WHY DO WE NEED A FASHION REVOLUTION?
#IAMSUSTAINABLEFASHION

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MASTERS OF SCIENCE - THESIS
POLITECNICODI MILANO
MARY ISABEL BUENAVENTURA KEANE

#iam sustainable fashion

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FASHION REVOLUTION

Why do we need a Fashion Revolution?

#iamsustainablefashion

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December, 2020

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Investigation Thesis / Tesi Di Ricerca
February - December 2020

Masters of Science - Design for the Fashion System
Politecnico di Milano, School of Design

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Acknowledgement:

This project has been the opportunity of a life time and I am both humbled and honored to have carried it out for my Master's of Science Degree study at Politecnico di Milano. These two years could not have been possible without the support from my family, friends, supervisors, teachers, mentors and so many people in different ways.

I would like to give my sincere gratitude to my supervisors Professor Paola Bertola and Angelica Vandi for their consideration, advice and encouragement in the completion of this study.

I also sincerely thank Marina Spadafora and Matteo Ward for providing me the chance to work in the Design Team of Fashion Revolution Italia (thank you Virgy and Chiara!), WRÅD and White Sustainable Milano (Milan Fashion Week 2020). Their commitment and passion to sustainable fashion, insights and distribution of the project offered me the chance to learn hands on with incredible people. Thank you for your valuable feedback that has made me a better designer (and human).

I would also like to acknowledge my family, specially my parents John and Joan, my sister Maggie, my brother Max and aunts Mary and Margaret for being my support system. Thank you for your endless help and love.

List of Drawings.

Abstract.

Why do we need a "Fashion Revolution"? There is increasing pressure to consider sustainability in fashion design from consumers, industry and educators. Although awareness has grown significantly in the last decade, there are various challenges for linking sustainable production and consumption. Methods to support sustainable design practices exist in some disciplines; however, only a few tools exist to support fashion design. Furthermore, there is a lack of enabling tools which support consumers to engage with diverse social actors to encourage sustainable fashion.

The purpose of this study is to investigate and develop a new model of measuring sustainability in the fashion industry that combines both qualitative and quantitative data, representing the complexity of human behavior, the emergency of the problem and possibilities for solutions. In order to answer this question, this Thesis is not limited to fashion design in itself: it is rather a crossing of different disciplinary fields, including fashion, design, sustainability, digital design and data visualization. This crossing enables a holistic and contemporary way of understanding sustainability in the fashion industry, allowing it to be the first investigation to apply the Responsible Design Methodology developed for the September Edition of Vogue Talents for Milan Fashion Week 2020.

KEYWORDS:
Sustainability, Sustainable Fashion Design, Fashion Design, Data Humanism, Digital Design, Data Visualization, Fashion Revolution, Digital Design

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To test the research question, a human centered design experiment called #iamsustainablefashion is developed combining both the areas of data humanism and the SHIFT methodology with the support and partnership of Fashion Revolution Italia. The results of the experiment identified the state of the art of sustainability in the fashion industry today, as well as current attitudes, experiences and challenges.

The key lessons from this study are that sustainable fashion design is still not a well-established area and the notion of sustainability and fashion design is shifting and evolving throughout time and context. Secondly, although sustainability should be embodied within a cultural movement, there is a requirement of an enabling system that supports more informed decisions and educates people in order to facilitate this behavior change. There is a current high demand for useful design tools in this area.

Most importantly, sustainable fashion is created and consumed by humans. This is why both the designer and the wearer are responsible for their decisions. Although there is neither a formal definition of sustainable fashion, nor a complete guide to achieving its goals, the more thoroughly the various elements of sustainability are applied, the closer we get to the commonly accepted ideals of sustainable fashion.

Additional and specific findings of the research and experiment are also discussed, along with opportunities, challenges and the future scope of the project.

Part 1:
Literature Review

1.1 Defining Sustainability

In order to start this project, it is necessary to understand the term sustainability and the number of meanings/interpretations that are attached to the word. Designers have a broad area to work with when defining "sustainable fashion" (**Figure 001**). Even though several scholars have tried to define sustainability (see, for example, McDonough and Braungart, 2002; Fletcher, 2008; Black, 2008; Thorpe, 2007; Bhamra & Lofthouse, 2007; Chapman, 2005; Fuad-Luke, 2009), the term is still ambiguous and difficult to frame. O'Riorden (1985) commented on the difficulty of defining sustainability and sustainable development, describing the process as: 'An exploration into a tangled conceptual jungle where watchful eyes lurk at every bend', whilst Spedding (1996) noted that perhaps this was the reason for: "The remarkable number of books, chapters and papers, that even use 'sustainable' or 'sustainability' in the title but do not define either" (Spedding , 1996, p151).

In terms of sustainable fashion, it is still even more difficult to clarify, even though much of the current literature describes some repeated conditions for "sustainability." The Oxford English Dictionary (2013) defines 'sustainability' as: 1. "The quality of being sustainable by argument; the capacity to be upheld or defended as valid, correct, or true"., 2. a. "The quality of being sustainable at a certain rate or level". b. "The property of being environmentally sustainable; the degree to which a process or enterprise is able to be maintained or continued while avoiding the long-term depletion of natural resources". In mainstream communication, sustainable design is usually understood in the context of sustainable development, through the lens of the World Conservation Strategy (IUCN/ UNEP/ WWF, 1980). They were the first to define sustainable

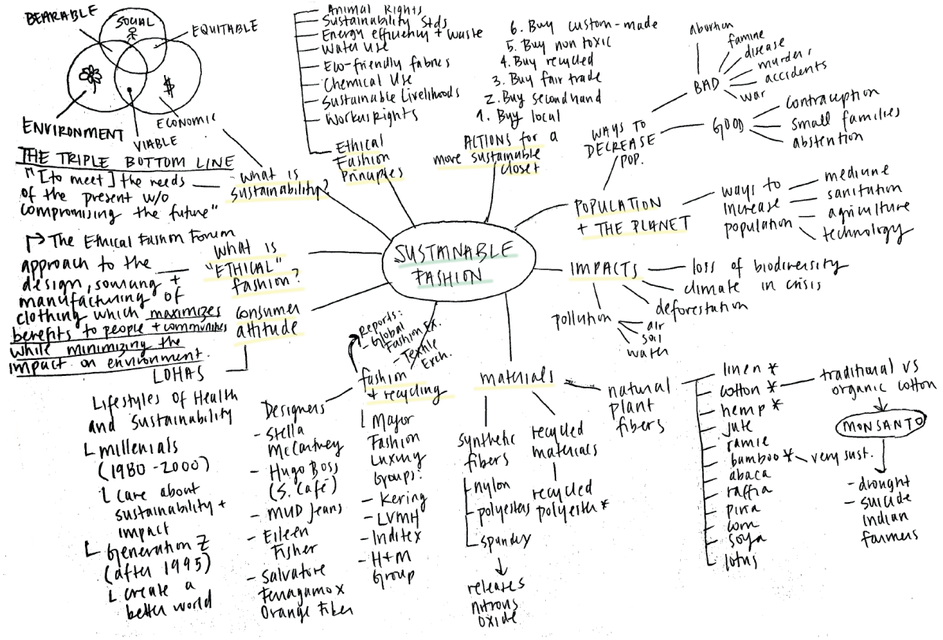


Figure 001: What is sustainable fashion? Idea mapping and brainstorming. By Mary Isabel Buenaventura.

development in the following sentence: “For development to be sustainable, it must take account of social and ecological factors, as well as economic ones; of the living and non-living resource base; and of the long-term as well as the short-term advantages and disadvantages of alternative action” (IUCN/ UNEP/ WWF, 1980).

Even though this definition is widely used, it is often critiqued for its lack of a holistic approach centered in the environmental aspects. The Brundtland report (also known as Our Common Future, sponsored by the United Nations), publication released in 1987 by the World Commission on Environment and Development that introduced the concept of sustainable development and described how it could be achieved, suggested that sustainable development had to “be resolved simultaneously and in a mutual way both integrating environmental issues and the vast and complex issue of human development and poverty” (WCED 1987; Robinson, 2004). The holistic approach of Brundtland in “Our Common Future” , (UN World Commission on Environment and Development, 1987) became another widely used definition for sustainability. It considers three basic pillars for sustainable development: environmental protection, economic growth and social equity: “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p43).

Despite its popularity, it is important to note that the Brundtland definition is not supported by professional consensus. Redclift (2000) for example, pointed out an underlining contradiction in this definition, arguing that the “needs” can change over time and through generations. For example, some societies may prioritize a clean environment and fundamental necessities of life, but others may define ‘needs’ as the development of material wealth despite the cost of an increased environmental footprint. (Redclift, 2000).

Dr. Sharachchandra Lele also identified weaknesses with the definitions of sustainable development, by breaking down the basic concepts of “sustainability” and “development”. Lele (1991) offered an alternative interpretation to sustainable development by defining ecological sustainability: “the ecological basis of human life, and sustainability as the sustenance of human life itself.” He discussed the weakness in the use of the word development, understood as “a process of growth and/or change as well as the end objective i.e. description of the ultimate human need.” Lele suggests a comprehensive sustainable development meaning as he considers the trinity of economic, social and ecological aspects of sustainability and development which culminates in his definition: (Lele, 1991; Chakrabarti, 2003). “Sustainable development is a process of simultaneously ensuring continuation of the economic, social and ecological basis of human life” (Lele, 1991).

Another influential concept of sustainability is the “Triple Bottom Line” (TBL), first used by John Elkington in 1994. In contrast to other definitions, it encouraged sustainable development and a commitment to corporate social responsibility (CSR). Elkington’s main argument was that companies should be considering people, planet and profit, balancing the demands of social, environmental and economic needs. The first component is people, and it “encourages socially and ethically responsible business including the work ethics, human rights, equity, labour, working conditions and political climate in the communities that it functions in” (Bhamra and Lofthouse, 2007). The second is planet, “considering the component of an environmentally responsible business through respecting the capacity of the planet and consideration of resource consumption.” It is considered the most important component, since human society cannot function without the environment (cited in Bhamra and Lofthouse, 2007, p15). The third component is profit, which accounts for both the economic sustainability and social benefit over long term. Incorporating all the triple bottom line (TBL) “could reflect in the evaluation of the company’s goal of sustainability through measuring the financial, social and environmental performance of the corporation” (Bhamra and Lofthouse, 2007).

In order to define “sustainable design”, it is important to noice the difficulty of accurately defining both of these words. The term “sustainable development” is more about the aspirational ideal and it is a challenge to apply these definitions to practical design practices. To appreciate the complexity of defining sustainable design, it is important to consider its evolution.

1.2 The Evolution of Sustainable Design

In order to define “sustainable development”, it is important to comprehend its evolution and to understand what is meant by other terms used in the world of sustainability, such as the difference between green, eco and sustainable design, three words often used interchangeably. Many consumers and even designers may find it ambiguous and confusing, and may not be aware that are are several differences.

Pauline Madge (1997), in her seminal discussion paper ‘Ecological Design: A New Critique’, described the semantic evolution of terms: from green, through eco to sustainable, which roughly mirrors the growth in societal understanding of the impact of their actions on the environment and society.

Magde (1997) explained that the term green design (commonly used in the late 1970’s and early 1980’s) was generally used to describe single-focus environmental impact and did not involve a systematic approach. Design began to embrace complex societal systems, and the term “eco-design” became a widely accepted term through the 80’s and 90’s. Eco-design dealt with the environmental impact of a product throughout the entire lifecycle from cradle to grave (Madge 1997, p44).

During the 90’s, an emergence of a deeper understanding of the Earth systems grew, and the definition of eco-design fell short to capture this balance. “Sustainable design” was created to differentiate a much broader agenda, introducing a global perspective to social, economic, cultural and product consumption aspects. Design moved from being a product based level

discipline towards looking at lifecycle, systems and services as well as social, psychological and cultural levels of context. Sustainable design grew from eco-design, and now goes beyond a production cycle to include people, social and ethical impact of production" (Knight, 2009).

This broader definition is interesting since it supports human well-being (such as self-esteem), a sense of identity, participation, and belonging that is not tied directly to the ecological function but would consider long term sustainability through incorporating theories and practices for design that cultivate ecological, economic, and cultural condition (Thorpe, 2007). An important characteristic of sustainable design is future-oriented product and process development aimed at being better to fit human needs, quality of life, equity and environmental harmony in parallel with innovation (Baumann et al., 2002, p413). This shows how design is a powerful and positive influence on environmental and economic issues, understanding the interconnection of relationships and a global context. Sustainable design ideas are holistic points of view, focused on the future and improve the quality of life for human wellbeing.

Since this project is focused on sustainability in the fashion industry, it is important to both define terms and identify the historical overview of these.

1.3 A Historical Perspective of Sustainable Fashion

Before the Industrial Revolution, resources were consistent with the human lifestyle of the time. In the United Kingdom, for example, John Ruskin (1819-1900), William Morris (1834-96) and other activists developed the idea of protection towards the environment and its significance for the survival of all life forms. William Morris (1834-1896) promoted the revitalization of handicrafts movement as well as considering environmental and social aspects through his work. He founded the Arts and Crafts movement, devoting his life for a future socialist world (Ibid, 2000, p15). After this period, the relationships between humans and the environment significantly changed (McLamb, 2008).

Advances in industrialization machinery in the Industrial Revolution increased, and brought new ways of mass production for shoes and clothing. During the late 19th century, ready-to-wear apparel expanded in a rapid pace and new standards of living encouraged more and more goods. This new reality had big repercussions in all areas, while companies understood the benefit of production, the marketplace became more competitive and the "norm was stimulating sales through changing styles and packaging" (Ewen, 1988).

Even though the Industrial Revolution started in the United Kingdom, the United States was the industrial model and lead this new world, associated with the biggest growth in consumerism, and also a system which many critics and academics blame for the current social and environmental crisis (Guha, 2000). Roy Sheldon and Egmont Arens epitomized the spirit of the times in their influential 'Consumer Engineering: A New Technique for Prosperity', published in 1932.

This new market-stimulated way of living generated a consumerist design system, based on overconsumption and style obsolescence, with no consciousness of environmental and social impacts. The needs of humanity and this productive market gave rise to the 1950's-60's lifestyle advertising. This development marked a change in the role of products from simple objects to social stimuli (Whiteley, 1993). The classic style and consumption of the 1950's was replaced by cheap, disposable and throwaway fashion, centered to the first babies born after World War II.

"There was a strange moment around the mid 60's when people stopped needing and need changed into wanting (...)
Designers became more important in producing 'want' products rather than 'need' products, because you have to create desire"
(Whiteley, 1993, p18).

1.4 The Anti Consumerists and Growth of Sustainable Design Thinking

Even though the consumerist model was a global movement and caused societal change, some groups of people emerged and joined through their rejection of the mainstream and through anti-consumption ideals. The fashion choices of these groups revealed a tendency to reject fashion trends and wear collar workers clothing, specifically blue jeans, t-shirts and work boots. This anti- fashion movement influenced modern fashion (Welters, 2008, p19).

As human production lead to more degradation loss, the growth of ecological thinking developed into a social movement. For example, Rachel Carson's book 'Silent Spring' (1962) played an important role in stimulating ecological thinking. During the 1960's and 70's, Non-Governmental Organizations (NGOs) started to rise, focused on driving change through government policy and regulations (such as Greenpeace and Friends of the Earth).

