local plant and animal life. Its impact on humans are reported in much higher incidences of cancers and lung disease around production facilities. As PE is derived from petroleum - the world's biggest pollutant - it is inherently harmful. It needs large amounts of water for cooling during production. Some studies have found that synthetic fibres make up a huge share of the micro plastics that are found in our oceans, this is caused by washing polyester garments. These microfibers get eaten by small fish and plankton, allowing a concentration of toxins in these organism, which will eventually make it up the food chain to reach humans (Uren, 2021).

Viscose is also a commonly-used fibre for H11. Viscose is the third most common textile in the world and is a semi-synthetic fibre made from wood pulp. It is often used as a more durable and cheaper alternative to silk and touted as a more sustainable option to cotton or polyester. However, viscose

is often produced cheaply using a lot of energy and water, while the chemically-intensive processes have huge negative impacts on local workers, communities and the environment. The viscose wood pulp is treated with many chemicals -one of which is carbon disulphide which has been linked to higher levels of coronary heart disease, birth defects, skin conditions and cancer, not just in textile workers, but also those who live near viscose factories. Furthermore, dissolving-pulp wastes approximately 70% of the tree. Viscose is thus contributing to the rapid depletion of the world's forests in favour of pulpwood plantations, and it is determined that 30% of rayon and viscose used in fashion is sourced from endangered and ancient forests grabbing land from indigenous communities and causing human rights' abuses (Robertson, 2021).

H11 also utilises a range of fibre mixes to achieve desirable properties. Although mixing fibres can often improve fabric properties, it creates problems at the end of the product's life cycle as challenges arise in recycling and usually it offers no biodegradability (Dissanayake & Weerasinghe, 2021). Combined with this, the H11 mixes often include synthetic mixes (Cotton/PE) contributing to the release of micro plastics throughout the lifespan of the garment (Uren, 2021).

Colour is a major attraction for H11 consumers regardless of the garment. The consumer always demands bright and beautiful colours. Currently H11 mainly uses synthetic dyestuffs for textile dyeing. The industrial production and use of synthetic dyestuffs for textile dyeing has grown into a massive industry. Synthetic dyestuffs have brought a wide range of colourfastness and vibrant hues to the market. Nonetheless, their toxicity has become a source of serious environmental concern. Synthetic dyestuffs have negative effects on all forms of life. The textile-dyeing water effluent is extremely toxic due to the presence of naphthol, vat dyestuffs, nitrates, acetic acid, soaping chemicals, enzymatic substrates, chromium-based materials, heavy metals and other dyeing auxiliaries. Formaldehyde-based colour fixing auxiliaries, chlorine-based stain removers, hydrocarbon-based softeners, and other non-biodegradable dyeing auxiliaries are among the other hazardous chemicals (Khattab, Abdelrahman, & Rehan, 2020).

Looking secondly at a design card such as *Ethical supply chain*, H11 has little insight into what happens within the garment factories where the products are being produced (Correspondence, 2022). Fashion is one of the most labour-dependent industries because each piece of apparel must be handmade along a lengthy supply chain. The fashion industry has moved its labour to low-income Asian countries where it recruits mainly female factory workers. Workers' rights violations are commonplace in off-shore factories for fast-fashion garment workers in for example Bangladesh, where women face obstacles in escaping poverty due to cultural norms or strict anti-union policies. Women are denied maternity leave, inadequate sanitation is provided and sexual harassment takes place in the workplace (McCosker, 2021).

There are many sustainable alternatives available today for both fiber, textile and dyeing that can be considered for H11. For example, by exchanging Conventional cotton for Organic cotton which is found to use 62 percent less energy to grow and produce than conventional cotton, owing to fewer inputs such as fertilizer production, regular spraying, irrigation, and tractor operations. As a result, organic cotton emits up to 46% less CO2 than conventional cotton (Eyupoglu, 2018). Furthermore, a LCA (Life Cycle Assessment) conducted by Textile Exchange found that green water (rainwater and moisture stored in soil and used for plant growth) accounts for 95% of the water used in organic cotton cultivation (2014). Because the chemical pesticides used in organic cotton farming do not harm other species, it contributes to a more diverse ecosystem helping to improve soil fertility by increasing nutrient levels and preventing erosion. A healthier plant grows in better soil, which also helps absorb more CO2 from the atmosphere (Eyupoglu, 2018). Organic cotton farmers, due to keeping agricultural land chemical-free, have fertile land for much longer than land hampered by the constant use of pesticides such as in conventional farming. The advantages are obvious: by using

fewer pesticides, workers' health is improved dramatically and communities can live in relative healthy conditions with access to clean water and food (McFarlane, 2022). Replacing conventional cotton with organic cotton promotes many positive environmental and ethical improvements that could contribute to lessen H11's environmental impact.

Eliminating PE in H11 collections is currently not possible (Correspondence, 2022) but switching to recycled PE could improve certain impact areas. When recycled PE is used the virgin material is replaced with recycled plastic bottles/PET. Although this material releases just as many microfibers, rPET is a more environmentally-friendly raw material because it conserves natural resources, saves energy in the manufacturing process, and reduces greenhouse gas emissions and chemical use (Kumartasli & Avinc, 2020). However, it is not without its drawbacks as recycling PET has its limitations. As many fashion items today are made of a mix of polyester and another fibre, this means that even clothes made entirely of polyester cannot be recycled indefinitely. PET can be recycled both mechanically and chemically. Mechanical recycling entails washing, shredding, and repurposing a plastic bottle into a polyester chip, which is then used in the traditional fibre manufacturing process. Chemical recycling is the process of returning a waste plastic product to its original monomers, which are nearly identical to virgin polyester. Mechanical recycling is used to obtain the majority of rPET because it is the cheapest of the two processes and uses no chemicals other than the detergents used to clean the input materials. However, the fibre may lose its strength during this process and thus must be mixed with virgin fibre (Elven, 2018).

Eco Vera stands as a new contender to replace traditional viscose with the exact same functional and technical properties of viscose. It is produced by a process first initiated by the company Lenzing AG (now called "Lenzing") and is made using sustainable wood from controlled sources which are FSC or PEFCS certified in Europe. More than 60% of trees come from Austria or Bavaria to ensure lower emissions and almost all the chemicals used during production are recovered and reused, causing 50% less emissions and taking up half as much energy and water than traditional viscose (Robertson, 2021).

Another more sustainable alternative to viscose is Tencel; Tencel is a form of Rayon, like viscose and Modal. It is made in a similar way by dissolving wood pulp and using special drying process called spinning. Tencel lyocell is better for the environmental than traditional viscose and cotton as it requires less energy and water. Tencel is biodegradable if it remains non-material and requires less dye than cotton. Furthermore, it is pure-white when produced so does not require bleaching (Benton-Collins, 2021).

Tencel utilises sustainably-sourced wood managed by PEFC and FSC certified tree plantations. It also utilises the NMMO process in the chemical treatment phase this means; N-Methyl morpholine N-oxide solution is more easily recoverable, and a closed-loop solvent system ensures that almost no solvent is dumped into the environment. Instead, it is repeatedly recycled to create new fibres and reduce harmful waste. The solvent recovery rate for Lenzing AG's version is claimed to be 99% (Benton-Collins, 2021).

Linen is also a highly-appropriate and sustainable textile option for H11. Linen is one of the oldest fibres known to man and is a highly-efficient fabric in terms of sustainability, function and feel. Untreated Linen is fully biodegradable and can withstand high temperatures, has moisture wicking properties and is resistant to bacteria. Its strength and versatility makes it ideal for upholstery, industrial products and summer garments (Newman, 2020).

The production of linen is also much more environmentally-friendly as the flax plant that forms the fibre is extremely resilient and can grow in poor soil, uses far less water consumption than cotton. According to the European Confederation of Linen and Hemp, "across its lifecycle, a linen shirt uses

6.4 litres of water compared to 2 700 litres for a cotton shirt" (Confederation, 2021). However, linen has a low crease resistance and due to the dense fibre it can be difficult to get pure white linen without heavy bleaching. GOTS certified linen fabric ensures no harmful pesticides, chemicals and dyes are used in the process (Newman, 2020).

Hemp despite being around for decades – has only recently been considered a strong contender to replace cotton. The fabric properties are durable, Is temperature regulating, is UV protective and has a similar feel to linen. Many brands have started incorporating hemp fibre in T-shirts mixed together with cotton to produce a soft hand durable tee (GABBA, 2022). The agricultural process of hemp is gentle on the environment and requires four times less water than conventional cotton, needs less land to cultivate and can thus produce double the fibre yield per hectare than cotton and has similar agricultural costs as cotton (Schumacher, Pequito, & Pazour, 2020).

Natural dyeing has resurfaced on the agenda in search of a more sustainable alternative to synthetic dyeing. Natural dyes are vegetable-plant-based colorants that are agriculturally renewable and sustainable, whereas synthetic dyes are made from non-renewable resources (Yıldırım, Yavas, & Avinc, 2020). Natural dyes are compounds that are abundant in nature and have environmentally-friendly properties being recyclable, biodegradable or decomposable. Some natural dyes offer antimicrobial properties and can absorb UV rays in the fabrics they are applied to. Natural dyes create a range of soft shades but can also produce bold hues. They require no toxic mordants (chemicals that help the dye adhere to the fabric) such as chromium, copper and tin (Alam, Islam, & Akter, 2020) but have been found to have less colourfastness properties than synthetic dyestuffs.

A low-impact dye also offers a promising alternative for H11. Low-impact dyes are still considered synthetic dyestuffs but have to be certified as environmentally-friendly by the Oeko-Tex Standard 100 (an international certification process). Low impact dyes, in general, do not contain toxic chemicals or mordants, require less rinsing and have a high absorption rate in the fabric (up to 70%). High absorption rates and less rinse water use result in less wastewater. (Gopalakrishnan, Shabaridharan, & Saravanan, 2018)

An example of a low impact dye is fibre-reactive dyes which are low-impact synthetic dyes that bond directly with garment fibres rather than remaining a separate chemical entity within the fibre. They contain no heavy metal, require no mordants or other toxic substances and come in a wide range of wash-fast bright colours. The dye cycle is shorter due to the high absorption rates which results in less water usage and energy use as it can be applied at lower temperatures (30 degrees vs. 1 000 degrees Celsius for direct dyes). A disadvantage of fibre-reactive dyes is that a large concentration of salt, surfactants and de-foamers are needed while, at present, the process is quite expensive compared to traditional dyeing.

2.1.3. Certifications, initiatives and standards

It is clear that it is in H11's best interest to invest in product certifications that facilitate the use of environmentally-friendly materials, dyestuffs, and ethical labour. In order to further define which certification would be most appropriate for H11, a comparison is made between the feasible certifications.

The *Better Cotton Initiative* (BCI) aims to make cotton farming more sustainable. BCI does not prescribe specific methods or technologies but allows farmers/plantations to choose which way of sustainable cultivation suits them best. The certification distinguishes between small farmers and medium- and large-scale plantations. It also still allows the use of genetically modified seeds (GMOs) and pesticides, which is a significant difference from organic cotton (Keurmerkenwijzer, 2018). The

quality mark establishes the following criteria: Pesticides are used sparingly, water is used efficiently, soil health is prioritised, and the natural environment is protected (McFarlane, 2022).

The Organic 100 Content Standard (OCS) is a certification for textiles made entirely of biological materials. Textile Exchange, a global non-profit organisation for products and retailers, manages the label. OCS accepts only material from certified organic farms. Each stage of the supply chain is audited by a professional third-party certification body (Keurmerkenwijzer, 2018).

The *Global Organic Textile Standard* (GOTS) is the most comprehensive certification available. It uses the same transaction certificate system as OCS but also incorporates social and environmental considerations (Keumerkenwijzer, 2018). The GOTS product chain includes water treatment, chemical usage, and labour rights. Every 'user' of the certification is subject to the same restrictions and must adhere to the GOTS social standards (GOTS, 2017).

The *Global Recycled Standard* (GRS) dictates that one or more material types of clothing and other products must contain at least 50% recycled material. This percentage must be stated per type of material on the label. There are also requirements for working conditions, safety and the level of staff training. Water, chemicals and energy consumption must all be registered, but there are no limits on how much of each can be used. The GRS is a voluntary international standard that establishes requirements for third-party certification of recycled input and chain of custody (Keurmerkenwijzer, 2018). Additional social and environmental processing criteria, as well as chemical restrictions, are included in the GRS. The standards all have the same goal in mind: to increase the use of recycled materials (Exchange, 2021).

A comparative table was created in which each certification could be compared. The points are then coloured in red, orange or green to represent the impact changes the certifications enact with red being the worst and green the best.

	BCI Better Cotton Initiative	REGANIC TO B	THE OTS OF OTS	Global Recycled Standard
Certification body	BCI	OCS	GOTS	GRS
Ban pesticides in raw crop	No requirements are set for BCI cotton. It leaves the decision to the farmer.	GMOS, artificial fertilisers, synthetic pesticides are prohibited	GMOS, artificial fertilisers, synthetic pesticides and any harmful chemicals are prohibited	Irrelevant/ No raw crop in recycled fibre
Content needed to certify organic fibre content	Unclear	95% is needed to meet OCS 100 But OCS Blend allows between 5-95% other fibre	Must be at least 70%	Must be at least 50%
Chemical use controlled	Encouraged to minimise chemical use	Some chemical protocols in place	Potentially harmful chemicals are banned	Harmful chemicals are banned
Water use controlled	Promotes water management	Water management plan is required	Water management plan saves up to 91% of water	Use of water needs to be registered but no limits on how much can be used
Wastewater controlled	Unclear	Yes	Strict requirements for wastewater	Yes
Dyeing process controlled	No	No	Strict dyeing protocols	No
Labour rights enforced	Promotes decent work standards	None	Yes	Yes
Traceability	Not very traceable	Each stage of the supply chain is audited by professional third party	The entire supply chain must be certified to be GOTS approved	Each step is audited by third party certification body
Soil restoration	Promotes biodiversity and land restoration	None	Promotes long term soil nurturing.	Irrelevant
Haberdashery requirements	None	None	Yes	None
Portion of supply chain overseen	Fibre cultivation	Raw material – fibre cultivation	Raw material to garment	Recycled fibre to garment

Table 2 Comparison of sustainable certifications

2.1.4. Interviews

Three interviews were conducted with experts in the field of fashion supply chains and sustainable fashion to gain in-depth insight and answers into how a brand can improve their supply chain. These semi-structured interviews allowed for a flow of ideas and questions that came up throughout the conversation *(see Appendix B Expert Interview transcription).* The first interview was conducted with the CSR manager of The Sting; Renee Mulder to define what is possible within the network of The Sting companies and advice was given for possible solutions for a small brand like H11. Next Sanne Beukers from Fair Wear Foundation was interviewed to get insight into ethical labour practises in fashion supply chains. Thirdly, Jop Schuring, Brand and Supply Chain manager of H11, was interviewed to get key insights as to what was currently possible for the H11 supply chain. He also provided overall insights about sustainability within fashion brands he's worked with in the Netherlands.

During the interview Renee Mulder revealed that although The Sting is a mass-production fastfashion giant, there is little stock leftovers and this is due to them sending unsold stock to the outlet market where it is sold for 1-4 euros per piece. The experts were canvassed as to the easiest steps in their opinion for H11 to follow in building a more sustainable and ethical supply chain. Renee suggested that H11 can implement smarter design choices such as designing in advance to avoid using air shipping which would reduce their CO² impact as well as choosing better materials and putting fibre/garment certifications in place such as those awarded by OCS or GOTS. Ethically the best way to ensure the labour rights of workers are being met, is to perform external audits or visit the suppliers in person.

Sanne Beukers from the Fair Wear foundation (FWF) mentioned that FWF was working on a new system that helps brands assess risks in their supply chain and offers tools to remedy these risks. FWF works on a membership basis so that brand members pay a fee for which they in turn request supply chain audits. She says that it is still however the brand's responsibility to ensure the factories are implementing the labour laws and rights. Sanne thought the easiest step to ensure H11 improves its supply chain (in regards to ethical labour) would be to ensure workers have freedom of association and social dialogue. This can be achieved by having structures in place for their voice to be heard through organisations such as FWF or labour representative committees. FWF found that Portugal was the country with the highest quality of working labour standards.

Jop Schuring mentioned that the importance of sustainability in fashion is imperative for the future. However, implementing this is far from easy as the consumer will always be price-aggressive. He mentions that if two identical products are sold for the same price, but one is sustainable the consumer will always choose the more sustainable option, but if the product is 10-20 euros more expensive the consumer will probably choose the cheaper option. Jop felt that to be more sustainable, H11 should be more intentional when developing a collection and by focusing on what H11 does well there can be less collateral damage, i.e. the H11 brand excels at menswear, outerwear, sweats and tees and falls short on womenswear and accessories. If H11 focused on their key items purposefully it would be more sustainable and more financially lucrative. Jop also mentioned that choosing better materials and incorporating organisations and certifications such as FWF, BCI, OCS and GOTS would be a good step to take for H11.

2.1.5. Supplier sourcing

To determine whether GOTS, OCS, BCI cotton is commercially feasible for H11. Suppliers with certifications were found and contacted on the platform Four Source, an online portal that allows you to find suppliers with different production capabilities and certifications (FOURSOURCE, 2022). Suppliers were selected based on what certifications (GOTS, OCS, BCI) they had obtained and whether they would produce for H11 MOQs (Minimum order quantity's). They were contacted to get a quote for a range of typical H11 products.

Supplier:	Current H11 Supplier		Tetriberica SA		Gulmek Tekstil Konfsantic LTD		PGTEX		Cute Dress Ltd.	
Certifications		BCI, OCS, GOTS, GRS		BCI		GOTS, BCI, OCS, GRS		GOTS, OCS, BCI, GRS		
Location: Bangladesh		Portugal		Turkey		Portugal		Bangladesh		
Price Quotation	Buying price€	Retail price €	Buying price€	Retail price €	Buying price€	Retail price €	Buying price€	Retail price €	Buying price€	Retail price €
JOGGER w/embroidery	14,50	59,95	18.80	75.00	13.50	54.00	21.90	88.00	14.60	58.00
BASIC CREW w/embroidery	9,50	39,95	19.40	78.00	14.60	58.00	23.70	95.00	15.50	62.00
BASIC HOODIE w/ embroidery	14,50	59,95	21.10	85.00	15.50	62.00	28.90	115.00	16.60	66.40
BASIC HOODIE w/ 2-3 prints/embroidery	17,40	69,95	23.70	95.00	16.70	67.00	29.95	120.00	18,90	75.00
T-Shirt	6,25	25.00	9.89	39.50	5.20	39.50	11.60	47.00	6.30	25.00

Table 3 Four Source suppliers' comparison

In general, the prices are higher for sustainable options in Europe and Turkey than typical H11 products. However, Cute Dress Ltd. In Bangladesh offers prices most similar to H11's current suppliers. From this comparison and in consultation, with the H11 team, it was decided that Tetriberica SA would be most appropriate for H11 as it meets the design criteria 10 and points 1-10,12, 13 & 16 from Table 7 People, Planet, Profit matrix. The supplier was contacted and asked to send some swatches/products that could be checked and tested for quality.

2.2. Consumer needs

2.2.1. Persona

To develop a successful collection for H11, the consumer needs to be defined to understand the context, history and what the needs are. To do this a consumer profile is created to map the ecosystems of both the female and male target market of H11.

H11's target market is 20–35-year-olds who are either at the end of their studies or starting their early careers. They are of a middle to high income brackets/family and are already well travelled. They are adventurous and always seeking to push the boundaries that life has to offer. They value comfort and like to look cool but effortless; so, value easy-to-style items.

A store shadow day was conducted in which customers were observed filtering in and out of store; friendly casual conversations were also had with customers to further get an impression on the types of H11 consumers; their personality's, lifestyle, life goals, style, and spending habits. The questions asked were not structured but rather casual "get to know" chatting to inspire a persona.

Together with the inspiration from the shadow day and in consultation with the H11 founders and team a fictional persona was created based on the types of customers observed and what the H11 team define as ideal target person.



Figure 8 H11 Ladies Consumer Profile



Goals:

- Travel to at least 5 countries every year Get promoted at tech company
- Go sky diving in Africa
- Get a dog
- Partake in a triathlon
- Enjoy life to the fullest

JOOST MEERLO HANG ELEVEN MENS CONSUMER PROFILE

Joost is a 25 year old Graphic Designer living in Amsterdam in a studio apartment. He loves to organise long and adventurous trips to exotic countries (less touristy) and do crazy activities such as motorcycling, cliff jumping, surfing, 4x4ing and camping in the wild. Joost is health conscious and leads a very healthy life going to the gym 3 x a week and subscribes to a keto meal box plan. He is very friend and family oriented and visits his hometown family and friends in Haarlem at least 2 times monthly. He works hybrid office and home and spends significant times in cafes and is a bit of a coffee addict.