At the same time, Victor Papanek, a designer and educator, was a leader in the field of ethical and social responsibility of design. He criticized the designer for creating a wasteful practice and modeling a consumerist design culture. He promoted the creation of a morally responsible and holistic approach to design, adapting technology to the individual's needs and studying the experience of other countries. He highlighted the fact that "designers often placed too much effort on the aesthetic aspects of design rather than considering the real problem and human need" (Papanek, 1985). Papanek emphasized the importance of the designer's role in society, and considered design as the most powerful tool for reshaping our social and environmental culture.

Papanek's new critical attitude was not welcome at the time. His book "Design for the Real World" was rejected by several publishers during the late 1960's and 70's, and when his article was published by one of the first professional design magazines of the time, the public's response was "the garbage can designer" and "an attack on Detroit mixed with a utopian concern for minorities" (Papanek, 1985, p xvi).

Even though he was highly criticised, Papanek's vision has influenced many contemporary scholars and designers. He was slowly accepted after major environmental crisises: the first energy crisis, the OPEC Oil Embargo (1973), four unusually cold winters, two major droughts leading to severe water shortages and the global energy shortage alerting people to the dangers of relying on fossil fuels for existence (Papanek, 1985, p xv- xvi).

During this time, the fashion industry also raised awareness of the environmental impacts of fashion, specifically towards the cotton growers, who used large amounts of pesticides and fertilizers in order to achieve greater crop yields as well as the use of chemicals in textile manufacturing, which discharged chemically laden water from their mils into local rivers and streams (Welters, 2008). This public awareness lead to the "eco chic" trend of "environmentally friendly" garments dominated by natural looking colors and fibers, being a "stylized reaction" to the problem with no solution towards sustainable design. Fashion collections and magazines often portrayed sustainability as a natural and pure visual identity and traded on popular notions of environmental responsibility, notably that natural is "good" and artificial, man-made or chemical is "bad" (Fletcher, 2008, p118-119). This type of thinking is based on the misinformation of the media and the chemical industry as a whole, since some processes for making synthetic fibers are more environmentally friendly than making natural fibers and vise versa, taking into account energy and water consumption, environmental impacts, consumer user stage and disposal.

Even though a growing awareness of environmental issues in the production of fashion led to some improvement, the responsibility of designers in promoting the sustainable message was somewhat lost, with the focus being placed on the improvement of textile and coloration processes which would allow the fashion market to continue to meet the 'needs' of the market.

Throughout the 1990's, design became more intensely focused on recycled materials, and by the late 90's, "eco-design" emerged considerably involving product to 'product lifecycle approaches' detailed in works such as "A Guide to Eco-ReDesign" (1997) (Thorpe, 2010). On the other hand, critics of consumerist design emerged; noticeably, Nigel Whiteley (1993) who was questioning and examining consumerist system of design which naturally lead on to the idea of "responsible design and ethical consuming". Whiteley pointed out that the consumer was now able to purchase products which were more appealing and desirable, consequently providing commercial success. In the meantime, positive social change and broader social goals had been largely neglected (Whiteley, 1993).

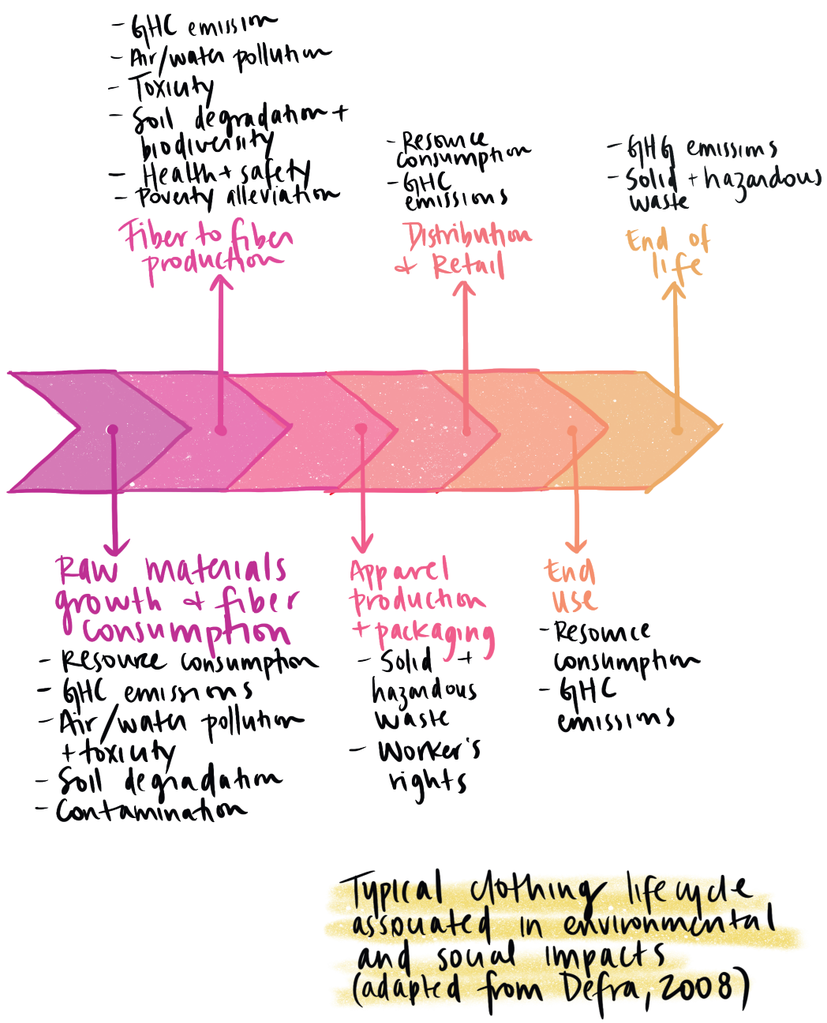


Figure 002: Typical clothing lifecycle associated in environmental and social impacts (adapted from Defra, 2008). By Mary Isabel Buenaventura.

1.5 The Challenges of Contemporary Sustainable Fashion Thinking

In the early 21st century, well designed clothes were available at a wide range of prices and people could easily afford fashionable clothing. As we witness this growth since the Industrial Revolution, fashion is still disposable and generates huge environmental and social impacts. These impacts happen at every stage of the product lifecycle, including cultivation and processing of textiles (manufacturing yarn, fabric, dyeing and finishing), clothing production, distribution, maintaining the product during use or reuse and final disposal. **Fiure 002** shows the typical clothing life cycle associated in environmental and social impacts.

Furthermore, as described in **Figure 003**, the increasingly complicated industrial chains in the clothing and textile sector make incorporating sustainability very challenging. These chains involve diverse factors and industries including waste management, agricultural, chemical fibre, textile, retail, service and apparel sectors. The industry is fragmented with various supplies from different stakeholders, dominated by small and medium enterprises (SMEs) which account for more than 80% of the market in the UK, for example. Although consideration of sustainable fashion business is growing, it is still a limited niche market share (Defra, 2011). **Figure 003** also indicates the use of various chemicals in the manufacturing and production process, the use of intensive natural resources, worker exploitation in the supply chain,

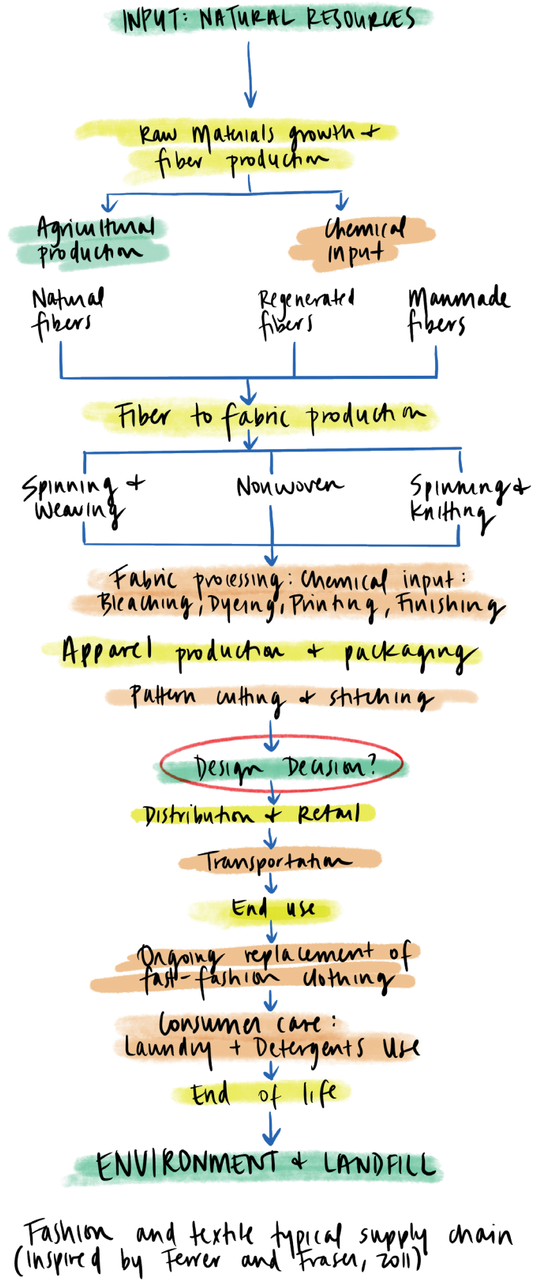


Figure 003: Fashion and textile typical supply chain (Inspired by Farrer and Fraser, 2011). By Mary Isabel Buenaventura.

to name a few. Furthermore, current clothing consumption is unsustainable. Fashion is inherently the most change intense category of consumer products (Kunz, 2005; Gam and Banning, 2011) and the current fast movement of trends is rapidly spreading in the fashion industry (Birtwistle and Moore, 2007).

The relationship between the designer and the product has also become disengaged, since the consumer's desire for new products shortens the available time for idea generation. This, with the need to reduce the financial risk of missing a key trend, limits the potential for individual creativity due to the demand of the employer. These are important challenges sustainable fashion design encounters.

The current fashion design system has led to a reduction in consumers internal capability of knowledge, making them less able to distinguish what is wrong and right with their choices of clothing. This passive consumption model often leads leads to a loss of their knowledge of how to make and reuse clothing, even to know what to wear (Farrer and Fraser, 2011).

Fashion companies have achieved economic success by reducing production costs through squeezing more output in less time and having less reflection of environmental and social cost with large volumes of production. It has been argued that this approach leads to a reduction in the emotional and symbolic value of a fashion product and to an increase in the level of consumption and resultant volumes of waste (Fletcher, 2008). The increasing consumption volume and disposing of ever-larger quantities of clothing lead to significant amounts of clothing waste that ultimately have a considerable effect on the environment and society at large.

Previous research into public understanding of sustainable clothing has been undertaken by various authors and government organizations such as Defra (2008), Jorgensen et al. (2006), Fisher et al. (2008), Saicheua et al. (2012) to name a few. Although increasing research into sustainable clothing has been

The awareness + attitude of "sustainable clothing" (Adapted from Saicheua et al., 2012)

RESEARCH:	METHOD:	KEY FINDINGS:	AUTHORS:
Public understanding towards sustainable clothing and the supply chain	Consumer research via questionnaire, Exploratory interviews with sustainability leaders/UK retailers	* Not enough interest in sustainable clothing to prioritize sustainability * Lack of communication with consumers * Lack of sustainable supply chain development model	Saicheua et. al. (2012)
The consumer end of the fashion supply chain	Focus groups, Survey, Interviews	* Lack of awareness of the need for clothing recycling * Lack of knowledge * Low quality of clothing donation * High quality clothing = great re-use/recycle potential	Morgan and Birtwistle (2009)
Perceptions towards clothes with recycled content and environmental awareness	Questionnaires	* Consumers will not pay + 10 euros for sustainable clothes * Environmental aspect should not be an added value/+ expensive * Major campaign needed to raise awareness	Nakano (2001)
Ethical fashion: Myth or future trend?	Focus group, Questionnaire (UK + Germany)	* Personal needs motivate sustainable consumption * Need more information and effective communication to allow better choices to be made	Jorgensen et. al. (2006)
Public understanding of sustainable clothing	Focus groups, Daily tasks, Deliberate workshops (UK)	* Lack of knowledge of sustainability impacts * Third party labelling + certifications across the EU are unclear + inconsistent	Fisher, et. al (2008)
Ethical clothing UK	Consumer research Trade research Desk research Statistical forecasting	* Ethical fashion is not a priority when consumers buy * Some consumers do not trust that ethical clothing is genuine	Mintel (2009)
General Environmental Survey	Online questionnaire	* Many consumers concerned about environmental issues * Concern about environmental issues the same as before the recession	Comres (2010)
Do Transparent Business Practices pay?	In-depth semi-structured interviews	* Attitude and purchase intention * Distrust of businesses' transparency * Power of price and/or quality	Bhaduri et. al. (2011)

Figure 004: The awareness and attitude of 'sustainable clothing' (Adapted from Saicheua et al., 2012). By Mary Isabel Buenaventura.

conducted over at least ten years, there is still insufficient awareness of what sustainable clothing is and the impacts of clothing production, use and disposal (Fisher, et al., 2008; Morgan and Birtwistle, 2009; Saicheua et al., 2012).

Furthermore, there is lack of consumer interest in prioritizing sustainability in clothing choices, lack of clear communication with consumers regarding the purchase of sustainable clothing and a lack of trust of retailers' claims of sustainability (Saicheua et al., 2012). Jorgensen et al. (2006) conducted focus groups in the UK and Germany in order to identify the consumers' beliefs and attitudes regarding ethical issues and consumer purchase behaviors. The research findings identified little evidence of ethical issues affecting overall consumer behavior. They found that personal needs are which motivate consumer consumption. This research suggested that consumers find it difficult to make ethical choices and that effective information and guidance are required to help them make better choices. In addition, it was found that communication between fashion companies and consumers is also considered to be very important (Jorgensen et al., 2006).

Fisher, et al. (2008) conducted extensive research regarding public understanding of sustainable clothing. Their research suggested that when people are provided with information, participants tend to reflect upon their behavior and are willing to change their habits, particularly with regarded to the energy impacts of laundry and social impacts of clothing production (2008, p8). Their research also suggested that using the appropriate media with sustainable information would be useful to consumers. **Figure 004** shows a summary of previous research regarding the awareness and attitudes towards sustainable clothing.

1.6 Sustainability in the Fashion Design Industry

The term sustainable fashion design has not yet been fully defined in literature. One of the main reasons is that both terminologies are complex components within broad discussion and have different interpretations. Furthermore, the relationship between the concepts of fashion and sustainability seem to contradict each other.

The meaning of fashion commonly implies “a way of behaving or doing something that is accepted and used by the majority of a group of people at a given point in time, regardless of the size of the group” (cited in Yurchisim and Johnson, 2010, p1). The nature of fashion is based fundamentally on the continuous process of change involving multiple facets in different ways at different times, defined as a succession of short-term trends or fads (Easey, 1995, p36). On the other hand, as discussed in the beginning of the section, the term ‘sustainable’ implies longevity and is derived from the function of ecosystems that assist themselves over periods of time (Thorpe, 2007, p7).

It has been argued that the relationship between fashion and consumption conflicts with sustainable goals. The pressure to constantly reformulate identity instigated by changing fashion trends encourages people toward ever increasing levels of material consumption (Fletcher, 2008). Thus, the current fashion system itself encourages a throw-away society and over-consumption. There are a number of academics that state fashion has both increased environmental and social problems and is a main contributor to waste.