Name: loost Meerlo Age: 25 Years old Status: Single Occupation: Full time graphic designer at tech company Education: Studied Graphic Design in Den Haag Location: Amsterdam, Netherlands

Buying Behaviour:

- Finds one brand that he likes and buys all the items he needs from that brand. Has a Mid-High budget
 - Functionality, comfort, and quality is priority
 - Likes neutral and basic styles with fun prints and some pops of colour
 - Buys at brands like; Hallinger, Kith, Surf Locos, and Patagonia Wants to be more sustainable but doesn't know how

Figure 9 H11 Men's Consumer Profile

2.2.2. H11 Collection Perception Questionnaire

With the H11 consumer defined, a questionnaire was created to gather data and opinions about current and older collections of H11. A range of 10 men's and ladies' items spanning current and previous seasons were used. The items ranged from worst-selling to best-selling items (defined by the H11 web data) as well as brand-new items that had little to no data. A separate survey for men's and ladies' items was created. The survey asked whether the participant would purchase the item as well as what they liked and disliked about the items, colour choice and price point. There was also the use of open questions that allowed participants to share their thoughts and ideas about the items. The survey was distributed via Instagram and WhatsApp to H11 consumers and potential consumers that fit the same profile as Figure 8 & Figure 9. By collecting opinions and perception of H11 collections, it allowed the design team to see the exact reason certain items didn't sell as well as the details that consumers really value. Providing key information to make future design decisions and aids in achieving the impact goals of reducing unsold stock and creating a new sustainable business model by incorporating the end users' needs in the beginning of the design process, the likelihood of creating an item that will sell is higher, resulting in less unsold stock. A total of 64 females and 51 male responses were collected.

From the results of the surveys, it was possible to compare which items were more popular among respondents (*see Appendix B Ladies Survey Results*). The Chenille Pull was the most popular followed by the half zip, circle cut tops and contrast piping racer top.



Figure 10 Survey items that would be purchased by respondents

It also gathered key input about what the consumer valued or disliked about each product and what influences them to buy or not to buy an item. The respondents also offered design changes that would improve their opinion on the items.

In general, female respondents seemed to value fewer pale colours and would like basic colours as well as vibrant options. For hoodies they felt an oversized fit with pockets was preferable over a cropped "feminine" version. The respondents were most enthusiastic about items that were basic but also unique (such as contrast racer top and circle cut out tops). In general, most respondents found the price too high for items that looked like they could be found in Zara with a similar quality. With 40% of respondents not willing to pay retail price for items, 28 % said they would maybe pay retail price and only 32% saying would pay retail price.



The men's survey results found that the rugby polo, hometown tee, swirl tee and knitted pull was the most popular among respondents (see Appendix B Men's survey results).

Figure 11 Men's survey items that would be purchased by respondents

Again, the survey was able to provide valuable input about the details that consumers liked and disliked about items that are not available from purchase data. It also offered beneficial design changes from the consumer's point of view.

Overall, the male respondents preferred neutral colours that were not too bright but also not too boring. It was clear they value back print t-shirts and items that looked clean, simple yet stylish. Again, respondents felt many items are overpriced for a fairly new unknown brand with simplistic designs. With 39% finding the retail price too high, about 31% responded that they would maybe pay the retail price and only 30% would be willing to pay the retail price.

2.2.3. Customer Interviews

To gain further insights into the needs of the H11 consumer, three interviews were conducted with past customers of H11. Respondents were found in different ways such as; during the shadow store day from *2.2.1. Persona* by asking if they were returning customers and if they would be willing to partake in a short interview, and through acquaintances of H11 employees who had previously purchased items. This provides relevant feedback from respondents were asked a range of questions regarding which items they purchased, what drew them to the items, what they hope to see H11 do in the future and their personal stance on sustainability in fashion (see Appendix B Customer Interviews). From this data collected it will be defined which areas of H11 attracts consumers and what areas are lacking and can inform design decisions for the collection.

The interviews found that almost all participants were impressed with the quality of most of the H11 items. They were attracted to the items for their quality, colour and artworks. It was revealed that the participants felt the menswear items were of a slightly higher quality than women's items. The respondents valued soft hand feel, comfort, neutral and pops of colours, artworks, and funky prints in garments. They all want to implement more sustainable purchasing choices but feel that they do not have the knowledge of how to do this and would appreciate the brand to educate and inform them so it is clear. The participants would all be willing to pay between 35-60 euros for a sustainable T-shirt and 70-100+ euros for a sustainable hoody if they like the design. The participants hope to see more unique and "cool" designs and artworks in future from H11 and mentioned that some styles look clichéd.

2.2.4. Instagram polls to define consumer preferences

Further data was needed to define what the H11 consumer needs are and gather quantitative data to look at multiple points, such as desired materials, fit, colour, trends, price and necessary functionality of the products as requested by the consumers. By using integrated voting polls on Instagram, it meant more respondents could be reached. This is due to the ease of use and that participation in Qualtrics surveys are often deterred by the time it takes to complete.

As tees and sweat sets form an integral part of H11's identity and are also their best-selling items; it is highly beneficial to determine what type of silhouette is preferred. Artworks are also a key identity for H11 collections, so it is also useful to define what type of artwork placement is preferred. Functional aspects of the best-selling items (hoodies) are also useful to know; such as whether a hoodie without front pocket is a deal breaker when purchasing.

As the Instagram poll is available only on a story the window to gather data is 24 hours which is why data was collected on separate days for men and women and directly specified to the viewer that the poll was only aimed at that gender. As sweat sets are at the core of the H11 DNA different silhouettes of joggers, hoodies, t-shirts, and crewnecks were presented to the respondents in the form of images as well as types of artwork sizes and placements. Different pocketing options for hoodies were also presented and the respondents then voted for their preference via the poll *(see Appendix A Instagram polls.)* As well as a poll regarding how much consumers would be willing to pay for a sustainably made hoody. A rough total of 180 responses for ladies and 98 for men was collected (varies slightly per poll).

Furthermore, Instagram offers an open text box option which allowed us to ask respondents what is missing from the current fashion industry and what items they cannot live without in spring and summer (see Appendix Open Instagram input). The open text allows respondents to offer valuable information about their needs and problems that the collection could address as well as highlight items that are in high demand in summer.



Figure 11 Summer essential items ladies (left) men (right)





Figure 13 Ladies T-shirt fit preference result



Figure 14 Ladies Hoodie & Crewneck fit preference results





Figure 16 Men's jogger fit preference results



Figure 17 Men's T-shirt fit preference result









Figure 20 Men's artwork preference results



Figure 21 Accent artwork preference (men & ladies)



Figure 22 Price point consumers are willing to pay for sustainable hoody

2.3. Trend analysis

As one of the design criteria is to incorporate some trends into the H11 collection, trend research and analysis was conducted. This was done by analysing trends predicted for the spring/summer season of 2023 on WGSN; a trend forecasting online platform. As there were many trends predicted it was determined which trends fit the H11 brand identity; to produce casual clothing – cool-looking with a slight nature and travel vibe.

Three major trend concepts predicted by WGSN that fit the H11 identity from *Figure 1 & Figure 2* are "Soul Space" which is the quest for contentment, connection and inner calm combined with an appeal of faraway places, nostalgia of far-off times and romanticising rural lifestyle. "Design-Wise" is a trend driven by a growing expectation and demand for products, experiences and systems that are smarter, simpler, and more sustainable. "Full spectrum" celebrates full creativity and embraces life in full colour, full of styling and full of fun (WGSN, 2022).

More inspiration was also collected regarding colour, prints, silhouettes, fabrics and vibe. With the trend inspiration collected, four different mood boards were created combining different elements from trend patterns and befitting the H11 identity for both men and women despite them varying in vibe and style. The mood boards were then presented to target consumers via Instagram stories, and they were asked to vote for their favourite mood board.



Figure 23 Men's mood boards



Figure 24 Ladies mood boards

WGSN also predicted a shift in clothing sizes and fitting, because younger generations don't feel like they need to wear one type of clothing just because society dictates it. As more consumers get frustrated with inconsistent standards, the shift to adopt a gender-inclusive sizing system that can help foster a more inclusive standard, is growing in the industry (WGSN, 2022).

Considering that the results from *Figure 65 Consumer struggles ladies* & *Figure 66 Consumer struggles men's* feedback suggest that many consumers face frustration regarding sizing and ill-fitting garments so then by adopting a more gender-neutral and inclusive strategy for H11 could be an innovative way to reduce unsold stock. It would both allow minimum order quantities to be reached and yet have a broader market to sell the items. For example, usual quantities per style amount to 250 each for women and men: 500 total to sell which normally will result in about 35% of unsold stock (Correspondence, 2022). However, if H11 could do one unisex-style of 250 pieces it drastically decreases the likelihood of having unsold stock.

To determine whether gender-fluid styles would be something the H11 customer is interested in, a poll (one for men and one for women) was again conducted on whether they would wear unisex items and to gauge how each gender reacts to genderless styles.



Figure 25 Ladies' & men's interest in unisex sweat sets

It was very clear that almost all male and female respondents were interested in unisex sweat sets. Therefore, the preliminary idea of a unisex collection was further explored to see which other unisex garments the consumer would be interested in. This was done by creating more Instagram polls *(see Appendix Unisex instagram polls)* with images of unisex T-shirts, shirts, outerwear, jeans, shorts and linen sets. Furthermore, an open question polled how they felt about unisex clothing to understand the current perception from the consumer's point of view (see Unisex opinions).



Figure 26 Consumers that would/would not buy/wear unisex product items

This shows the H11 team which items would be most appropriate to introduce to the consumers as a unisex collection.

2.4. Material Testing

The Portuguese supplier sent samples of items they had stock fabric of. This consisted of a 100% cotton waffle and 95% Cotton 5% Polyester (GOTS certified cotton). These fabrics were a non-negotiable for H11, so they must be incorporated within the collection.

However, to determine whether they meet design criteria; *5. Durable Quality and 4. Easy to wear and care for* some performance and property tests were performed. Four tests were done: Dimensional stability after washing, wash fastness, pilling test, and abrasion resistance.