However, on the other side, fashion is an important catalyst for cultural change. Fashion can be a powerful medium to transform culture towards sustainable design actions. Fashion is not only referred to as a function of clothing but it also creates wellbeing, expresses identity, embraces creativity and connects global communities (Forum for the Future and Levi Strauss & Co, 2010). Similarly, fashion and clothing have become critical within our way of living, assisting us physically, culturally, socially and psychologically and is intrinsically incorporated in to how we live and see ourselves within the world community (Kopplen and Vaughan, 2007).

Kate Fletcher (2008), in her book "Sustainable Fashion and Textile Design Journeys", provides a useful insight to rethink the role of fashion and cultivate new aspirations for sustainability. According to her interpretation, fashion and clothing are different concepts connected in different ways. Clothing is material production while fashion is symbolic production. Fashion is connecting with humankind and is in the heart of our culture dealing with our emotional needs, dealing with social beings as individuals and manifesting through garments. It is not just material consumption of clothing (Fletcher, 2008, p120).

Likewise, Chapman and Gant (2007) criticize the dominant notion of current sustainable design. They argue that sustainable design is predominantly rooted in the reduction of environmental and social impacts and that the conclusion of sustainable design is not to consume, but rather to have and to lead a minimalistic life. They argue that human consumption is a pivotal role in sustaining our life which is the motivational core of our production and consumption cycle and the progress and improvement of our life. The suggestion of considering sustainable design should be more focused on steering people towards alternative approaches for production and consumption, incorporating new thinking and design innovation (Chapman and Gant, 2007, p6).

Fletcher (2007) also offers a similar perspective of a new vision for sustainable fashion. She argues that "sustainable fashion has to be more than a minimal consumption drive, something more attractive not because we are flippant or fashion junkies but because of the significance of fashion to human culture. A new vision will reconnect us with our clothes, their design concepts, materials and making, this will underline the cultural importance of fashion the terms and metrics of quantity to those of quality-ultimately a more positive, forward-looking and creative place to be" (Fletcher, 2007, p121).

Indeed, sustainability in fashion design calls for fundamental changes and thinking in relation to the design process and a consideration of how design affects production and consumption.

It is widely recognized that design influences and can transform our material world linking production and consumption (Papanek, 1985; Bhamra and Lofthouse, 2007). Design can have, not only the ability to transform the sustainable consumption patterns by changing products and production, but also by influencing social norms, consumption and lifestyle aspirations. Influencing the psychology of consumption through exciting, innovative and meaningful messages can help create a new vision of how people live their lives (Richardson et al., 2005, p12). This requires more innovative design strategies that maximize and enhance the environment and quality of life while pursuing sensible economic objectives (Lewis et al., 2001, p186).

1.7 Demands for Sustainable Fashion Educational Tools

In order to tackle the environmental and social issues of sustainability, new design tools and methods should be established specifically approaching sustainability in fashion design.

Education is one of most critical elements for facilitating sustainable development and sustainable design which in a broad sense includes improving the quality of basic education, reorienting education to address sustainability, improving public awareness and providing training to many sectors of society (Singh, 2010). Furthermore, education is capable of making people able to address environmental and developmental issues including ethical awareness, values, and attitudes, skills and behavior consistent with sustainable development (UNCED, 1992). However, the traditional design approach would find it difficult to tackle the sustainable design goal. Typical design education commonly emphasizes designing the visual element of new products, highlighting the importance of aesthetics and artistic experimentation, while little consideration is given to the integration of sustainability. Indeed, sustainability is not considered an essential part in design processes or is often regarded as self-examination (Heeley, 1999, p203). We are now faced with the fact that these approaches are not sufficient to encourage sustainable fashion and that a new approach is needed.

Fletcher and Grose (2012, p157) argue that “in order for sustainability idea and practices to transform the fashion sector, a deeper and a broader communication and education movement has to develop to build ‘literacy’ in the general population around ecology and natural systems and their interconnections with human systems”.

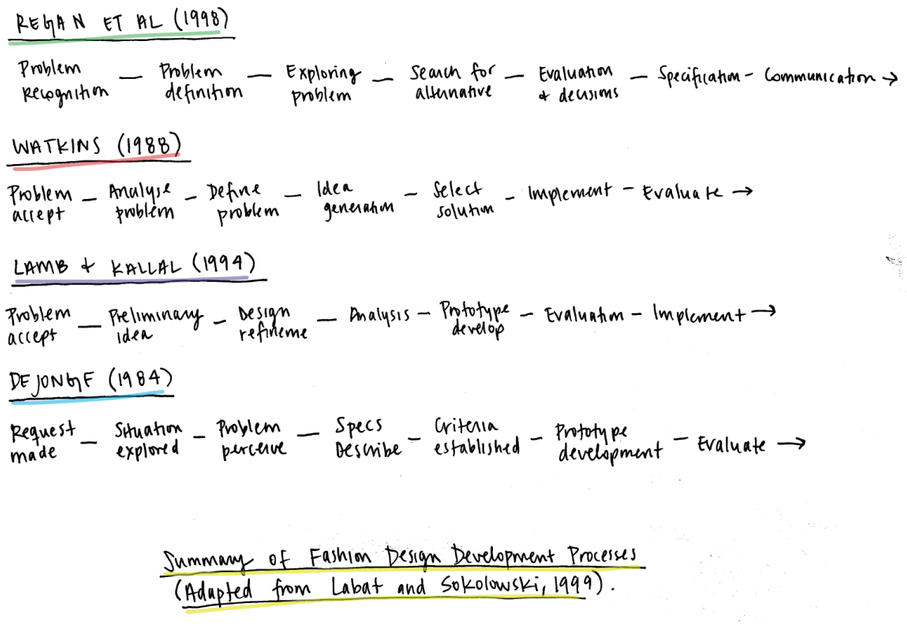


Figure 005: Summary of fashion design development processes (adapted from Labat and Sokolowski, 1999). By Mary Isabel Buenaventura.

1.8 Fashion Design Development Processes & Co-Design

Until today, it is very difficult to measure sustainability in the fashion sector, due to the background revision in this section. The fashion design development process tends to be a linear program, based on 1. Problem recognition, 2. Idea generation, 3. Implementations and 4. Evaluations. Four examples of these linear process are shown in **Figure 005**. These are the four main fashion design development process, which do not consider sustainability in any of their points, and are linear equations, that don't visualize the complexity of the industry and of human creation.

One approach to social innovation for sustainable fashion is that of codesign. The term co-design is used in this study in its broadest sense; the terms participatory design and co-design are often treated synonymously with one another. Sanders and Stappers (2008) define co-design as "any act of collective creativity that is shared by two or more people… it is applied across the whole span of a design process. Co-design refers, for some people, to the collective creativity of collaborating designers".

Sanders and Stappers (2008) made several important statements about the role of a participatory design process and the changing role of designers, researchers and users throughout the participatory experiences. According to their argument, traditional design process refers to when a user is a passive object of study, and the researcher brings knowledge from theories and develops more knowledge through observation and interviews. The designer then passively receives this knowledge in the form of a report. On the other hand, in co-design, the researcher supports the user by providing tools for ideation and design expression. "Users" can play co-creating roles throughout

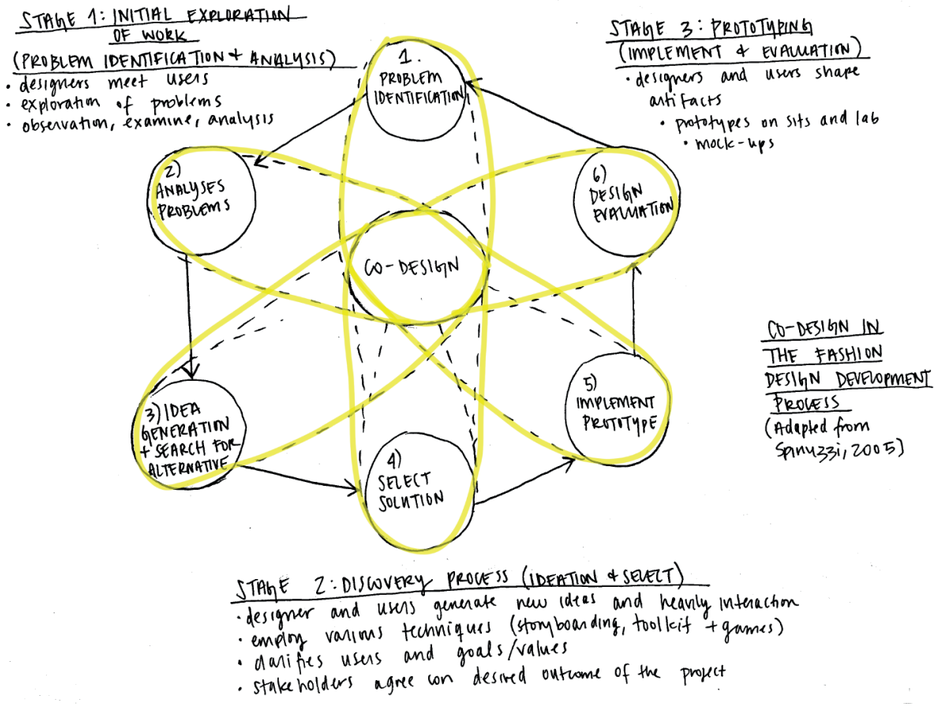


Figure 006: Co-design in the fashion design development process. By Mary Isabel Buenaventura.

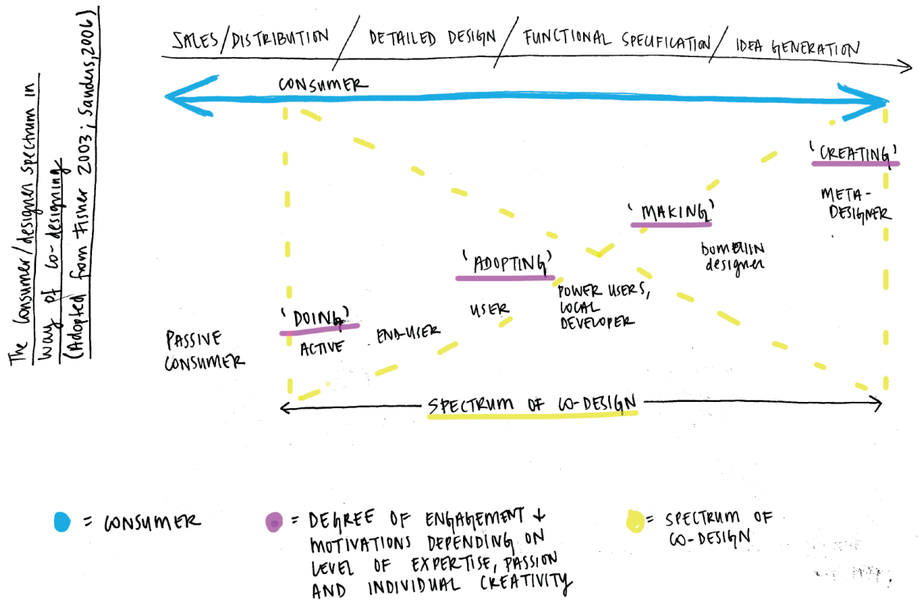


Figure 007: The consumer/designer spectrum in way of co-designing (adopted from Fisher 2003; Sanders, 2006). By Mary Isabel Buenaventura.

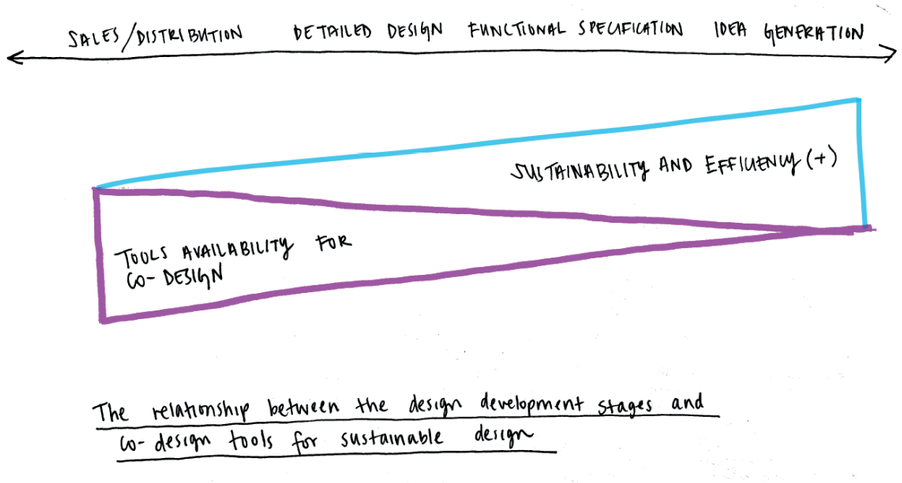


Figure 008: The relationship between the design development stages and co-design tools for sustainable design. By Mary Isabel Buenaventura.

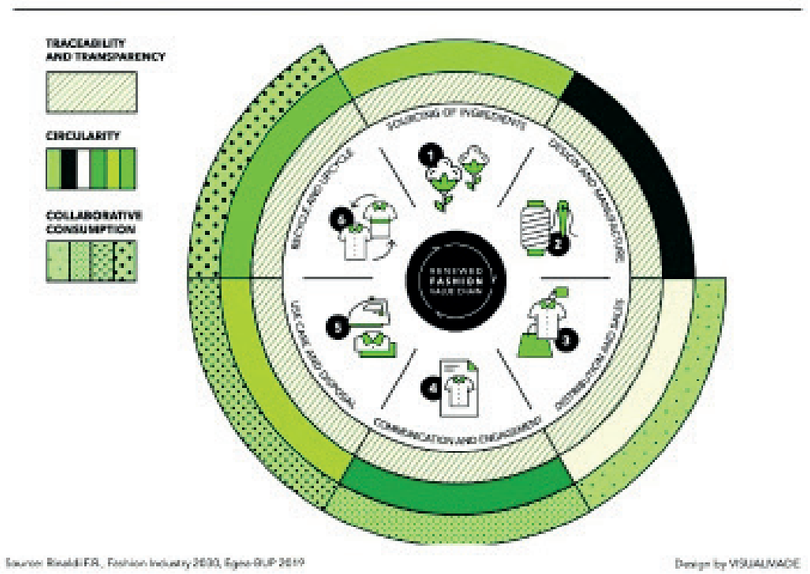


Figure 009: The Renewed Fashion Value Chain, 'Fashion Industry 2030' by Francesca Romana Rinaldi.

the design process. Therefore, the role of the designer and researcher blurs and the user becomes a critical role in the design process. **Figure 006** illustrates the co-design methodology. This rise of interest in co-design activities includes participatory design practices and consumption; Sanders and Simons (2009) have articulated three types of values in the co-design process: monetary (business, commercial and economic value), user experience (personal emotional value) and social value (improving quality of life).

Furthermore, Sanders and Stappers (2008) observed that the nature of consumers has evolved as they are no longer satisfied with a passive role in consumption but they want to be 'co-creator'. The role of the individual is not only just as a consumer or user but rather they act as a continuum of diversified characteristics: as active participants, co-designers and co-producers dependant on the degree of engagement, motivations, expertise, passion and individual creativity. Fisher (2003) proposed the classification of the various levels of considering people as consumers and designers ranging from passive consumer, to active consumer, to end-user, to user, to power users, to domain designer, all the way to meta-designer. The spectrum of consumer and designer in the co-designing process is illustrated in **Figure 007**.

Whilst there is a plethora of excellent tools for developing craft skills and facilitating distributed production, there are still very few which encourage these skills to be employed in the context of a deeper understanding of sustainability. **Figure 008** illustrates the relationship between the design development stage and co-design tools available for sustainability. Unfortunately, there are not many tools available for sustainable fashion design and there are almost absent for the specific support of sustainable fashion design practices at the idea generation phase through co-design process.

In relation to business, new models of circularity in the value chain must be designed and implemented. For example, the The Renewed Fashion

Value Chain by Francesca Romana Rinaldi (see **Figure 009**) demonstrates what companies must urgently consider in order to tackle the environmental and social problems that lie behind the value chains of the fashion industry. By questioning the future of the industry in 2030, the author states that the necessary changes can be summarised in six points: having traceable and transparent value chains; involving consumers in a circular economy to prolong product life; reading and interpreting data so that technologies can increase human creativity; granting consumer centricity, engagement and inclusivity; transitioning from suppliers of products to suppliers of services; making profits without harming the environment or society (Rinaldi, 2020). The book also references several company cases to highlight that numerous good practices are being adopted and that companies are gradually moving away from greenwashing to become truly strategic.

As discussed in previous section, there are several tools for eco and sustainable design, although few of them are specific to fashion. Rather than 'reinvent the wheel', future tools require a new emphasis on innovation and education in order to raise awareness, generate understanding and develop new solutions for sustainable fashion and textile designers and potential co-designers. Looking at sustainability can be a great opportunity for designers to rethink the design process, the designer's intention and suggest new directions.

It is also important to consider what the designer's role is in the co-design process for sustainable design is, how an individual can contribute in design processes through interactive communication and how potential stakeholders can symbiotically participate in the fashion design development process.

Until now, the only way to evaluate sustainability in fashion brands is through goals, priorities and theories. What if sustainability in a brand could encompass all of these factors, in order to give a more realistic and complex solution/answer?

1.9 Measuring Sustainability in the Fashion Sector

After understanding the term of sustainability, we must understand the specific importance it has in the fashion industry. Total consumer spending in clothing and footwear in the United States reached the threshold of $418,376 million in 2017: an increase of 30% since 2009, the first year of recession (The Business of Fashion and McKinsey & Company, 2017). What may be more significant than how much consumers spend is the increase in how many items each person buys. According to statistics by McKinsey & Company, from 2000 to 2014, the number of garments purchased each year by the average consumer increased by 60 percent. The World Resources Institute estimates that 20 garments are manufactured per person each year and consumers worldwide buy more than 80 billion items of clothing yearly (The Business of Fashion and McKinsey & Company, 2017). How much we spend on clothes, how long they last in our wardrobes, and the type of fabrics we wear reveal a complex picture that extends beyond the world of design, runways and trends to include overconsumption, waste, and pollution. But there is also an important shift underway among apparel producers, and many companies today are committed to developing new strategies and technologies that change the way we think about our clothing, as well as how they are produced and how they interact with the environment. Reading the world through the lens of clothing, and telling the stories that lie behind what we wear, can give us insight into the economic, environmental and cultural forces that affect our daily lives. **Figure 010** exemplifies this complex picture the fashion industry represents.

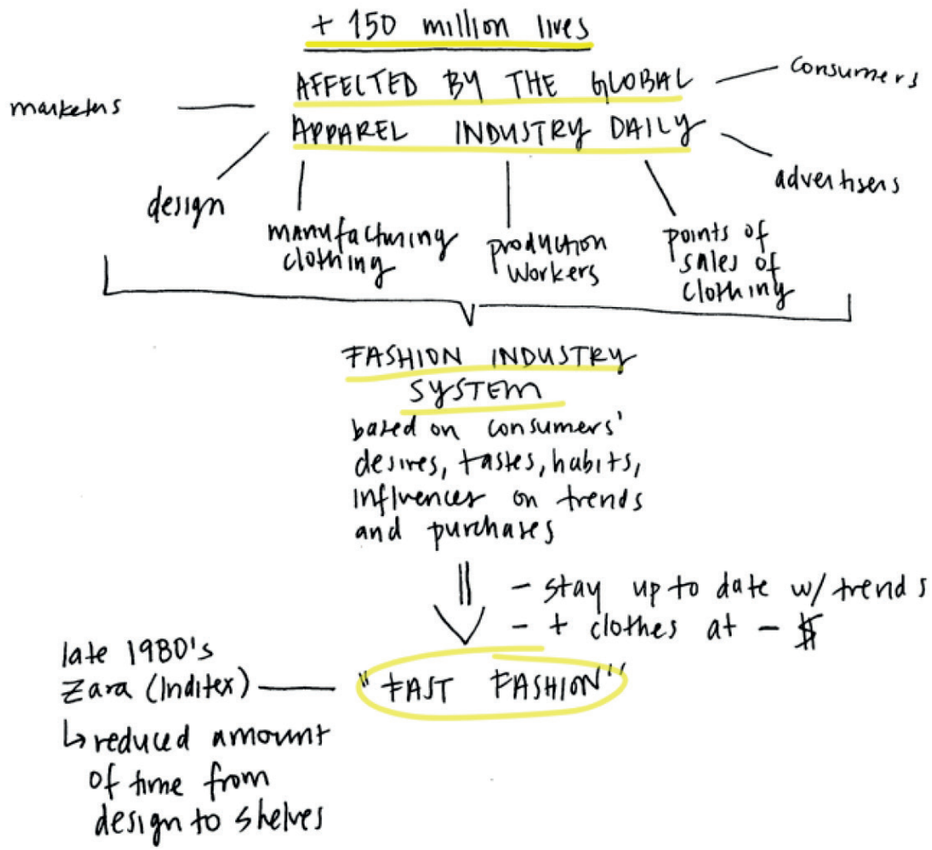


Figure 010: Complexity of the fashion design system.
By Mary Isabel Buenaventura.

The increase in the production cycle was coupled with a decrease in the cost of fast fashion clothing, which makes it more affordable for a greater number of people. Since 2000, clothing and footwear sales in the U.S. increased dramatically: 51.8% from 2000 to 2017. What is more alarming, though, is that over the last 20 years, the Consumer Price Index for all items has increased by 63.5% while the price of clothing measured by the CPI for apparel has fallen by 3.3%. What this means is that clothing that would have cost $100 in 1993 would cost $59.10 in today's dollars, according to the American Enterprise Institute (Bowman, 1997). The decrease in clothing prices has a direct correlation to the increase in how many items we buy. A report by the environmental organization, Greenpeace, using data from institutions such as McKinsey & Company, Textile World, Environment Agency and the International Trade Association, Office of Textiles and Apparel (OTEXA), concluded that:

"People in developed countries today own many more items of clothing than they can actually wear."
(The Business of Fashion and McKinsey & Company, 2019)

The World Economic Forum estimates that the fashion industry is responsible for 20% of the world's total solid waste. In fact, the Fair Fashion Center (FFC), an institute that provides new solutions to rethink the business of fashion at each stage in its supply chain, reports that every year 85% of textiles worldwide (about 21 billion tons per year) are sent to landfills and, as highlighted by the report The Pulse of Fashion Industry, only 20% of the cast- off clothes are recycled or reused (Global Fashion Agenda & The Boston Consulting Group, 2017).

In 2015, the United Nations set 17 Sustainable Development Goals (SDGs) to be achieved by the end of 2030, including affordable and clean energy,

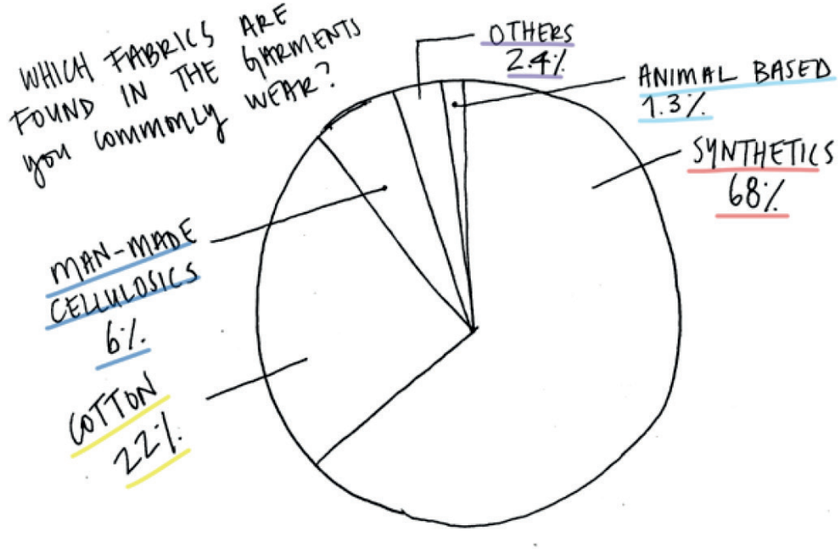


Figure 011: Which fabrics are found in the garments you commonly wear? By Mary Isabel Buenaventura.

climate action and responsible consumption and production. As shown by a theory called Quantum Redesign of Fashion, developed by the Fair Fashion Center of the Glasgow Caledonian New York College (FFC), the $2.5 trillion dollar fashion industry could have an impact on many of the 17 SDGs. This theory shows how companies within the fashion industry should address each of the SDGs by rethinking their businesses at each stage of the supply chain, especially the dramatic growth in textile production that has raised alarms among organizations like the United Nations.

"When considering the influence the fashion supply chain has on other industries - from farming and manufacturing to transportation, real estate and waste management-there are many distinct but entangled elements that must evolve in order to create an industry that is a respectful and regenerative ecosystem that supports people, planet and profits."
- Fair Fashion Center (GCU Fair Fashion Center, 2020).

Elevated textile production increases the quantity of resources needed to create fabrics and the pollution resulting from both their production and disposal. Additionally, the fabrics that dominate the textile market, found in the majority of the garments we wear, are the same ones that have a detrimental effect on the environment. **Figure 011** visualizes which fabrics are found in the garments that are mosy commonly used.

- ***Synthetic fibres:*** are the ones produced from oil and account for almost twothirds of the textiles production.
- ***Man-made cellulose fibres:*** are the ones that are not directly extracted by plant, as for example cotton, but the ones who are produced through a chemical transformation of plants-based material.
- ***Animal-based fibres:*** the ones coming from animal sources, (wool and silk).

- ***Cotton:*** is the most popular and used among the cellulose-based fibres and it is extracted directly from cotton plants.

-***Others***: in this category are usually included the so-called bast fibres (linen, hemp and jute) and other fibres produced not to make garments that we find in rugs, blankets or carpets.

In order for consumers to make choices on buying sustainable and responsible clothing, it's important to realize the production numbers hidden behind the most produced fabrics. Fibers are made in a variety of ways and the downsides generated from their production differ. By knowing which fabrics are produced the most, and their quantity, producers can estimate the overall impact of textile production and consumers can better orient their choices and pay attention to what, and how much, to buy.

For example, cotton is one of the most common fabrics used in clothing, either by itself or in combination with other varieties. According to the World Wildlife Federation (WWF), it takes more than 20,000 liters of water to produce 1kg of cotton, the equivalent of a single t-shirt and one pair of jeans (Global Fashion Agenda & The Boston Consulting Group, 2017). Another material commonly found in jeans, shirts, dresses, trousers and underwear is man-made cellulosic fibers, such as viscose, which is made from tree pulp. These cellulosic fibers contribute to deforestation and use toxic chemicals during production, chemicals that are released into the environment. Last but not least, the most used synthetic fabric, polyester, is a main player in causing pollution, not just because it's an oil-based material, but also because it is responsible for the dispersion of microfibers into the ocean, which are shed when clothing is washed.

Some companies producing textile fibers and clothes have started to develop new business models and new technologies to reinvent the way garments are produced and the materials from which they are made.

Figure 012: Display of logotypes made by each institution.

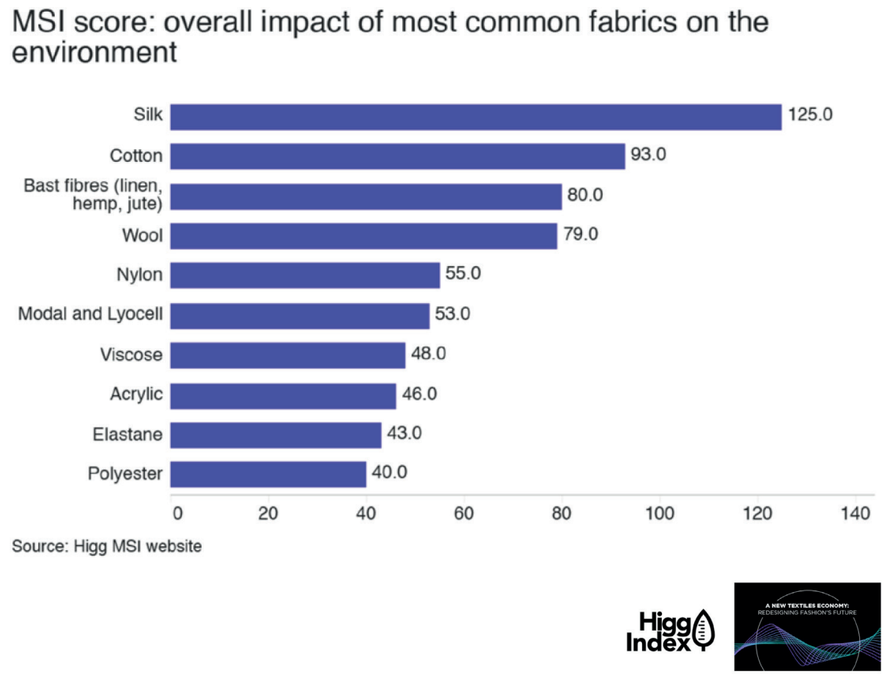


Figure 013: MSI score: overall impact of most common fabrics on the environment. By Higg MSI.

1.10 Innovation in the Fashion Design Industry

In the last few years, major institutions, such as the TextileExchange, the Sustainable Apparel Coalition, the Ellen MacArthur Foundation, the Fair Fashion Center and the United Nations (see **Figure 012**), have attempted to incentivize efforts for a more sustainable fashion industry and help companies, as well as their customers, achieve a better understanding of the downsides of apparel production. These institutions have developed tools and sponsored new initiatives to share information and increase awareness among companies of sustainable techniques and methods to encourage them to re-think the way they produce garments.

The Sustainable Apparel Coalition, an institution that promotes environmental sustainability in the apparel, footwear and textile fields, has developed a tool called the Higg Material Sustainability Index (HMSI) that assesses the sustainability level of materials used in garment manufacturing. The index assigns a score, based on production data collected from more than 200 firms that enables us to measure a product's sustainability performance and reveals a huge amount of detailed information about the impact of fabrics on the environment. In **Figure 013**, the HMSI shows that the fibers used most to make garments are also the ones that have the greatest impact on the environment (Higg MSI, 2020).

Pollution resulting from textile production involves the consumption of freshwater, a rapid depletion of other natural resources (such as oil), the rise of global warming, as well as an excess of plants and algae in the water, a

phenomenon known as eutrophication (Ellen MacArthur Foundation, 2019). By combining the data from the HMSI tool with the conclusions found in the Ellen MacArthur Foundation Report, A new textiles economy: Redesigning fashion's future, consumers can understand how much the most common fabrics they wear impact the environment.