Dimensional stability test is done to determine if the fabric shrinks or lengthens after washing at the appropriate settings in a normal household machine with regular household detergent (EN-ISO 6330). The pilling resistance test is done to determine if the fabrics pill after a certain number of rubs with fabric on fabric (EN-ISO 12945-2). Colour fastness determines the fastness of the fabric on other materials when washing in a solution. It will show if the colour change of the fabric sample after washing or if it bleeds on other textiles. Multifiber (ISO 105-F10) is used to see the bleeding effect on different fibers. It is important to perform this test as H11 items should not bleed dye onto other items when the consumer washes them. Abrasion resistance (EN 12947-2) refers to the resistance of the fabric to abrasion; specimens are abraded against a standard abradant fabric under a constant contact force.

The tests can be viewed in Appendix 1.7 Quality Testing. Both fabrics passed all tests, and it can be concluded that they will meet the design criteria.

2.5 Conclusion

In this phase of the research to create a roadmap for future H11 collections, the gathering of data should focus on how to help to improve their environmental impact and create more ethical and sustainable future collections. As the new design model should have a system-thinking perspective if the company wants to meaningfully reduce its negative impacts, it was decided to use several methods to gather data to increase the credibility and validity of research findings.



Figure 27 Method of triangulation

Triangulation can help ensure that fundamental biases arising from the use of a single method, or a single observer are overcome. Triangulation is also an effort to help explore and explain complex human behaviour using a variety of methods to offer a more balanced explanation (Bhandari, 2022). This was done during this phase of the design model as it allowed us to look at the problem from many different viewpoints; by collecting literature research on the impact current H11 materials have and what existing solutions there are. consulting experts on ethical and sustainable supply chains and consult consumer needs and wishes it was able to further elaborate on those findings.

Switching to natural and recycled materials such as organic cotton, eco-vera, linen, hemp and recycled polyester can all offer H11 the first steps in creating a more conscious footstep. However, to ensure following steps in the supply chain do not counteract the positive change (ie. Toxic dyeing) more steps need to be taken. Natural dyeing can possibly offer H11 a unique technique in creating a more sustainable product if commercially feasible; however, as vibrant colour is a pre-requisite for H11 products it should be further explored in this research whether it would achieve such vibrancy.

From literature and expert interviews, it was found that third-party certifications offer the best possible way to ensure that more sustainable supply chain processes are being adhered to and can be trusted. This is important for H11 as they want to be able to inform the customer honestly without greenwashing. The most sustainable certification option appeared to be the GOTS certification as it has protocols for the entire supply chain from farm to garment which means sustainable choices are made at every step of the process.
GOTS also includes labour rights protocols which will help meet the ethically made design criteria. With this conclusion suppliers were sourced using the FOURSOURCE platform and a GOTS certified Portuguese supplier was found.

Including the customer in this phase also draws a new point of view regarding current H11 products; plenty of insightful feedback into the failures and successes of the current H11 product designs were gathered; which are useful to eliminate future ranges that lead to unsold stock. By collecting opinions and perceptions of current H11 collections, it allowed the design team to see the exact reason certain items didn't sell, as well as focus them on that what consumers really value.

This is providing key information to make future design decisions and is aiding in achieving the impact goals of reducing unsold stock and creating a new sustainable business model. From the collection perception surveys a total of 115 responses were gathered which provided targeted feedback and insights from people who fit the target group. Both men and ladies preferred neutral colours and pops of bold colours in the form of body colour, artworks, or prints. Many felt the garments to be overpriced for a young and unknown brand with simplistic designs. This could impact the extent of how sustainable the collection can be as more sustainable options are always more expensive; however, it could also mean that if the design is unique enough and of a higher quality the consumer might be swayed to spend more. This was confirmed in the past customer interviews with all three interviewees stating they would pay between 10-40 euros more for a T-shirt and 10-30 euros more than the typical H11 price point for a hoody if the design was unique and the items were sustainably made. It is important to note that due to decisions from the H11 marketing department it was unable to share the survey directly to H11 Instagram followers and instead distributed to respondents who fit the target group but may be unfamiliar with the brand. This is unfortunate as having feedback directly from brand familiar respondents could provide more useable and reliable results.

From Instagram poll and feedback research polls many useful consumer insights were gained; roughly 180 ladies and 98 men's responses were recorded per poll. Oversized fits were amongst the most popular across all product groups for both men and women. Medium-small chest artworks, sleeve artworks and back print artworks were of preference. These polls also determined that most consumers were willing to pay between 60-80 euros for a sustainably made hoody. The open text box option found both men and women struggle with ill-fitting clothing and size discrepancies. Many found the current fashion market didn't cater to different body types, produced low quality garments that shrink/break/fade in short time periods and didn't contribute to any sustainable improvements to combat the changing climate.

Male respondents mentioned their ranges lack more light and summery styles such as the linen styles that are often available for ladies. Some respondents mentioned they really like the branding on garments whereas others found clean and simple designs better. It was also suggested that respondents could benefit from capsule wardrobes to be more environmentally-conscious but lack the knowledge of how to apply such a concept.

Most popular summer essential items noted for ladies were shorts, flowy woven pants and oversized linen shirts. For men's items the essential items for summer were shorts, t-shirts, resort shirts and overshirts.



Figure 28 Mood board polls results

From the trend research and consumer feedback about mood boards; Hometown summer (ladies) and Calm summer days (men) were selected as most popular. These mood boards fit mostly with the WGSN trend direction of Soul Space. From the unisex consumer research, it was clear many respondents are very interested in almost all unisex garment options except unisex denim jeans which had majority negative response. From the consumer feedback many respondents strongly favoured the idea of unisex clothing as many female respondents find themselves shopping in the men's section already.

Furthermore both the fabrics the Portuguese supplier sent passed the quality test and ISO standards and can meet the relevant design criteria.

Section 3 Design refinement

3.1 Evolvement

3.1.1 Sustainable Colour

To further determine whether natural dyeing would produce a preferable colour shade and quality for H11 some natural dyeing experiments were pursued. The process was done by talking to natural dyeing experts, watching tutorials, and analysing literature about natural dyeing.

Step by step process:

1. Scour

Strips of White 100% Cotton H11 Tee (180GSM T-shirt material) and strips of 100% Cotton brushed sweater fabric was cut and placed into a large pot with neutral detergent and boiled for 60 minutes. This is done to remove all impurities, oils and dirt left in the fabric (Behan, 2018).



Figure 29 Scouring fabric

2. Create Dye

It was determined which plants and vegetables would be used to achieve different shades of colours. Red onion skins were chosen to achieve a rusty brown colour, avocado skins and pits were chosen for a warm pink hue, spinach for green/yellow hues, cabbage for purple, blue and pink and coffee for nude and brown tones.



Figure 30 Natural dye selection colour wheel



Figure 31 Natural dyes from left to right: Avocado peels, coffee, onion skins, cabbage, spinach

The natural material was placed in a pot on the stove with 700ml of water. As only small swatches were being dyed a medium-sized pot was adequate. The water and natural dyeing materials were simmered for 60min to extract the colour and left to cool.

3. Mordant/Ph Modifiers

To fix the dye to the fabric a mordant/fixative is required such as Alum or Soda Ash (Behan, 2018). Salt is also commonly used (Dyar, 2020). Acids and alkaline can also act as a Ph sensitive modifier that could result in different colouring variations. Therefore 3 different pots of Salt, Vinegar, and bicarbonate of soda and water mixtures were used to see what sort of colouring variations could be achieved as well as whether natural mordant such as salt would achieve an appropriate colourfastness. Utilizing 1:4 parts water the mixtures were brought to the boil and the strips were separated into the different baths and treated. The mixtures and fabrics were then left to cool.



Figure 32 Mordant & Ph modifier baths

4. Dyeing

Each dye colouring was separated into 3 smaller pots, and each boiled a vinegar, salt and baking soda treated strip of both fabrics. The strips were boiled for 30 minutes in each dyestuffs and left to absorb for another hour. The strips were then rinsed and flat dried.



Figure 33 Dyeing process with different mordant/ph modifiers



Figure 34 Dyed samples directly (wet)

The samples were then cut in half to test whether the colours would fade after washing as colourfastness is an important aspect for H11 quality. The swatches were washed at 40 degrees for 60 minutes with regular washing detergent.



Figure 35 Avocado-dyed swatches before & after washing



Figure 36 Red-onion dyed swatches before and after washing



Figure 37 Coffee-dyed swatches before and after washing



Figure 38 Spinach-dyed swatches before and after washing



Figure 39 Cabbage-dyed swatches before and after washing

The naturally-dyed samples resulted in a range of bright and bold colours that are appropriate for H11 designs. Red-onion skins, as well as the samples dyed with avocado pits and peels had very good colourfastness after washing, whereas coffee-dyed swatches resulted in a paler colour after washing as did swatches dyed in spinach and cabbage which had no colourfastness. Furthermore, baking soda and salt was found to produce the best colour hues and fixation.

From these swatches it was concluded that baking soda as a modifier and coffee and avocado as a dye seemed most promising to fit the colour and vibe of the mood boards from section 2, so a second experiment of mixing these ingredients to create a new hue was performed.



Figure 40 Coffee +Avocado dye experiment

This time the waffle fabric that was tested in section 2 was utilised to determine what colour would be achievable in the final proto. The avocado pips and peels were placed in a pot along with coffee grounds and the exact same steps as before were performed.

Again, the swatch was cut in half and washed using the same parameters as before to see its colourfastness properties.



Figure 41 Left: Unwashed Right: Washed - Avocado-Coffee Dye waffle swatch

The swatch faded slightly after washing but achieved a desirable and vintage effect that matches with the vibe of the most popular mood boards from section 2.

3.1.2 Fit: Hoody and user test

As deducted from the consumer research and trend analysis in section 2, sizing frustrates users today and they are interested in gender-neutral clothing. This interest in gender-neutral clothing could provide H11 with a more tactical approach to minimising unsold stock as both genders are offered one product.

A user-fit test was pursued to determine what fit is preferable for the consumer. A hoody was the preferred choice of this experiment as sweats form an integral part of the H11 identity and would serve as the best option to test unisex items. By having both female and male participants try on a female and male hoody from H11 and a unisex hoody from a high street brand, the users could differentiate their likes and dislikes on each fit.