These tools offer trustworthy data that can help consumers make sustainable choices when they shop for apparel. If people knew that cotton (as shown in **Figure 013**) has a big impact on water consumption, that silk, wool and nylon's production contributes to global warming and that fibers pollute water by increasing eutrophication, they might think twice before buying ten expensive items as opposed to a single (though maybe more expensive) item and keep it longer. Buying fewer items would decrease fiber production and improve its negative impact on the environment. Making fewer and more responsible purchases could make the difference. Instead of buying items made of fabric blends that are very difficult to recycle, we can choose to buy items made of pure fabrics that are easily recyclable once thrown away.

Cotton is a good example: it is hard to recycle when it is combined with other fibers, and requires a new kind of machinery that few companies have. Another strategy that consumers can use is to make sure their clothing comes from companies that adopt sustainable strategies to produce them. In fact, there are many brands today that provide solutions that rely on the HMSI data to empower their production. One of them is Patagonia, which uses data to carefully choose the materials for its garments and estimate their impacts on the environment. As stated by the SAC, "materials play a significant role in a product's lifetime sustainability impact. Selecting which materials to use is one of the first steps in a product's development. Making informed choices at this early stage can have dramatic benefits, especially when that product is produced at industrial scale" (Ellen MacArthur Foundation, 2019).

The huge changes that, in collaboration with universities or research centers, are experimenting with new ways to create materials, business models and technologies that are going to change the fashion industry's supply chain. In fall 2017, Textile Exchange released a report called "Preferred Fiber & Materials Market" where it collected compelling stories of companies in the fashion industry that have been deemed remarkable innovators (The Textile Exchange, 2017). The report presents six different areas: strategy, synthetics, plant-based, man-made cellulosic, animal fibers, and leather alternatives. It shows the range of initiatives and alternatives being developed by the industry and offers options for consumers who want to buy brands that are more sustainable and responsible.

One of the most incredible examples of innovation featured in the TextileExchange report is represented by a dress that was part of the exhibition, "Items: Is Fashion Modern?" at the Museum of Modern Art in New York between October 2017 and January 2018. The dress, designed by Stella McCartney, was made of silk entirely created in a lab. The company that developed this fabric, Bolt Thread, has collaborated with Fiorenzo Omenetto, a Professor of Engineering and Biomedical Engineering at Tufts University, who was the first to pioneer and develop the study of how to replicate silk's proteins for creating silk entirely in a lab without using spiders. His research is focused on multidisciplinary studies intersecting technology, biologically inspired materials and the natural sciences.

Another feature in the Preferred Fiber & Materials Market report concerns new ways to produce leather. Vegea makes leather by using vinaccia, the byproduct of crushed grapes, and the company Modern Meadow found a new way to produce animal-friendly leather by growing strains of yeast engineered to produce collagen (the protein found in skin) that keeps the traditional qualities of leather while adding new functionalities, such as flexibility.

"Producing fibers in the lab will completely change the supply chain behind clothes and textile production, along with the manufacturing skills and tools needed to make them which will affect the workers who make them as well as consumers... The gap between technology and humans is going to become thinner and thinner, and technology will help us develop new signs of expression of the way that we are as human beings."

- Fiorenzo Omenetto, Biomedical engineer,

Ultrafast Nonlinear Optics and Biophotonics at Tufts University

(The Textile Exchange, 2017)

Yet, beyond the innovations being developed in order to solve environmental problems caused by the fashion industry and make it more sustainable, the research coming from both the scientific and technological world will also affect the relationship between people and clothes.

Researchers are not only replicating what nature does (as they already did with silk), but also increasing and improving the functionalities of the materials created in the labs. This type of study will reinvent the way we conceive and use garments. For example, in the future our clothes might be able to react to our human emotions or activities by changing color in response to sweat, or other inputs coming from our bodies such as electricity.

Consumers will have more choices available to purchase sustainable garments, and if consumers respond, hopefully the apparel industry will keep producing clothing made from sustainable manufacturing processes. Beyond our clothing labels is an important story about the garments we wear and how they impact our environment. But there is also another hopeful story of how business, scientific and technology experts are working together to make our garments more sustainable for the future health of Mother Earth.

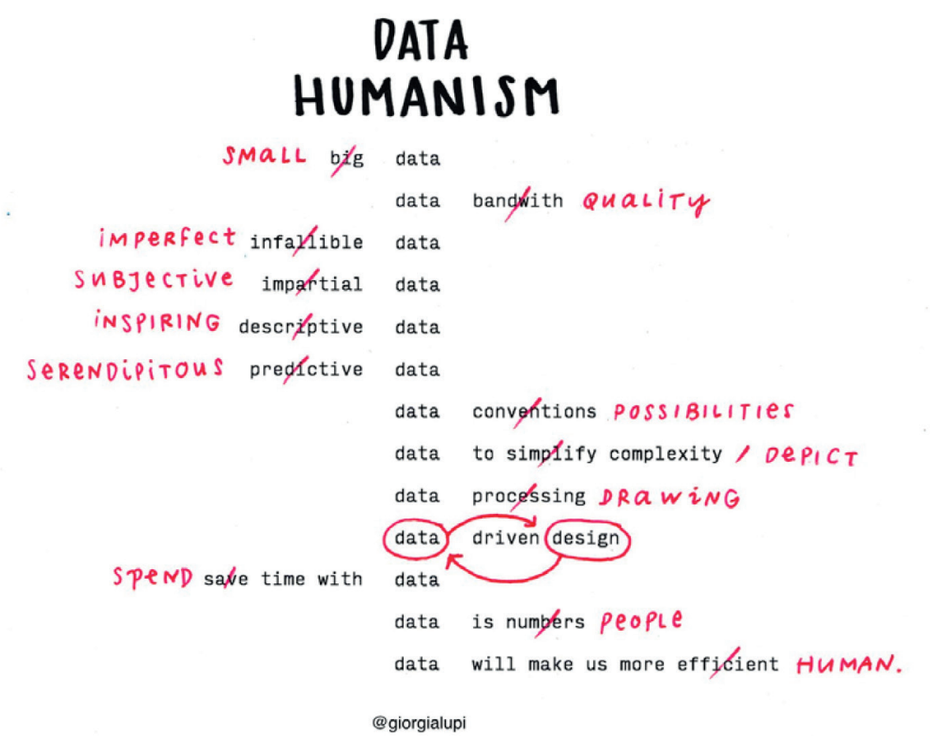
1.11 Data Society and Data Humanism: The Fashion Revolution will be visualized

As designers, how can we communicate the complex sustainable fashion data in an effective way to consumers? An answer to this question was the understanding and research of data humanism, which is discussed in the following section. The main inspirations of this part of the investigation is the work of Giorgia Lupi, information designer, partner of Pentagram Design and advocator of data humanism.

According to Lupi, "data doesn't belong to a distant dystopian future: it's a commodity and an intrinsic and iconic feature of our present" (Lupi, 2020). As designers, she states that we have to "question the impersonality of a merely technical approach to data and to begin designing ways to connect numbers to what they really stand for: knowledge, behaviors, people" (Lupi, 2020).

In Lupi's Data Humanism Manifesto (see **Figure 014**), she states the concepts that are needed to apply a data humanist approach to design and society (listed below):

- ***Embrace complexity:*** The goal is to move away from a simple measurement of quantity; to transform raw information into interconnected knowledge, presenting unexpected parallels and secondary tales. This process is nonlinear storytelling; people can get happily lost exploring individual elements, minor tales and larger trends within the greater visualization, while being naturally invited to engage with the visual on deeper levels.



"Making enticingly accurate infographics requires more than a computer drafting pro- gram or cut-and-paste template, the art of information display is every bit as artful as any other type of design or illustration, with the notable exception that it must tell a factual or linear story"
- Steven Heller, The Infographic Designers' Sketchbooks (Lupi, 2020)

Figure 014: Data Humanism Manifesto by Giorgia Lupi.

- ***Move beyond standards:*** Drawing with data is an invaluable tool to discover what is unique about the numbers at hand. It also raises new questions about the data itself. This limiting practice helps to reveal new possible analyses to perform: Instead of being overwhelmed by the size of a dataset and by millions of numbers, we focus only on their nature, their organization, and doing so often opens new opportunities originating from this vantage point.
- ***Sneak context in:*** We have to reclaim a personal approach to how data is captured, analyzed and displayed, proving that subjectivity and context play a big role in understanding even big events and social changes (especially when data is about people). Most importantly, we both work with data in a very handcrafted way, trying to add a human touch to the world of computing and algorithms, using drawing instead of coding as our form of expression.
- ***Data is imperfect:*** It's time to leave behind any presumption of absolute control and universal truth and embrace an informed depiction of the big numbers and small imperfections that work together to describe reality. And data visualization should embrace imperfection and approximation, allowing us to envision ways to use data to feel more empathic, to connect with ourselves and others at a deeper level.

According to Lupi, as designers we should learn how to include and render the more qualitative and nuanced aspects of data: we should experiment with how to visualize uncertainty, possible errors and imperfections in our data. Most importantly, we should keep in mind how data can be a powerful tool for all designers, bringing stories to life in a visual way and adding structural meaning to our projects (Lupi, 2020).

Apart from the work of Giorgia Luipi and in a more global scale, the first international workshop on Digital Humanism was held in Vienna, Austria, April 4 – 5, 2019. It was organized by the Faculty of Informatics of TU Wien, and supported by the Vienna Science and Technology Fund, and the Viennese

Municipal Department for Economic Affairs, Labor and Statistics. It is important to clarify that Digital Humanism is not a movement or an approach, but a manifesto. It expresses well worries that are rather widespread among scholars presently.

In this thesis investigation, the research and understanding of the Data Humanist point of view and manifesto is crucial in order to embrace and understand the importance of human data and the way it can be visualized in order to comprehend the complexity of society (in this case, the approach is to sustainable fashion design).

Part 2:

Thesis Question & Methodology

2.1 Research Question and Study Objectives

Based on the definitions, research, study and discussion in Part 1 of this thesis investigation, Part 2 will define the research question, main study objectives and applied methodologies.

As seen on **Figure 015**, this investigation is an attempt to join the worlds of sustainable fashion and data humanism, in the general context of “Why we need a Fashion Revolution”. The research question is born from this conceptual framework, and will be answered through applied methodologies and an experiment that will generate data/key findings.

Research Question:

How can we create a new model of measuring sustainability in the fashion industry that combines both qualitative and quantitative data, representing the complexity of human behavior, the emergency of the problem and possibilities for solutions?

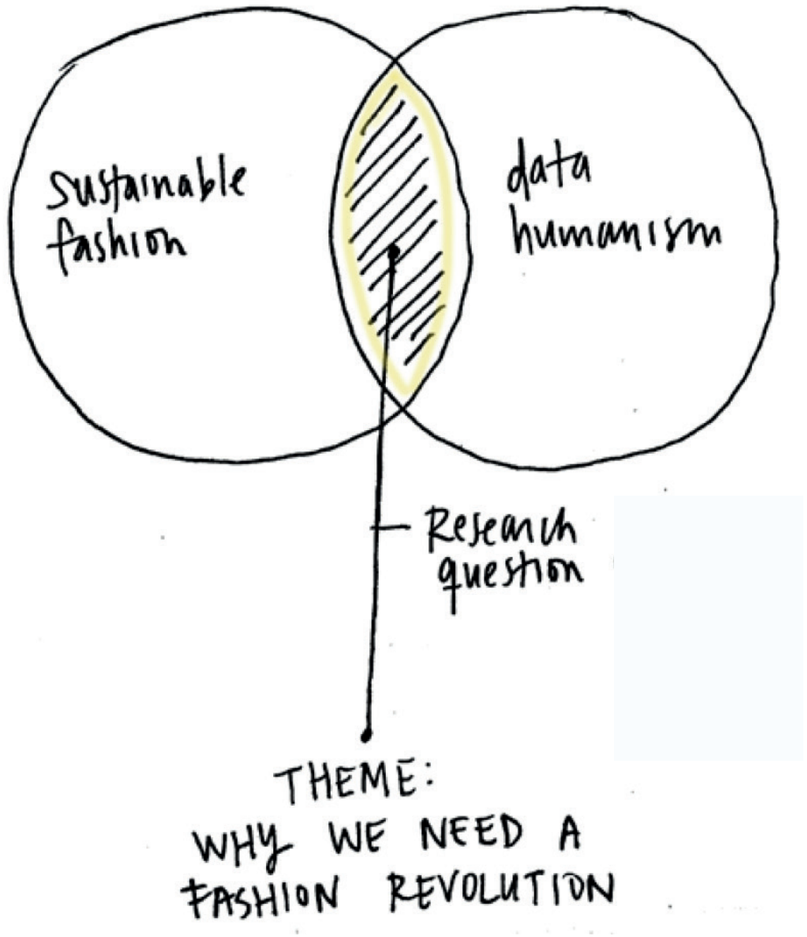


Figure 015: Research themes.
By Mary Isabel Buenaventura.

Study Objectives:

1. To critically review essential literatures through the examination of secondary sources:

- To define the definition of sustainable fashion design through reviewing the literature on sustainable development, sustainable design and the interpretation of sustainability within fashion design.
- To identify the fundamental problems of current design practice by reviewing the contemporary shift towards sustainable fashion design.
- To examine and review existing sustainable design principles and tools.

2. To establish key criteria and a conceptual model for the development of a human centered sustainable fashion design model through data humanism.

3. To apply this model in a real world situation and evaluate the key findings of the experiment.

Figure 016: Vogue Talents Responsible Design Homepage. By Vogue Talents Italia

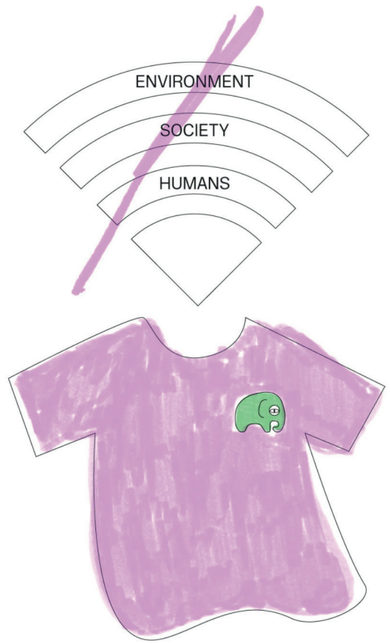


Figure 017: Responsible Design Model. By Ward, M., Maino, S., & Guazzarini, S.

2.2 Applied Methodology: "An Elephant in the Room", Vogue Talents, MFW Sept. 2020

In order to create a new model of measuring sustainability in the fashion industry focused on data humanism, the methodology used was based by the theoretical framework of the "Big Elephant in the Room" project by Matteo Ward, Sara Maino and Sara Guazzarini released in September in the World of Vogue Talents for Milan Fashion Week (see **Figure 016**) (Ward, M., Maino, S., & Guazzarini, S., 2020).

Vogue Talents is the scouting project of Vogue Italia launched in 2009 which, in addition to two printed issues per year, has more than one million users across social and web. Having reached the first ten years of presence in the publishing landscape, today it is a brand through which Condé Nast Italia supports the new generation of designers, a solid multimedia platform that has established itself as a reference point for creatives from all over the world, a network of people and activities that connect people and companies, in a mechanism that is not only communicative but promotes business and new perspectives on fashion.

For this year's Milan Fashion Week in September 2020, Vogue Talents opened up to a wider audience. The venue was an imaginary building created exclusively for Vogue Italia by Monogrid, divided into explorable thematic areas and conceived as a symbolic venue for the initiative entirely dedicated to emerging creativity. The methodology presented in this investigation was created by WRÅD Design Studio, and was part of "The New Frontiers of Awareness", an area dedicated to responsible commitment.

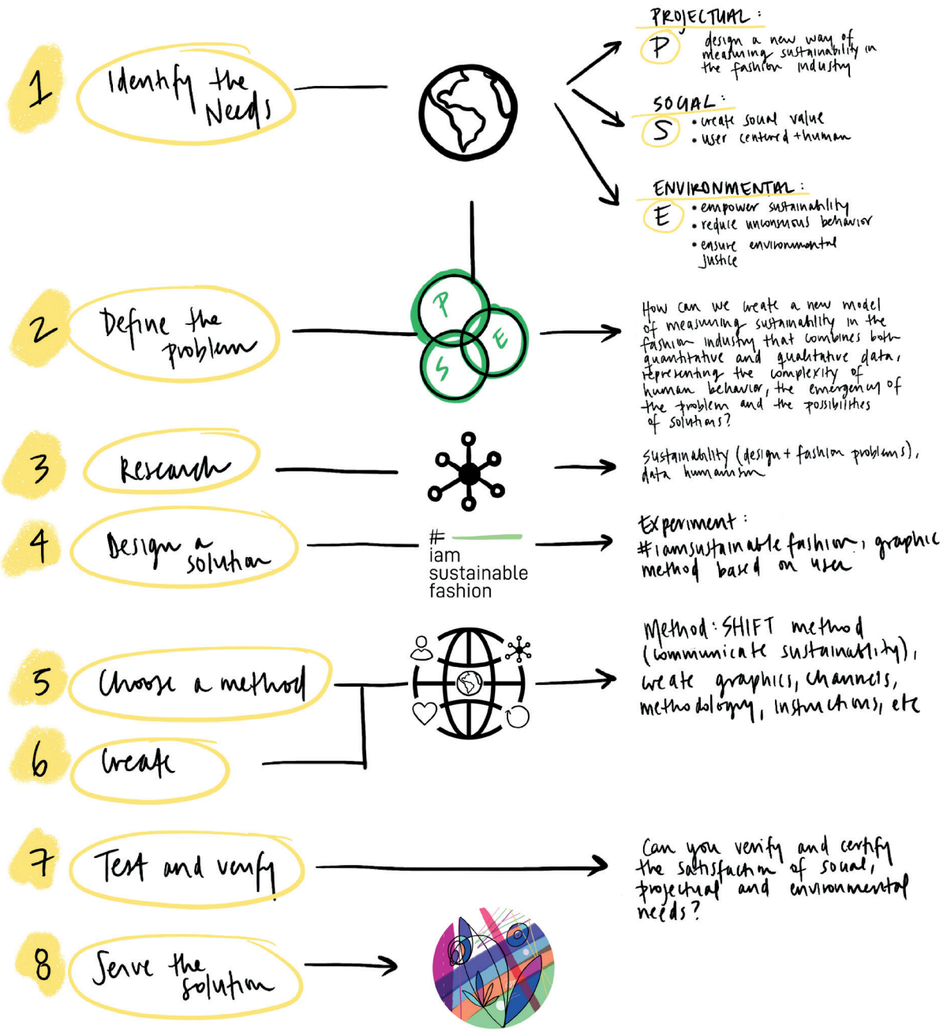


Figure 018: Applied Responsible Design Model for this investigation.
By Mary Isabel Buenaventura based on Ward, M., Maino, S., & Guazzarini

While working on this investigation, I had the pleasure of working for WRÅD as a graphic designer, and had close interaction with the team. I was allowed to use this methodology for this thesis project.

As explained by Matteo, the "elephant in the room" is that clothing is stealing essential resources from people to end up in landfill after few uses, where it can take up to 200 years to dispose of. It shows the disconnection fashion design has between the environment, humans and society in a graphic manner (see **Figure 017**). This is a structure for designers to answer the question: who are you designing for?

This method was the base of the structure of this thesis investigation, since it is a framework made specifically for sustainability in the fashion system and released a only few weeks ago. The #iamsustainablefashion experiment was one of the first projects to use this methodology. As a researcher I am beyond grateful that I was allowed this opportunity.

As shown in **Figure 018**, this methodology was applied specifically for this investigation. In general terms, the methodology has 8 general steps:

1. ***Identify the needs***: what social (S), evironmental (E) and projectual (P) needs are you called to address?
2. ***Define the problem*** and define the issue at stake.
3. ***Research:*** what's the status quo on the identified issue?
4. ***Design a solution***: can you imagine to design a solution to such issue?
5. ***Structure a methodology***: choose your formula of materials, tools and processes.
6. ***Create***: create your project and monitor each step of the process, gather data.
7. ***Test and verify:*** make sure your solution does not hinder the satisfaction of other essential and environmental needs.
8. ***Serve the solution:*** you are ready to serve your market.

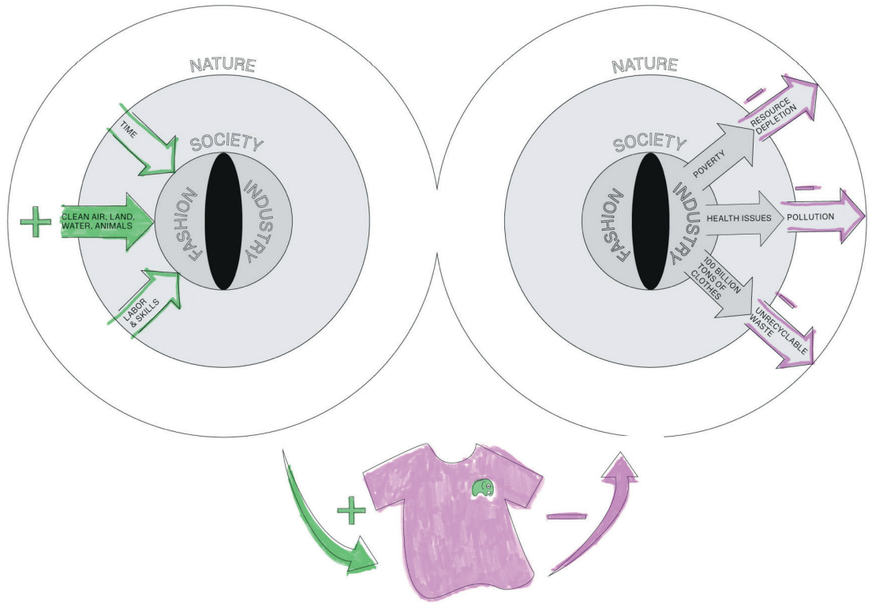


Figure 019 a

Figure 019 b

Figure 019 a and b: Responsible Design Model.
By Ward, M., Maino, S., & Guazzarini, S.

This responsible design method relates to this thesis investigation to a great extent. It is specially made to deal with design project in the area of sustainable fashion design, and what makes it different from other academic methodologies is the idea of placing the needs of people as the first step. Designing with the needs of humans as a priority, and then analyzing these lens through projectual, social and environmental aspects is key to assure a sustainable design outcome. Understanding nature the base of this structure, and analyzing the inputs/outputs the fashion industry has on society (see **Figure 019 a**) is a new holistic model to consider the effects these problems have at large scale.

For example, an obvious output to this project was to create fashion t-shirt for each user after answering the experiment. After analyzing the projectual, social and environmental needs, creating garments was not a justifiable and congruent solution, but rather keeping it as an online platform was.

"Sustainability is not a thing to do but a thing to be" (see **Figure 019 b**) is the closing statement of this framework. On a personal level, after deeply researching about sustainability this year, I think that this is the perfect way to comprehend this concept. Understanding sustainability as a way of living and identifying with it on a personal level (rather than an obligation) is key.

Figure 020: The 17 Sustainable Development Goals (SDGs).
By The United Nations.

Figure 021: The Eight Sustainable Fashion Priorities.
By The Global Fashion Agenda.

2.3 Development of a Human Centered Model

In this investigation, we have understood the complexity of sustainability in design and in fashion. However, how can we measure sustainability in brands currently? The truth is that there is no one solution to this evaluation, but there are three ways that are used in separately in order to understand this factor (listed below):

1. ***The UN Sustainable Development Goals:*** In 2015 all United Nations Member States came together to create a "universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by 2030" (United Nations, 2020). The 2030 Agenda for Sustainable Development includes 17 Sustainable Development Goals (SDGs) which, together, create a holistic guide to achieving the UN's goals (see **Figure 020**). From ending poverty and reducing gender inequality to tackling climate change and reviving biodiversity, the SDGs recognize that the fight for human rights and the fight for the health of our planet must go hand in hand. Fashion must integrate efforts to protect the environment and the people working throughout supply chains in order to truly be a sustainable industry.

2. ***The Eight Sustainable Fashion Priorities - Global Fashion Agenda:*** The Global Fashion Agenda is an international association engaged in promoting social and environmental responsibility in fashion, and an umbrella association created around the Copenhagen Fashion Summit, the event which has now

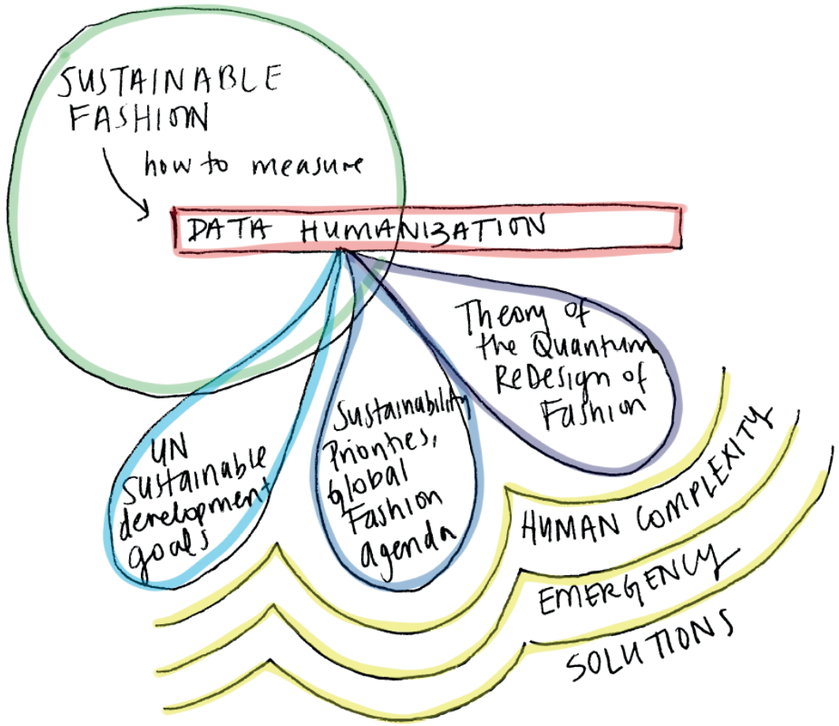
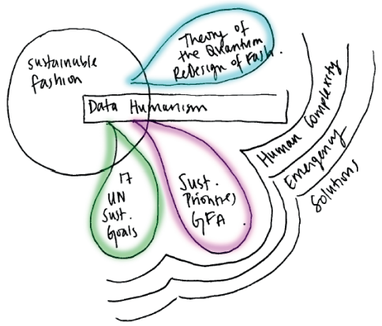


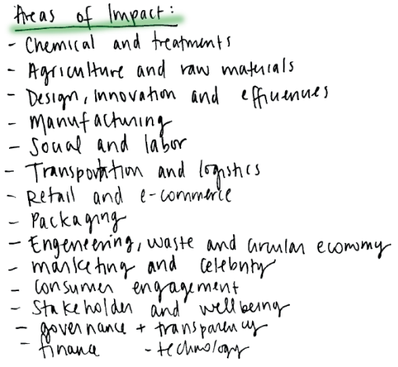
Figure 22: The development of a human centered model for sustainable fashion design. By Mary Isabel Buenaventura.

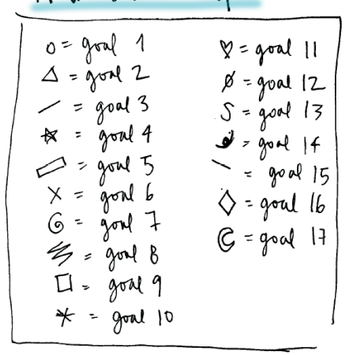
emerged as the main gathering of ethical and sustainable fashion labels (Global Fashion Agenda, 2020). GFA notably set itself the mission of publishing studies and reports on sustainability issues, as well as lobbying with Danish, European and international institutions to promote a more sustainable fashion industry. “The Eight Priorities for Fashion Executives Shaping a Sustainable Fashion Industry 2020” is a document that articulates the eight most crucial sustainability priorities for the fashion industry (see **Figure 021**), offering clear guidance on where to focus their efforts. Within these eight priorities, the CEO Agenda is divided into two key sections: four core priorities for immediate implementation (blue) and four transformational priorities for fundamental change that require collaborative structures and investments (pink).

3. ***Theory of the Quantum Redesign of Fashion*** developed by Glasgow Caledonian New York College’s Fair Fashion Center: The paradox of fashion is that it has helped develop the modern world but, in doing so, has also created some of its greatest environmental and social challenges. The Quantum Redesign of Fashion theory explains that resolving these challenges requires a new perspective on the elements that form the problem. “Borrowing concepts from quantum mechanics (especially the theories of entanglement and coherent resonance) and applying the ideas behind them at a different scale allows us to look at those elements as integers, and solve for a new quotient, one that encourages the industry to transform into a respectful and regenerative ecosystem” (Glasgow Caledonian New York College, 2020).

In this investigation, a new model was created (see **Figure 022**) based on the research of part 1 of this investigation. This new model considers the analysis of sustainable fashion through the lens of data humanism, relating raw data to people, and using the framework of the three models listed above. This new







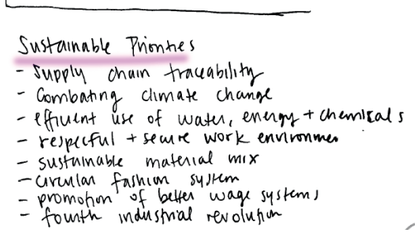


Figure 23 a

Figure 23 a and b: The development of a human centered model for sustainable fashion design. By Mary Isabel Buenaventura.

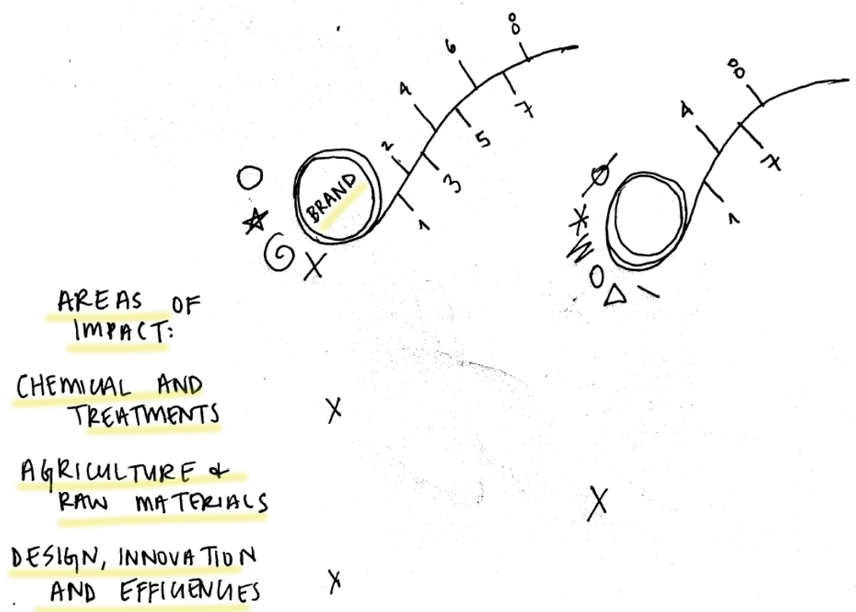


Figure 23 b

vision gives sustainability a new dimension, holistic view and complexity that brands need to understand. Each of the fifteen integrated businesses identified by the Theory of Quantum Redesign of Fashion is therefore connected in the visualization to the Sustainable Development Goals that a “quantum redesign” could potentially impact, and are also linked to the eight sustainable fashion priorities (see **Figure 023 a and b** to see the sketches of how this could be visualized).