User in hoody	Parameters	User comments
	Sex: Female Usual size: M/L Sample size: M	 Likes the sleeve length, quality and hood fit Body is to narrow Prefers more oversized Dropping shoulder point would be preferable
	Sex: Male Usual size: M Sample size: M	 Sleeves should be a little longer Pocket is good size Body is quite long and narrow prefers wider fit Likes quality of cuffs and ribbing and hood

Table 4 Men's hoody fit test



Sex: Female Usual size: S Sample size: M

- Likes that it fits oversized on her
- Body length is too long
- Doesn't like when there is overlapping of pocket

Table 5 Ladies' hoody fit test

User in hoody	Parameters	User comments
	Sex: Female Usual size: M/L Sample size: M	 Likes the wideness of the body but finds the sleeves could be longer Pocket and hood are a bit small and prefers to have drawcords
	Sex: Male Usual size: M Sample size: M	 Sleeves are much to short and body length is too short pocket is adequate Width of body is good Hood is small
	Sex: Female Usual size: S Sample size: M	 Likes the oversized fit it has Sleeve length is fine Pocket is good Hood feels too small

Table 6 Unisex hoody fit test

User in hoody	Parameters	User comments
	Sex: Female Usual size: M/L Sample size: M	 Oversized fit around shoulders is nice Sleeves are a weird length Body is too long but wideness is good
	Sex: Male Usual size: M Sample size: M	 Body length is much too long Rest of the fit is good Hood and drawcords is nice
	Sex: Female Usual size: S Sample size: M	 Too oversized would need an extra small size Body length is too long Sleeves are okay Hood and pocket are good Cords are bit too long

From the user test it can be concluded that the consumer wants a wider oversized fit that incorporates a dropped shoulder. Sleeves should be long enough that one can pull the ribbing over the hands and the hood should be big enough to fall easily over the head but not block the face/eyes. A bigger kangaroo pocket was also preferred, and medium length cords should be incorporated into the hood.

3.2. Mood boards

The final mood board was then created by combining all the elements from Section 2 and inspiration from the natural dying and sketches. The final collection will be called Slowdown Summer and ties into the trend of "Soul Space" where connection and contentment is sought-after, reminding us to slow down and take in the good times.

The colour card was also developed by taking inspiration from the natural dyeing earlier in the section. It forms the perfect balance between the neutral tones and bright pops of colour that the H11 consumer values highly.





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Figure 42 Final Unisex mood board and colour card

3.3. Sketches

From the ideas collected in section 2 and the colours that the natural dyeing provided, as well as inspiration drawn from the mood board sketches were created to form a creative direction for the collection.



Figure 43 Initial collection sketches

The sketches are done in a way in which gender lines are blurred and the focus is fully on the vibe and feeling of "Soul Space". Comfort, casualness and easy-to-wear are integral concepts of the design criteria and therefore the sketches reflect this by having flowing and organic oversized silhouettes.

3.4 Conclusion

Several ideas and concepts were explored in this section: From the natural dyeing experiment it was concluded that the dye derived from red-onion skins, avocado peels and coffee material, was most appropriate for H11 in terms of colour hue and colourfastness; the additional experiment of combining avocado peels and coffee grounds resulted in a pleasant hue that fits the final mood board; from the hoody fit test, it could be concluded that the consumer wants a wider oversized fit that is not too low below the waist and with sleeves over the hands and pockets and hoods that should balance out the oversized aspect.

All these considerations can be met in the final collection, except for the natural dyes. When searching for real-world production options for natural dyeing, H11 has found no commercially feasible way currently to incorporate natural dyes into its supply chain. It then concluded that the next best option would be to incorporate GOTS-certified low-impact dyeing as this will achieve the appropriate colourfastness and the bright hues, but still minimise environmental impact.

The final collection was then developed (based on the Figure 42 Final Unisex mood board and colour card) and was created taking into consideration consumer wants, needs and preferences as well as drawing inspiration about colour from the natural dyeing section for colour.



Section 4 Execution

The four garments chosen from the collection that will be produced is the Hoody, Crewneck, Shorts and Waffle Overshirt. This is because they are most feasible for H11 to produce sustainably in the future and fit their brand identity from Figure 1 & Figure 2 best.

To get the perfect unisex fit of the items, prototyping is required. Prototyping was done for the hoody and the shorts to create a spec; and then was adjusted for the crewneck. The overshirt needed no prototyping as an existing spec was used. One of H11 most successful items, the Herringbone Overshirt, is already unisex and has a spec which the supplier could use to create a first prototype with.



4.2 Choice of material per design

For the final prototypes it was decided to use the 95/5% Cotton/Polyester for the Hoody, Crewneck and shorts and the 100% Waffle fabric for the waffle overshirt. This is because they were a non-negotiable for H11, passed the quality tests and meet relevant design criteria; *5. Durable Quality and 4. Easy to wear and care for* and are readily available at the suppliers to create prototypes with. However, it should be noted for future production mono-material 100% Cotton would be preferred as this would be more in line with the Table 7 People, Planet, Profit matrix.

For the sampling of the hoody and shorts; an existing hoody and H11 leftover stock was utilised and combined to create the "perfect unisex" 1st rough prototype. The 1st rough proto of the shorts were created from old sweatpants from H11 which were cut and an

appropriate length was determined by comparing men's and ladies' short lengths, then a middle ground was found and determined as the perfect length.



Figure 45 Unisex shorts prototyping

The rough proto was again tested on both female and male users and feedback gathered on the fit and feel. Both the users approved of the length and overall fit of the shorts.



Figure 46 Unisex proto shorts user testing

For the rough prototype of the hoody the unisex hoody was utilised as well as a hoody from leftover SS22 H11 stock. The feedback from the fit test was incorporated into creating this rough prototype. The length of the body of the garment was shortened, and panels were added in the side seam to create a more oversized fitting. From the users' mentions on big pockets, it was decided to incorporate a bigger pocket.



Figure 47 Unisex Hoody spec

The rough proto helps to gauge the fit of the hoody and determining details such as arm hole openings. Workmanship is not relevant for this proto as the proto will only be used to create a fit spec; suppliers will make the second proto in which they pay more attention to workmanship. The rough proto was again tested on a male and female user and checked for more feedback. The users both found this fit great but said the sleeves could still be a bit longer.



Figure 48 First hoody rough prototype user test

4.3 Producing final prototypes

The two rough prototypes were presented to an H11 product developer together with the brief of wanting a unisex short and oversized-fit hoody. For the shorts, the product developer suggested adding a little bit more seam allowance as the loose terry cloth has a little more stretch than the proto fabric and will give a looser more comfortable fit. With his assistance the spec was created and suggestions made for the tech-pack that can be sent to supplier (see Appendix).

	HANG ELEVEN H11U SS23 SANDER SHORTS	STYLE 9843	STYLE STATUS 9843 QUOTATION				L	ARTICLE NR 3R+08
		Grading	xs	s	м	L	XL	XXL
A	Inseam	0,5	12,5	13	13,5	14	14,5	15
в	Waistband Height	0	5	5	5	5	5	5
с	Waistband Drop	0	3	3	3	3	3	3
D	Front rise incl. waistband	1	30	31	32	33	34	35
E	Back rise incl. waistband	1	40	41	42	43	44	45
F	Waist width relaxed msnd at top	2	33	35	37	39	41	43
F1	Waist width elastic at seam	2	34	36	38	40	42	44
1	Hip Position from top	0	22	22	22	22	22	22
J	Hip Width	2	47	49	51	53	55	57
к	Upper tigh width (2,5cm from crotch)	1	28	29	30	31	32	33
0	Bottom hem	0	2	2	2	2	2	2
P	Front pocket	0	3	3	3	3	3	3
Q	Front pocket opening from side seam	0,5	16,5	17	17,5	18	18,5	19
BB	Cord Length (visible)	0	12	12	12	12	12	12
	Distance between eyelets	0	4	4	4	4	4	4
	Artwork Position							
	Artwork 1 position from side seam	5	5	5	5	5	5	5
	Artwork 1 position from hem	8	8	8	8	8	8	8
	Artwork 2 position from side seam	3,5	3,5	3,5	3,5	3,5	3,5	3,5
	Artwork 2 position from under pocket	1,2	1,2	1,2	1,2	1,2	1,2	1,2

Figure 49 Unisex shorts spec

For the hoody the product developer made some suggestions related to extension of the pocket to the seam; as well as adding length to the sleeves, details such as cuff opening, ribbing length and cord length and again helped to create a spec that could be sent together with the tech-pack to the supplier (see Appendix 1.8 Tech packs).

	HANG ELEVEN H11U SS23 SANDER HOODY		STYLE 9 8843 (Sample Size	L	ARTICLE N 3R+08
									12.0
		Grading XS-L	Grading XL- XXL	xs	s	м	L.	XL	XXL
A	Total length from HSP	1	1,5	70	71	72	73	74,5	76
в	Sleeve length from lsp	0,5	0,5	54,5	55	55,5	56	56,5	57
C	Full shoulder seam to seam	1	1,5	60	61	62	63	64,5	66
D	Shoulderdrop	0	0	8	8	8	8	8	8
E	Cross front (halfway armhole)	1	1,5	52	53	54	55	56,5	58
F	Crossback(halfway armhole)	1	1,5	53	54	55	56	57,5	59
G	Chest width 2cm from armpit	2	3	56	58	60	62	65	68
н	Waist position from hsp	1	1	41	42	43	44	45	46
1	Waist width	2	3	57	59	61	63	66	69
1	Bottom width	2	3	44	46	48	50	53	56
<	Armhole straight	0,5	0,5	24,5	25	25,5	26	26,5	27
	Bicep width (2,5cm from armpit)	0,5	0,5	22,5	23	23,5	24	24,5	25
M	Elbow width (halfway sleeve)	0,5	0,5	17,5	18	18,5	19	19,5	20
N	Sleeve opening	0,5	0,5	7,5	8	8,5	9	9,5	10
C	Neck width (seam to seam)	0,5	0,5	26,5	27	27,5	28	28,5	29
P	Neckdrop front (hsp to seam)	0,5	0.5	5,5	6	6,5	7	7,5	8
Q	Neckdrop back (hsp to seam)	0	0	2	2	2	2	2	2
	Sleeve cuff	11.24		0	0	0		0	0
x	Sleeve width at cuff seam	0,5	0,5	11,5	12	12,5	13	13,5	14
1	Cuff height	0	0	6	6	6	6	6	6
	Bottom rib			0	0	0		0	0
L	Bottom width at rib seam	2	3	48	50	52	54	57	60
MM	Cuff height	0	0	6	6	6	6	6	6
	Panelling			0	0	0		0	0
00	Width of panel from armpit	0.5	0.5	4.5	5	5.5	6	6.5	7
PP	Width of panel from bottom side seam	0,5	0,5	6,5	7	7,5	8	8.5	9
	Hood			0	0	0		0	0
2	Total Hood length	1	1	52	53	54	55	56	57
AA	Hood Opening	0,5	0,5	39,5	40	40,5	41	41,5	42
BB	Hood width	0,5	0,5	27,5	28	28,5	29	29,5	30
	Kangaroo pocket	1.1		0	0	0		0	0
DD	Kangaroo pocket height	0.5	0.5	21.5	22	22.5	23	23.5	24
E	Kangaroo pocket width at top	0.5	0.5	29.5	30	30.5	31	31.5	32
F	Kangaroo pocket width at bottom	0.5	0.5	37.5	38	38.5	39	39.5	40
	Artwork position			0	0	0		0	0
	LC Artwork from HSP	0.5	0.5	16.5	17	17.5	18	18.5	19
	Sleeve Artwork from shoulder seam	0	0	4.5	4.5	4.5	4.5	4.5	4.5
	Artwork from CB	0	0	0	0	9	0	0	0

Figure 50 Unisex Hoody Spec

Together with the product developer the hoody spec was adjusted to create the crewneck spec and tech-pack that could be sent to suppliers. It was suggested that the side panels be made in ribbing to give the crewneck more structure.

	HANG ELEVEN H11U SS23 SANDER CREWNECK		STYLE 8844 0	TATUS		1	Sample Size:	1	ARTICLE N 3R+08
-	+	-				1.0	1		
		Grading XS- L	Grading XL- XXL	xs	5	м	e	XL	XXL
A	Total length from HSP	1	1,5	70	71	72	73	74,5	76
в	Sleeve length from lsp	0,5	0,5	54,5	55	55,5	56	56,5	57
c	Full shoulder seam to seam	1	1,5	60	61	62	63	64,5	66
D	Shoulderdrop	0	0	8	8	8	8	8	8
E	Cross front (halfway armhole)	1	1,5	52	53	54	55	56,5	58
F	Crossback(halfway armhole)	1	1,5	53	54	55	56	57,5	59
G	Chest width 2cm from armpit	2	3	56	58	60	62	65	68
н	Waist position from hsp	1	1	41	42	43	44	45	46
	Waist width	2	3	57	59	61	63	66	69
1	Bottom width	2	3	44	46	48	50	53	56
ĸ	Armhole straight	0,5	0,5	24,5	25	25,5	26	26,5	27
	Bicep width (2.5cm from armpit)	0,5	0,5	22.5	23	23,5	24	24.5	25
M	Elbow width (halfway sleeve)	0.5	0,5	17.5	18	18,5	19	19,5	20
N	Sleeve opening	0,5	0,5	7,5	8	8,5	9	9,5	10
0	Neck width (seam to seam)	0.5	0.5	20.5	21	21.5	22	22.5	23
P	Neckdrop front (hsp to seam)	0.5	0,5	8,5	9	9.5	10	10.5	11
Q	Neckdrop back (hsp to seam)	0	0	2	2	2	2	2	2
R	V-Notch width	0	0	6	6	6	6	6	6
s	V-Notch Length	0	0	5	5	5	5	5	5
r	Rib Height	0	o	3	3	3	3	з	3
	Panelling			0	0	0		0	0
00	Width of panel from armpit	0,5	0,5	5,5	6	6,5	7	7,5	8
PP	Width of panel from bottom side seam	0,5	0.5	8.5	9	9,5	10	10,5	11
	Sleeve cuff		100 C 100 C						
x	Sleeve width at cuff seam	0,5	0,5	11,5	12	12,5	13	13,5	14
4	Cuff height	0	0	6	6	6	6	6	6
	Bottom rib								
LL	Bottom width at rib seam	2	3	48	50	52	54	57	60
MM	Cuff height	0	0	6	6	6	6	6	6
	Artwork Position			1					
	LC Artwork from HSP	0.5	0.5	16	16.5	17	17.5	18	18.5

Figure 51 Unisex Crewneck spec

For the waffle overshirt it was decided to use the spec from a current H11 item namely the Herringbone Overshirt. This is because the Herringbone Overshirt is one of H11 best-selling items and is already marketed as unisex. Although the shirt is made of much thicker and woven fabric, the H11 product developer felt for the first prototype it would be adequate and changes could be made for further development.



Figure 52 H11 Herringbone Overshirt

SIZE SPECIFICATION

	Hang eleven H11U SS23 SANZA OVERSHIRT	STYLE 9852	STATU	S				-	Sample	Size:	М	ARTICL 3E+05	ENR	
1	A REAL PROPERTY AND A REAL	12.00		1	_	Gaint	-		0		_			-
~		DATE		DATE =		DATE -	Ψ.	XXS	XS 🛩	S 💌	M	L *	XL-	XXI-
1		SPEC	PROTO	SPEC	PROTO	SPEC	PROTO	32	34	36	38	40	42	44
			1st		2nd		PP				-		1	
A	Total length from hsp	76			1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		1.00	73	74	75	76	77	78,5	80
A2	Total length from CB	81		1			1.1	78	79	80	81	82	83,5	85
В	Sleeve length	47.5						46	46,5	47	47,5	48	48,5	49
С	Full shoulder seam to seam	61				-	1	58	59	60	61	62,5	64	65,5
D	Shoulder drop	10					1	10	10	10	10	10	10	10
E	Cross front (halfway armhole)	54						51	52	53	54	55,5	57	58,5
F	Cross back (halfway armhole)	56					i	53	54	55	56	57,5	59	60,5
G	Chestwidth 2cm below armpit	61.5					1	55,5	57.5	59,5	61,5	64,5	67.5	70.5
н	Waist position from hsp	40						37	38	39	40	41	42	43
1 -	Waist width	61.5					·	55,5	57,5	59,5	61,5	64,5	67,5	70,5
J	Bottom width	62.5						56.5	58.5	60.5	62.5	65.5	68.5	71.5
ĸ	Armhole straight	26						24.5	25	25.5	26	26.5	27	27.5
1	Bicep width (2.5cm from armpit)	24.5						23	23.5	24	24.5	25	25.5	26
M	Elbow width (21cm from armpit)	18						16.5	17	17.5	18	18.5	19	19.5
N	sleeve opening 3cm above cuff seam	15						13.5	14	14.5	15	15.5	16	16.5
0	Sleeve opening	13			-			11.5	12	12.5	13	13.5	14	14.5
ii ii	Cuff height sleeve	6		-	-			8	8	8	8	8	8	8
P	Neckdron front (hen to edge)	a		-				7.5	8	85	a	95	10	10.5
0	Neckdrop hork (hen to seem)	15						1.5	15	15	1.5	15	15	15
02	Neckwidth (seam to seam)	18		-	-		-	16.5	17	17.5	18	18.5	10	10.5
Care .	Chest pocket	10		-	-	-		10,0	11	17,5	10	10,0	13	10,0
т	Packat pac from CE	4.5			-	-		2	2.5	4	4.5	5	5.5	E
ii.	Pocket length	4.5	-					20	20	20	20	20	20	20
V	Bocketwidth	14	-	-	-			15	15	16	15	15	15	15
V VA/	Pocket wider	205	-	-	-	-	-	20	20	205	20 5	20	20	20.5
VV	Floe legath at apple	20.5	-	-	-		-	20	20	20,5	20,0	29	29	29,5
~~	Flap length at centre	0	-		-	-		0	0	0	0	0	0	0
11	Plap length at side	0	-		-			1		- 1	1	1	1	1
V	Collar Collar CP	0.5	-		-	-	-	0.5	0.5	C.F.	0.E	C.F.	C.F.	CE
<u>~</u>	Collar height at CB	0.0	-	-	-	-		0,0	0,0	0,0	0,0	0,0	0,0	0,5
Y	Collar stand at CB	3		-	-	-		3	3	3	3	3	3	3
2	Collar spread (lapel to lapel)	9.5	-					6,5	1,5	8,5	9,5	10,5	11,5	12,5
AA	Collarpoint	8.5	-	-		-	-	8,5	8,5	8,5	8,5	8,5	8,5	8,5
RR	Collarength (collarpoint to collarpoint)	48.5	-		-			44	45,5	4/	48,5	50	51,5	53
	Tokes		-		-				-					
AB	Frontyoke length at shoulderseam	28.5	-		-		-	28,5	28,5	28,5	28,5	28,5	29,5	29,5
AC	Backyoke length from hsp	24.5				-		24,5	24,5	24,5	24,5	24,5	25,5	25,5
	Other							1.000	1		-		100	
00	Forwarded shoulderseam	2	_					2	2	2	2	2	2	2
	Placket width	3,5		-		-		3,5	3,5	3,5	3,5	3,5	3,5	3,5
	Slit length	10			-		1 B	10	10	10	10	10	10	10
PP	Hem height	1						1	1	1	1	1	1	1
QQ	Bottom difference side	10.5						10.5	10.5	10.5	10.5	10.5	10.5	10.5

Figure 53 Overshirt spec

4.4 Description of elaboration

The tech-packs and specs (see Appendix 1.8 Techpacks) were sent to the supplier and the first samples were sent back a few weeks later in the available loose terry and waffle fabric. The first prototypes from suppliers are usually not colour or haberdashery accurate as it is to sample the garment to check overall fit and appearance. Luckily, the supplier was able to either make the sample in white or as close to the requested colours as possible in order to have the samples ready for this research. The crewneck colour is slightly different to the pantone which was selected; this is because the first prototype is in fabric available at the supplier. The ribbings were digitally printed to match the body and the waffle overshirt was produced in white.

To match the collection overview, the waffle overshirt was dyed with Avocado and Coffee dye; but if this is to go into production the supplier would dye this to match the pantone with low impact dye; this is because the supplier currently does not have natural dyeing within its facilities.



Figure 54 Avocado & Coffee dyeing overshirt



Figure 55 Final collection Prototypes

Section 5 Evaluation and implementation

5.1 Fit & Feedback session

To determine whether the final prototypes met the design criteria a final evaluation is needed from the consumer. This is done by performing a fit and feedback session with both a male and female user to see if the unisex product meets the criteria set for both genders.