In the future, this new framework could be presented in the model of a benefit corporation (B Corp), and could act as a certification that brands could use to analyze their internal sustainable practices. It could also be a community for driven businesses looking to redefine the role of business in society, balancing people, profit and environment.

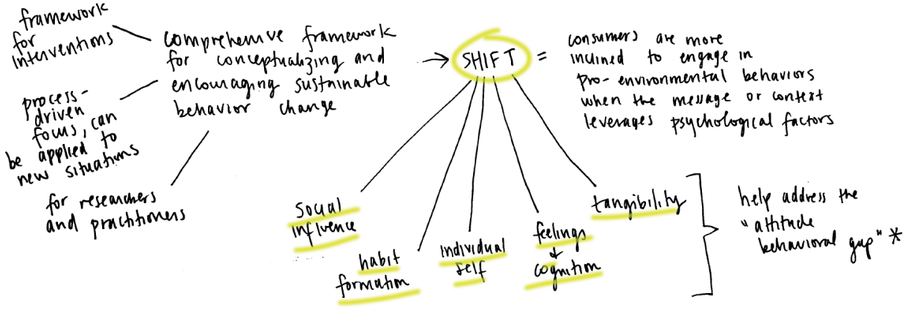


Figure 24: SHIFT methodology framework.
By Mary Isabel Buenaventura.

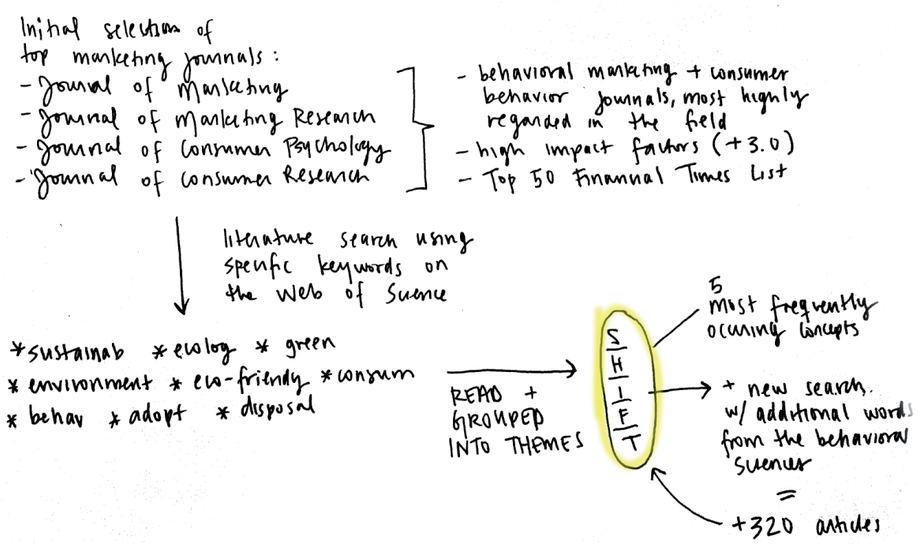


Figure 25: SHIFT methodology framework.
By Mary Isabel Buenaventura.

2.4 Conceptual Methodology: The SHIFT Method

In order to create a design experiment based on sustainable behavior, it is necessary to apply a theoretical framework based on sustainable communication and behavior.

The framework used in this project is the SHIFT method (represented by the acronym SHIFT), and it proposes that consumers are more inclined to engage in pro-environmental behaviors when the message or context leverages the following psychological factors: Social influence, Habit formation, Individual self, Feelings and cognition, and Tangibility (see **Figure 024**). This framework is based on a review of more than 320 examples of academic literature from marketing and behavioral science that examines the most effective ways to shift consumer behaviors to be more sustainable (White, K., Habib, R., & Hardisty, D. J., 2019) (see **Figure 025**). The authors also identify five broad challenges to encouraging sustainable behaviors and use these to develop novel theoretical propositions and directions for future research. Finally, the authors outline how practitioners aiming to encourage sustainable consumer behaviors can use this framework.

The SHIFT method was developed based on the idea that businesses able to adapt to the demands of our changing world, including the urgent demand for sustainability, will be more likely to thrive in the long term and enjoy strategic benefits (Banerjee, Iyer, and Kashyap 2003).

A sustainable business focus has advantages such as identifying new products and markets, leveraging emerging technologies, spurring innovation, driving organizational efficiency, and motivating and retaining employees

(Hopkins et al. 2009).

Moreover, research suggests that socially and environmentally responsible practices have the potential to garner more positive consumer perceptions of the firm, as well as increases in profitability (Brown and Dacin 1997; Luo and Bhattacharya 2006; Olsen, Slotegraaf, and Chandukala 2014; Sen and Bhattacharya 2001).

In the SHIFT framework, sustainable consumer behavior is defined as "actions that result in decreases in adverse environmental impacts as well as decreased utilization of natural resources across the lifecycle of the product, behavior, or service" (White, K., Habib, R., & Hardisty, D. J., 2019). Although the authors focus on environmental sustainability, they are consistent with a holistic approach to sustainability, since improving environmental sustainability can result in both social and economic advances.

Unlike typical consumer decision making, which classically focuses on maximizing immediate benefits for the self, sustainable choices involve longer term benefits to other people and the natural world. Although broader marketing strategies can be useful in this domain, marketers also need a unique set of tools to promote sustainability. Listed is the SHIFT framework summarized and explained by category:

*1. **Social influence:*** Humans are social animals and will follow the actions of others, especially on ethical issues. When people learn they are using more energy than their neighbors, they decrease their usage. But what if the sustainable behavior has yet to be established? For example, how does one convince people to install solar panels if no one in their neighborhood is doing it? For ethical behaviors, learning about the behaviors of others can be motivating.

2. ***Habits:*** To build a new sustainable habit, one must first break bad habits. This is easiest when someone is experiencing big life changes, such as moving, getting married or starting a new job. Another strategy is to apply penalties for bad behavior, rather than rewarding good behavior. There is a possibility, however, that people will return to their old ways if the penalty is removed and the new habit isn't formed. To build new habits, it can be helpful to make the sustainable action easy to do, provide timely prompts, offer incentives to help get the new behavior started and provide real-time feedback about actions over an extended period of time.

3. ***Individual self:*** Sustainability can appear more attractive when the personal benefits such as health or product quality are highlighted. Emphasizing self efficacy also works. When people know their actions matter, they make greener choices. Self-consistency is also important. People like their words and actions to be consistent. Often one environmental commitment can snowball into other actions and changes over time. For example, someone who insulates their house to improve energy efficiency may be more likely to unplug electric devices when they leave for a vacation. Likewise, consumers expect companies to be consistent. There's also self-concept to consider. People make choices that match their perception of who they are or who they want to be.

4. ***Feelings and cognitions:*** Sometimes we make decisions at the spur of the moment (based on how we feel at the time), and sometimes we make decisions after thoughtful deliberation. When communicating about sustainability, it is important to consider both the heart and the head. Consumers seek out positive emotions such as happiness, pride and the warm glow that comes from doing good. If the sustainable option is fun, people naturally will want to do it. Conversely, negative emotions such as fear and guilt can be effective when used

subtly. But an overly emotional, guilt-tripping message is a turn-off and either will be actively ignored or even induce the opposite behavior (psychological reactance). Providing consumers with the correct information and education is important, but it must be framed so that consumers care. Thoughtfully designed eco-labels are a great way to communicate sustainability to consumers.

5. ***Tangibility***: In general, people don't care much about abstract, future consequences. Therefore, it's critical to make sustainability tangible. One way is to communicate the local and proximate impacts of pro-environmental actions. For example, how are local animals, plants and people already being affected by climate change? Concrete examples also help. People are more moved by a photograph showing how far a single glacier has retreated in one year than by a graph of glacier retreat around the world. To match consumer timescales with environmental timescales, project consumers into the future.

In the literature review for the SHIFT framework, the five routes to sustainable behavior change are identified (SHIFT) while delineating specific behavior change strategies within each category. In the next section, the authors highlighted a set of theoretical propositions regarding when and why each of the routes to sustainable behavior change are most relevant. This is done by outlining a set of key challenges (KC) that make sustainable consumption distinct from typical consumer behaviors. This part of the investigation is the exact copy as the research paper, since they are theoretical points. However, the text has been been cut to show the most important points (and due to the length of this thesis investigation).

SHIFT: Theoretical Implications and Directions for Future Research

"***1. Theoretical Implication: The Self–Other Trade-Off***

(KC = Key Challenges)

KC1: When a given behavior or product is positioned on the basis of its symbolic attributes (vs. functional attributes), consumers may exhibit more positive attitudes and behaviors if the option is framed in terms of being sustainable versus a traditional product.

KC2: Encouraging the self-concept to be seen as broader than the self (either interdependent or transcendent) will lead to increases in sustainable behaviors.

KC3: Agency primes will lead to an increased tendency to engage in sustainable behaviors.

KC4: Both individual differences in moral identity and moral identity primes will increase sustainable consumer behaviors.

KC5: Sustainable options and behaviors might have unique positive associations when compared to traditional options, including being healthier, more innovative, and being linked to the outdoors and nature.

KC6: Outwardly focused positive emotions such as awe, empathy, and moral elevation will predict positive sustainable consumer behaviors.

KC7: Connecting sustainable products and behaviors to aspirational role models in a way that cultivates a sense of inspiration and luxury might increase sustainable behaviors.

2. Theoretical Implication: Long Time Horizon

KC8: Those whose regulatory resources are somehow limited will be more likely to lapse in terms of engaging in sustainable behaviors (vs. other types selfcontrol behaviors).

KC9: Sustainable behaviors that provide greater immediate (vs. long-term) warm

glow feelings or positive affect will lead to decreased perceptions of the long time horizon and increase the likelihood of sustainable actions.

KC10: Individuals with higher discount rates and low consideration of future consequences might be more sensitive to heightening the tangibility of environmental outcomes.

KC11: Individuals will be more motivated to engage in sustainable consumer behaviors when they either dispositionally or situationally take the perspective of future generations.

KC12: Sustainable consumer behaviors may be best promoted over the long term by using a combination of in-the-moment tools and lasting-change tools.

3. ***Theoretical Implication: The Challenge of Collective Action***

KC12: Messages communicating both the behaviors of others (collective action) and collective efficacy will increase the tendency to engage in sustainable actions.

KC13: Messages communicating both the behaviors of others (collective action) and collective efficacy will increase the tendency to engage in sustainable actions.

KC14: Collective, future-oriented emotions such as anger and hope might foster sustainable consumer behaviors.

KC15: Communicating information about climate justice might motivate sustainable consumer behavior change.

KC16: Tangible (vs. intangible) collective impact framing increases proenvironmental behavior.

4. Theoretical Implication: The Need to Replace Automatic with Controlled Processes

KC17: Those who have a fresh start mindset (measured or manipulated) will be more inclined to change to sustainable consumer behavior habits.

KC18: Tangibility interventions shift people from analytic to experiential processing and will therefore moderate the effectiveness of other interventions.

5. ***Theoretical Implication: The Problem of Abstractness***

KC19: When the sustainable action or the outcome is ambiguous, uncertain, or new in some way (vs. being clear, certain, and well-established), social factors such as the presence of, behaviors of, and/or expectations of others will be more influential in determining behavior. This might be pronounced among those high in uncertainty avoidance.

KC20: Rewarding small milestones will encourage consumers to continue engaging in environmentally friendly behaviors and help avoid green fatigue.

KC21: Those consumers who are encouraged to focus on the future self will be more likely to engage in sustainable consumer behaviors.

KC22: Visual communications (vs. text) will be effective at eliciting otherfocused emotions such as love and empathy and lead to greater participation in sustainable actions. This effect will be enhanced for individuals who are visualizers" (White, K., Habib, R., & Hardisty, D. J., 2019).

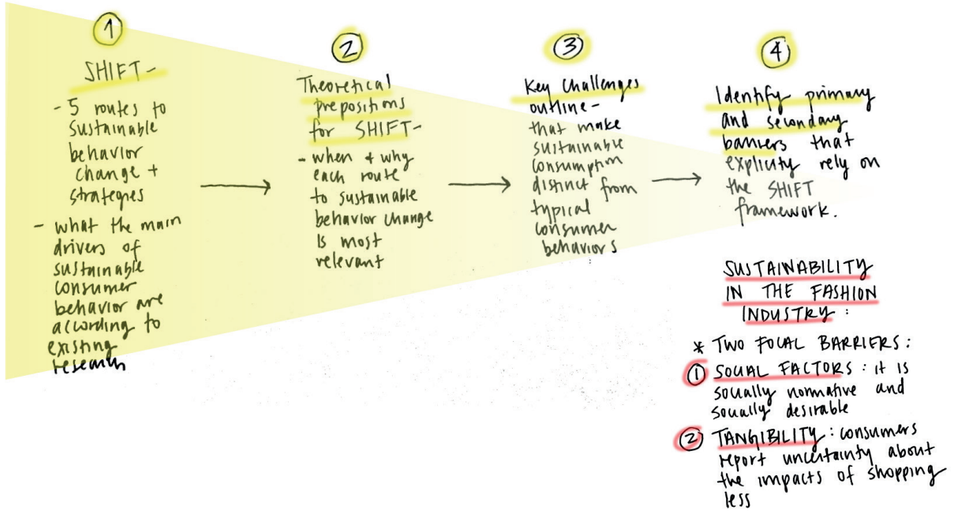


Figure 026: SHIFT methodology theoretical steps.
By Mary Isabel Buenaventura.

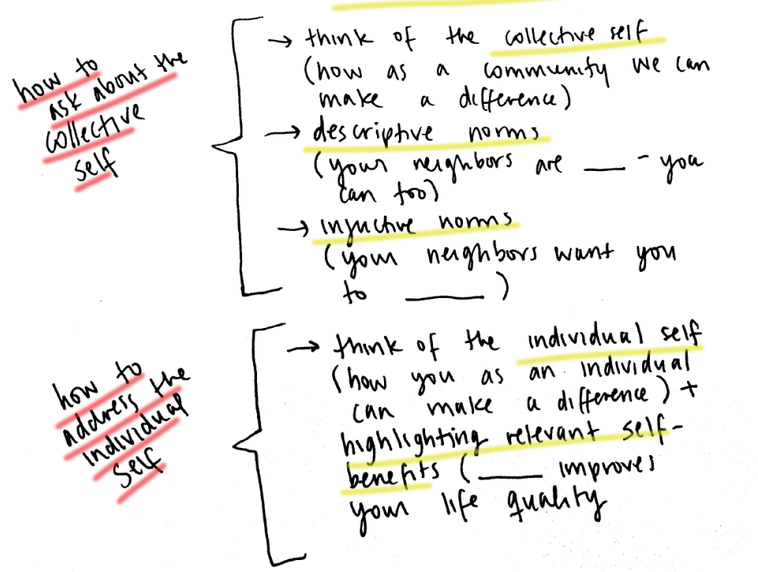


Figure 027: SHIFT methodology individual questions.
By Mary Isabel Buenaventura.