Each user was asked to try on the items and rate the product's fit, fabric/hand feel and design out of 10 (10 being the best).



Figure 56 Final Prototype Waffle Overshirt evaluation

Waffle Overshirt Sample size: Medium

<u>Dennis</u> Usual Size: L/XL Length: 195cm



<u>Lily</u> Usual size: L Length 170cm





Figure 57 Final prototype Shorts & Hoodie evaluation

Hoody & Shorts Sample size: Large





Figure 58 Final Prototype Crewneck evaluation

Crewneck Sample size: Large



5.2. Design Criteria Evaluation

To ensure the products met criterion 1. Meets the needs of the H11 consumer the consumer was involved throughout the design process, and it was found that they value both bold and neutral colours with interesting prints or pops of colour. They prefer oversized fit for T-shirts, hoodies, crewnecks, and sweatpants. Unisex garments were very appealing to the consumer and therefore it was chosen to create unisex collection containing oversized hoody, crewneck, shorts and overshirt. The consumer also liked artwork and branding on the chest, sleeve and back therefore this was incorporated into the hoody. The crewneck was decided to only have chest branding, as some consumers emphasized, they prefer more subtle branding. The products also had to meet criteria 7. Fits H11 Brand Identity and 8. Visually Appealing and 9. Has some trend influences to do this WGSN was utilised to search for trends and concepts that fit the H11 identity and inspired the concept of "Slow Down Summer" of the collection. The fit and feedback session also determined that the consumer rated the visual appeal of the designed garments an average of 7+ out of 10.

To ensure the products met criterion 2. Comfort a fit and feedback session was conducted determining how the product fit. The feedback was very positive, and respondents rated 7+ out of 10 for fitting of all products. Criterion 3. Casual fits and silhouettes refer to the products fitting in a casual and simple way that links to the laid-back and travel enthusiastic brand identity of H11. When designing collection overview this was taken into consideration and very casual silhouettes such as oversized tees and rugby polos were designed. Criteria 6. Appropriate for everyday life & travel Similarly refers to the ability to wear the garments on a daily base and while travelling. During the fit & feedback session users mentioned they found them appropriate for casual everyday life and would consider wearing it on a long plane journey. Criterion 11. Entire capsule collection needs to be coherent so that outfits can be created with the collection referred to the ability to style different items within the collection together to create a stylish outfit. The collection was designed in a way that the colours complimented each other, and no matter which pieces were worn together it would still look cohesive; however, limitations in time meant there was no way to evaluate this from the consumers point of view.

Criteria 4. Easy to wear and care for meant the garments needed to be able to be worn with ease; therefore, they were tested in the fit and feedback session and respondents found the wearability of the garment very easy. The quality control tests also ensured that the fabrics would not shrink during washing processes, as well as colour fastness to ensure dyes would not bleed onto other fabric. Pilling and abrasion resistance was also tested to ensure the fabric would not pill or break during prolonged usage. As both fabrics passed these tests it can be concluded the items meet criterion 4. Easy to wear and care for and 5. Durable Quality.

Criterion 10. Collection must have sustainable choices based on People; Planet & Profit was the most difficult to achieve as there is so many different opportunities to be sustainable within H11's supply chain. The decision during this research was to consult with a European supplier that is GOTS certified that can produce the garments with organic cotton, low impact dyes and made in and ethical way. However, only these decisions were made for the sweats and waffle overshirt of this collection.

5.2 Implementation



CUSTOMER FOCUSED DESIGN

Incorporate customer within design process. By including the consumer in the design process Hang Eleven can avoid designing products that result in wasted resources and unsold stock. Use the power of social media to ask consumers what needs, preferences and styles they want. Have co-design focus groups where customers can provide various feedback for improvements on products. Interviews with customers and fit feedback sessions during early design process can help create products that the consumer is more likely to buy.

INTENTIONAL & CREATIVE DESIGN

Incorporate customer within design process. By including the consumer in the design process Hang Eleven can avoid designing products that result in wasted resources and unsold stock. Use the power of social media to ask consumers what needs, media to ask consumers what needs, preferences and styles they want. Have co-design focus groups where customers can provide various feedback for improvements on products. Interviews with customers and fit feedback sessions during early design process can help create product that the consumer is mark



QUALITY

Prioritise good quality products as the H11 consumer values the quality of their H11 items it is important to of their HII items it is important to continue this throughout all product groups. Having high quality items also prolongs the lifespan of that item contributing to a more sustainable product. Conduct quality control tests with current H11 products and asses where changes can be made within supply chain to minimise poor quality items.

HANG ELEVEN

ROADMAP TO INCORPORATE MORE RESPONSIBLE COLLECTIONS



MATERIAL SOURCING

Switching conventional materials such as conventional cotton, viscose, and polyester for more conscious choices, such as organic cotton, Eco-vera, Linen, Hemp and recycled synthetics will minimise their harmful impact.



DYEING & PRINTING

Conscious decisions should made be regarding production processes such as dyeing and printing to minimise the contribution to choice low-impact dyes and pigments. Explore future possibilities of natural dyeing.



Figure 59 Roadmap to incorporate more responsible collections

maltreatment due to stricter labour laws. It can also ensure CO2 is reduced during

transport.

haberdashery, and labour rights.

The Figure 59 Roadmap to incorporate more responsible collections was created as recommendation for H11 to follow for future collections. A key part of this recommendation is to incorporate the consumer and design-thinking model approach in the early phases of the design process. This will be beneficial in making future design decisions but should also refrain from impacting the creativity of the designer whose role within a company is based on having an eye for design and creative ideas. The consumer-focused design should have a balance with the designers' creative vision of future collections. Another key part is certifications which recommends GOTS as the most comprehensive and traceable certification. Limitations within this research did arise such as; exploring more suppliers and possibilities for the rest of the collection and whether they will be commercially feasible for H11. Limitation regarding profit should be further evaluated regarding whether integrating steps from the roadmap will be financially possible for H11; however, as the goal of the research was to improve the impact of the collections selecting one step per season will already greatly improve H11's impact progress.

As part of the implementation a photoshoot was conducted of the products which can be seen in Appendix C Collection Book.

Section 6 Process reflection

The whole process of developing a sustainable collection started with the idea that H11 should do better to minimise their environmental impact as its current production and supply chain is not in line with their ethos. What started as fun idea turned into a huge mountain that needed to be climbed. The thing about sustainability is that it is so broad that there are many different routes to explore - in many ways the word sustainable can already be seen as a form of greenwashing as it does not really define anything concrete. For this process it was therefore important to define what areas H11 can reasonably improve on and so the People, Planet, Profit matrix was created. This also formed a part of the design criteria. However, perhaps this was not the most relevant matrix to use for H11 as it kept the scope of this research much to broad. Had there been a discussion in the beginning to focus more in-depth on the most relevant improvements steps for H11 the findings could perhaps be more specific and detailed.

The literature pointed to many different materials that the current H11 collections could use to replace their current selection. Experts in the field advised that third-party certifications can be a credible ingredient to ensure that claims of sustainability are actually met. All of these inputs were taken into consideration by the H11 team when they decided that GOTS-certified garments were deemed the most comprehensive in regard to the People, Planet, Profit matrix. This work also informed their search for sustainable suppliers which were sourced in line with their certification. It was insightful that the FOURSOURCE platform enabled us to overview all the suppliers, their products, and their certifications.

The Design Thinking Model that was chosen as a research model was a new one for H11 which has never included the end consumer in the design process. The model taught H11 a lot - well beyond sustainability - because the consumer had such a large influence on this collection. It was most valuable to get their feedback about what they liked and didn't like about current collections and different types of fits and artworks. At almost every step in the design process the consumer was asked for feedback or evaluation. For example, the unisex idea was sparked by trend research, and it was exciting to see such a positive reaction from the consumer. In a traditional H11 setting when an idea is put forward it is either shot down for lack of commerciality in-house or it is taken on board, but this new process puts the power firmly in the consumer's hands.

The ideation phase also incorporated dyeing experiments and although the natural dyeing was just an experiment that did not result in a feasible execution, the colours from the process did inspire the colour card and mood board for the collection and was even incorporated in one of the final pieces. To get the "perfect" unisex fit, user evaluations were made in which three different hoodies were tested on users to gather user preferences. With this information prototypes could be made which was quite a challenge, due to a lack of sewing practice since the first lockdown. I was able to complete the rough prototypes and the suppliers produced the final protos. The final protos from the suppliers turned out very well and it was exciting to see the garments that were once sketches. They were again tested on users to see if they met the criteria and overall, the garments met all the criteria.

Overall, the design model offered a new perspective to H11 to incorporate the end user in the design process and will be quite relevant to future collections. The findings about sustainability is also relevant to implement future sustainable collections for H11.

Section 7 Personal reflection

I started the graduation research project process very excited about creating a sustainable collection for H11. I had been completing my 2nd internship here and was now employed as a part-time designer. I was still in a junior position and H11 knew that I still needed guidance. During my internship the workload was quite light, and I thought I would easily be able to balance both my thesis and three days of design work. For me it was very important to graduate on time but at the back of my mind it was also very important to gain experience working at a company that will potentially sponsor my visa in the future.

Early in the process the senior designer left and suddenly I had to take on her workload as well, while they searched for her replacement. I remained adaptable and professional and thought I could balance it all for a few weeks. Unfortunately, they never found someone for several months. This put excessive strain on me and my thesis and caused me great stress. To cope with this, I had a meeting with my managers and explained that I needed less responsibility and to focus more on my thesis for the coming months. They agreed to this boundary and let me go work only two days per week for two months.

Furthermore, in late April legal clashes between the original two founders of H11 occurred and after many weeks of turbulence and doubts the company split in half. I was selected along with the product developer and design team to start a completely new brand. This again caused a lot of confusion and stress in my life, but I remained calm and continued writing my thesis for H11 as intended. The process of creating has been a complicated one where I often felt like I was working blindly; but now looking at this report and the final samples I am grateful and proud of myself for following the design model and trusting the process that it will come together. I have learned that I am very adaptable and can cope under many difficult circumstances but to make sure I don't cause myself future stress I need to set SMART goals for my future.

1. Set Professional Boundaries

As someone who is quite adaptable, I often am too flexible in which I end up feeling burntout or overworked. I need to be able to set myself tasks and not take on more unless I really have very little to do. I can measure this by checking in with myself and my schedule each week to see what tasks I have and if there is time for more. This will be attainable and relevant as setting boundaries will allow me not to disappoint myself and my managers by taking on to many tasks that then do not get finished. I feel I can achieve this in my future role as a junior designer.

2. Build a network in the Netherlands

I think the next step for me as a professional is to build a large network that I can ask for help and advice in the future. It is very beneficial to have a network of industry professionals that can give guidance and provide knowledge in areas I have yet to develop. I can achieve this by attending more work meetings and learning the Dutch language. This will be attainable soon as my Dutch language level is already A2/B1 and is very relevant to my goal of staying and naturalising in the Netherlands in the future

Company Afterward

Jenna has done a very good job in turning our company inside out. She has analyzed and defined what is going on in Hang Eleven. It was a pleasure to see how she would define the 'normal' way of thing, and challenge why that is was so. Which gave us the chance to look at our procedures. And asses if this was still the way to go for Hang Eleven. She challenged the conventional way of thinking, in which we got stuck by our day-to-day routines.

In this thesis I see written down the vision we have as a company. A vision that is often discussed within the company. But in more abstract words and over different ways our work-areas. From sales to marketing to production. The vision that also changes quite regularly. But never have been written down so plainly as we see it here. Making it useful for new employees, suppliers, or any affiliated persons to comprehend what we strive. Since it is written down so straight forward, it makes it more feasible to see if we are on the right road.

Jenna has, time over time, brought the importance of sustainability on the table. She not only addressed it, but also give us a clear road map of how to implement this. For SS23 we will adjust our strategy and aim to follow some steps from her roadmap. Which is a direct result of Jenna and her efforts.

We would like to complement Jenna with a very thorough and workable thesis. We have enjoyed her work for Hang Eleven. And hope to do so for many more years. Since she is a very pleasant person to deal with. We have experienced her as a hard-working and amiable person who has brightened our office with a lot enthusiasm and happiness.

Best regards, Jop Schuring

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Appendix A Table 7 People, Planet, Profit matrix

	People		Planet		Profit
1.	The products need to be ethically made	6.	Products need to be made of natural materials and/or recycled materials	12.	Meets at typical price point of H11 or up to 30% more expensive
2.	No forced or child labour	7.	No harmful chemicals, dyes or printing techniques can be used.	13.	The products should be commercially feasible for H11 Order Quantities and budget
3.	Garment workers earn a fair wage	8.	Production processes should minimize waste and negative impacts	14.	Designs & Products need to meet the Functional, Expressive & Aesthetic needs of the H11 consumer
4.	Safe working conditions	9.	No animals should be harmed in the production of the products	15.	The Products must match Aesthetic and Brand image of H11
5.	The ethical practices must be certified through third party certifications	10	CO2 needs to be reduced in transportation	16.	The product should be of the same quality (or better) than current H11 styles
		11.	Reducing the use of plastic packaging		

1.1 Instagram polls



Figure 60 Ladies fit polls



Figure 61 Men's fit preference polls



Figure 62 Ladies(left)v and men's(middle) and accent (right) artwork preference poll

Figure 63 Ladies and men's pocket preference poll

1. Open Instagram input

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Figure 64 Consumer Ladies Summer essential items

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Figure 65 Consumer struggles ladies

Figure 66 Consumer struggles men's

2. Unisex instagram polls

Figure 67 Unisex garment option polls

Figure 68 Unisex Garment option polls part. 2

Figure 69 Sustainable price point poll

3. Unisex opinions Instagram



Figure 70 Unisex items consumer feedback/opinion

1.2 Quality Testing

Dimensional stability after washing

The dimensional stability test determines if the fabric shrinks or lengthens after washing at the appropriate settings in a normal household machine with regular household detergent (EN-ISO 6330).

Conditions of the test:

- Temperature: 40 degrees Celsius
- Time in washing machine: 1 hour
- Amount detergent: 50ml

- Drying method: dried by air, laid flat (procedure C)

The fabric samples are cut in pieces of 30x30 cm and a square is drawn on them with the size 25x25cm with a permanent marker.



Figure 71 Dimensional stability test – Left: Waffle fabric Right: Cotton/poly fabric

Table 8 Fabric samples for dimensional stability results

Fabric	Measurements before	Measurements after	Shrinkage/Lengthening %	Surface Shrinkage/Lengthening Percentage
100%	Course: 25cm	Course: 25cm	Course: 0%	+2,0%
Waffle fabric	Wales: 25cm	Wale:25,5cm	Wale: +2,0%	
95/5 % Cotton/Poly Loose Terry	Course: 25cm Wales: 25cm	Course: 25,5cm Wale:25,5cm	Course: +2,0% Wale: +2,0%	+4,0%

Pilling Resistance

The pilling resistance test is done to determine if the fabrics pill after a certain number of rubs with fabric on fabric.

For the fabric test samples, four small circles are cut out of the fabric, measured in thickness, weighed on a very precise scale, and then put on the pilling test machine. The samples are numbered. One sample of each fabric are taken out of the machine at 250 rubs, one sample at 500 rubs, one sample at 750 rubs and one sample at 1 000 rubs.



Figure 72 Samples at 1 000 revolutions compared to pilling scale

Table 9 Results Pilling test

Fabric	Sample number	Thickness	Weight	Revs	Result
100% Cotton	1.	1 <i>,</i> 49mm	4,80gr	250	4-5
Waffle fabric	2.	1,48mm	4,90gr	500	4-5
	3.	1,52mm	4,90gr	750	4-5
	4.	1,50mm	4,89gr	1000	4-5
95%/5%	1.	2,34mm	4,65gr	250	4-5
Cotton/Poly	2.	2,31mm	4,50gr	500	4-5
Loose Terry	3.	2,47mm	4,53gr	750	4-5
	4.	2,26mm	4,50gr	1000	4-5

The result is 4-5 meaning there is very little to no pilling and the fabric passes the quality standard.

Colour Fastness

This test determines the colour fastness of the fabric on other materials when washing in a solution. It will show if the colour changes of the fabric sample after washing or if it bleeds on other textiles. Multifibre (ISO 105-F10) is used to see the bleeding effect on different fibers. It is important to perform this test as H11 items should not bleed dye onto other items when the consumer washes them.

The experiment is done according to the ISO 105-C10: 2007. The Mathis Labomat machine is used to operate this test. A test sample of 4x10 cm is cut and attached to a multifiber by sewing. Beforehand the weight of the sample had to be determined to conduct this test. The synthetic detergent soap solution was done in a 5g/liters ratio. For this sample it means the ratio is 1.49g/0.298 liter. After the sample went through the program with a 40-degree program for 45 minutes it was taken out and rinsed under cold running water and later the excess water is wrung out by hand. When drying the samples, the test fabric and the multifiber cannot touch each other to prevent dye migration.



Figure 73 Change of colour scale

In the figure above, a scale is shown that is used in this test to determine the level of change in colour to the different fabric samples. Values from 5 to 0 are given, in which 5 means no difference and 0 means very noticeable difference.

Table 10 Results wash fastness

Fabric	Result
100% Cotton Waffle fabric	5
95/5% Cotton/Poly Loose Terry	5

Both fabrics had no effect on the multifibre and it can be concluded that they both have excellent wash fastness.

Abrasion Resistance

A circular sample was cut out using the small round fabric cutter labelled "Abrasion resistance". The weight and thickness of the sample was first taken before performing the test. Further on, the sample was put in the abrasion-resistance machine and its new weight and thickness was recorded every 2 000 revolutions. The test has been performed according to ISO standards (EN-ISO 12947-2). The requirement for the test is to complete 8 000 revolutions without causing defect on the sample. If damage is caused to the sample before

completing 8 000 revolutions, it will be confirmed that the fabric does not meet its ISO standards.

Table 11 Abrasion test results

Fabric	Rotations	Thickness	Weight
95/5% Cotton/Poly	0	2,08mm	0,35gr
Loose Terry	2000	2,05mm	0,35gr
	4000	1,94mm	0,33gr
	6000	1,80mm	0,36gr
	8000	1,74mm	0,31gr
100% Cotton Waffle	0	1,42mm	0,37gr
fabric	2000	1,39mm	0,36gr
	4000	1,37mm	0,30gr
	6000	1,31mm	0,31gr
	8000	1,28mm	0,33gr



Figure 74 Abrasion resistance samples after 8 000 rotations

As can be seen from the Figure 74 both test samples passed the ISO Standard Quality test.



HANG ELEVEN date: 29 -03-2022 Season: FW 22 Style: SUNSHINE FLOWER FRONT PRINT Scale: 100%, actual size. Measurements for sizes XS, S, M, L. Please scale 110% for the sizes XL, XXL, 3XL. Technique: EMBRO/IDERY Colour - SEE BELOW GENTER FRONT PRINT: hangveh HangEleven HANG ELEVEN PANTONE® A WALE HAII 40 MM 490MM hu HangEleven HNG ARTWORK PLACEMENT NO 15CM 1 HE Hang Eleven hangeleven 1 8CM 105 1999 m 0 10 350 MM HANG ELEVEN SS23 UNISEX- WEAR SS23 UNI SANDER HOODIE sign HNG LVN 國面 hu

COLOUR VARIETY
OUALITY
REFERENCE
100% GOTZ ORGANIC LOOSE
TERRY COTTON
PANTONE®
Terry COTTON

HANG ELEVEN



HANG ELEVEN

Scale: 100%, actual size, Measurements for sizes XS, S, M, L. Please scale 110% for the sizes XL, XXL, 3XL. Technique: EMBROIDERY

Season: FW 22 Style: SUNSHINE FLOWER FRONT PRIN

HA

NNG LVN

hu

Colour - SEE BELOW

Creation date: 29 -03-2022



4,5CM

8CM

pillion



40 MM



2CM

6CM

6CM



30 MM



40 MM

HANG ELEVEN	SS23 UNI SANDER H	IOODIE SS23	UNISEX- WEAR
COLOUR VARIETY		QUALITY 100% GOTZ ORGANIC LOOSE TERRY COTTON	REFERENCE

HANG ELEVEN





		77	
HANG ELEVEN	TEES	STYLE FW20	WOMENSWEAR



-	1		
PANTONE®	PANTONE®	PANTONE®	

REFERENCE QUALITY 100% GOTZ CERT ORGANIC COTTON WAFFLE

HANG ELEVEN