In summary, the SHIFT method is used in this investigation as a framework for sustainability oriented questions for the experiment and collection of data. The five routes to sustainable behavior change strategies (SHIFT) and the theoretical prepositions outline the key challenges of sustainable consumption. These key challenges helped identify two focal barriers (primary and secondary) that explicitly rely on the SHIFT framework, specifically for sustainability in the fashion industry: 1. Social factors: it is socially normative and socially desirable, and 2. Tangibility: consumers are uncertain about the impacts of the fashion industry (see **Figure 026**).

The framework of the SHIFT method also determined how the questions of the experiment were going to be asked: always considering the collective and individual self (see **Figure 027**). In the experiment, there is the use of descriptive norms and injuctive norms, highliting the relevant benefits of sustainability.

Part 3:

Design Experiment

3.1 Creation of #iamsustainablefashion

The creation of the experiment #iamsustainablefashion took into consideration all of the research and frameworks of Parts 1 and 2 of this investigation. As a design experiment, the most important factor that influenced the design process was studying the approach of learning, since it is a decisive factor in behavior change.

The “Stages of Change” model was studied in order to understand the learning process. The “Stages of Change Model” is based on the Trans-Theoretical Model of Change (also known as TTM), which was developed by James Prochaska and his colleagues (see **Figure 028**). It is considered a very powerful approach to thinking and behavioral change. The authors found that cognitive and experimental change methods are most effective in motivating new thinking and behavior (Prochaska, 1997). The TTM model was largely applied in social care and health care sector and Doppelt (2008) adopted this approach into sustainability agenda which is called 5D staged approaches. The processes of influencing and the stages of changing behavior are illustrated in **Figure 029.** The stage-theory of behavior change and learning cycle have similar processes which is not only influenced by individual level of activities but also involving social context that is a critical role in behavior change.

The stage theory outlined that behavior change does not occur immediately, but rather it can be achieved end point when maintenance is accomplished over the long term. Moreover, the process of behavior change is not a linear model; the process can be repeated several times before changes can be maintained. Allen et al. (2002) observed the several important aspects

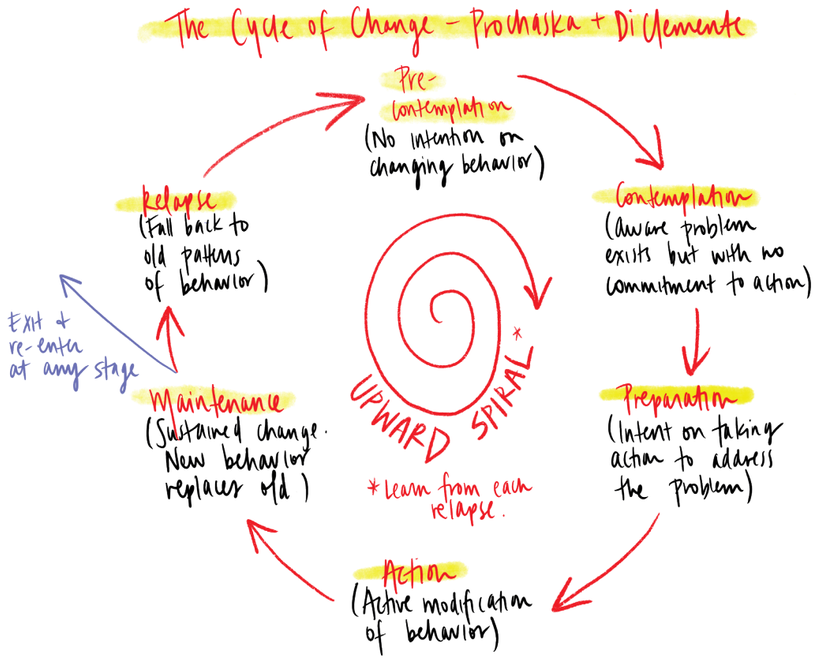


Figure 028: 'Stages of Change Model' by James Prochaska.
By Mary Isabel Buenaventura

regarding the process of behavior change:

1. Behavior change is different for every person who takes an action through implementing their own ways and time.

2. Changing behavior is associated with the social activities rather just persuading individuals' behavior.

3. Depending on the development of the individual and collective capacity, people can adopt and contribute to the environmental action differently (Doppelt, 2008).

Furthermore, new learning requires people to adapt to new behavior. This will accelerate changes influenced by the psychological and social impact on behavior. The suggestion of Allen et al.2002 (p14) is shown: Behavior change = Knowing what to do + Imperative + Enabling environment. Their observation indicated that a component of behavior change requires the learning and doing environment that provides people to know what they can do and give them and enabling-platform to create imperative solutions. Particularly, learning is a critical part in understanding the situation in all three parts of the behavior change equation. Therefore, understanding environmental and social issues could help the development of people's motivation (imperative action) for a more environmentally friendly behavior. An enabling environment builds a bridge between people to people as well as learn and share new insight through social way.

This social bridge was the reason for the name #iamsustainablefashion, since it represents the essence of community and social connection. #iamsustainablefashion represents a new #iamsustainablefashion has three categories of outcomes:

1. State of the art: this experiment will give a state of the art picture of how users relate to sustainability in the fashion industry. It will show the values and activities people engage in at the moment.

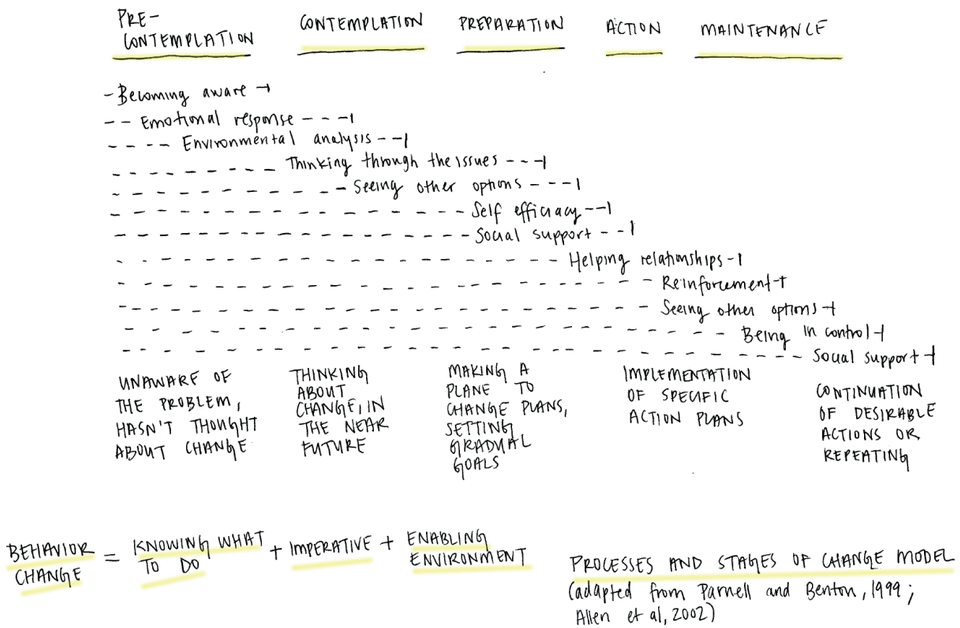


Figure 029: Processes and 'Stages of changes model' (Adapted from Parnell and Benton, 1999; Allen et al., 2002). By Mary Isabel Buenaventura.

2. Design activism: the platform is driven by design activism, since in itself it gives awareness to the topic of sustainability in the fashion industry.

3. Interactive tool: as an artifact, the experiment is also an interactive tool based on data humanism.

The key points to consider for the experiment are the following (listed below):

- To paint a human portrait with human-centric data.
- Catalogue of the complexity of daily living.
- To display that the mind organizes the data it accumulates (often subconsciously).
- The goal of seeing patterns and perhaps fine-tuning negative behavior data doesn't have to be boring and clinical.
- In a hyper-technological, ever-connected world, there is a beauty and simplicity in returning to a way of connecting that both roots us to our world and to one another.
- Purpose of individuals to connect with themselves and with others at a deeper, more humane level.

Apart from the SHIFT method explained above, there are also key questions regarding sustainability in the fashion industry that were taken into consideration (listed below):

1. ***Who made this?*** Who made my clothes is a question pushed to the forefront by Fashion Revolution. For a simple enough sounding enquiry it holds a lot of power. Knowing who made your clothes is predicated on a brand having close connections with their factories and a closely monitored supply chain. There should be no hidden faces within the fashion industry.

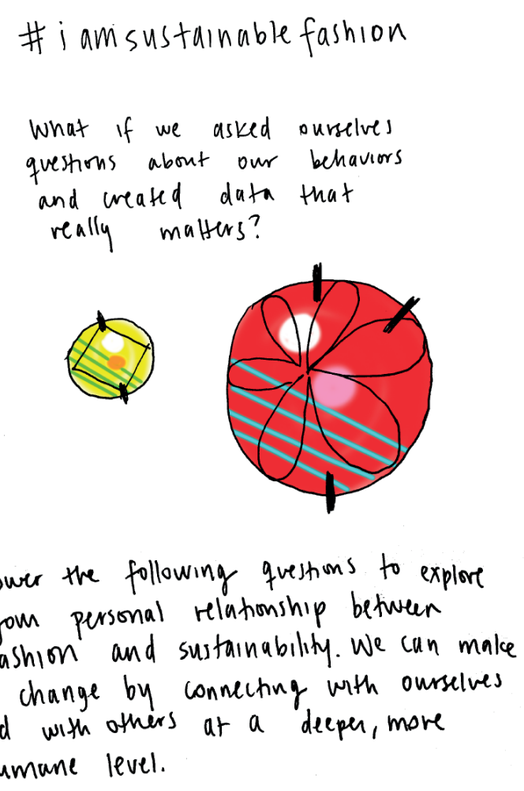


Figure 030: #iamsustainablefashion first instructions sketches. By Mary Isabel Buenaventura.

2. ***Is this price fair?*** Warp speed production times go hand in hand with plummeting prices. A $15 t-shirt might be the new normal but is it fair? The price of a garment represents a multiplicity of processes, from growing the cotton and stitching the seams to sending it to the shop floor. Layer a viable profit on top of this and it doesn't leave much for those at the bottom of the chain. By asking whether a price is fair, we can begin to recognize a garment's true value.

3. ***What fabrics are used?*** Not all fabrics are created equal so consider the inseam tag just as important as the price tag. What is the fabric content? Is it oil-thirsty polyester or a natural fibre? Cotton is an obvious, plant-based option but the industry harbors some murky practices. Look for Fairtrade and Organic certifications as an indicator of fair practices and a dedication to responsible water treatment and monitoring chemical usage. Other stand-outs include hemp, ECONYL and Tencel.

4. ***Is this brand transparent?*** Take a look through your favorite brand's website. How open are they about their practices? Do they specify where their clothes are made? Do they share factory information? Do they talk about their supply chain? If you're not content with the information on their website, ask them directly. Ask them about their fabrics, working conditions, prices and environmental impact. If they don't or won't answer, it's probably a cue to look elsewhere.

5. ***Do I truly need this?*** Not all sustainability issues lay at the feet of the manufacturers. We need to question our own choices every step of the way, too. Fast fashion promotes want over need and it's up to us as consumers to change this. Fashion is - and always should be - about fun and creativity. Style as a form of expression will always exist outside the parameters of necessity. But, if it's a fifth pair of jeans or a third pair of sandals, it's important to consider

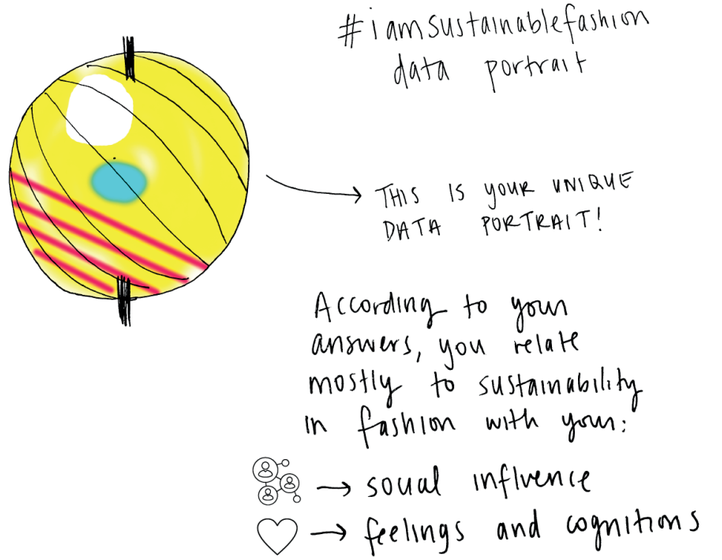


Figure 031: #iamsustainablefashion first data portrait sketches. By Mary Isabel Buenaventura.

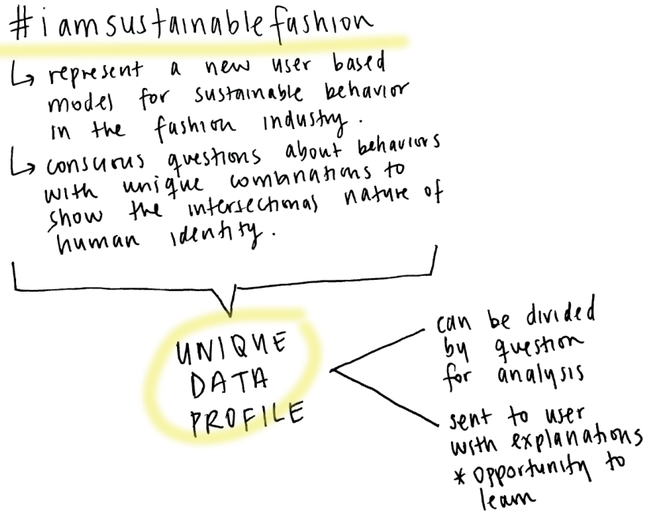


Figure 032: #iamsustainablefashion data portrait importance sketch. By Mary Isabel Buenaventura.

the impact of our shopping impulses. Take a step back, consider your purchase and ask do I need this?

6. ***Will this piece last 30 wears or longer?*** Whether it's in terms of quality or trend, longevity is the key to a consciously curated wardrobe. Look at the seams, check the fabric and consider every new piece within the context of your life. If it's made to last and you can envisage wearing it past the end of the current season and far beyond, that's your green light.

#iamsustainablefashion represents a new user based model for sustainable behavior in the fashion industry, by asking conscious questions about behaviors with unique combinations to show the intersections and nature of human identity (see **Figure 030**). The experiment is an online questionnaire, with 20 questions (four questions based on the SHIFT theoretical framework). The user will be able to answer which questions they feel attracted to answer in order to discover how they relate to sustainability in the fashion industry on a personal level. After submitting the answers, the user will receive a digitally hand drawn data portrait by email, with the SHIFT category they relate to, and other tips of how they can broaden their relationship to sustainability (see **Figure 031**). The unique data profile can be divided by question for further analysis, and by creating the opportunity for e-mail communication, it is a chance to learn more (see **Figure 032**). The unique data portrait will also be shared on the @ iamsustainablefashion Instagram account, to create a sense of community and to see how other people relate to sustainability in different ways.

Figure 033: #iamsustainablefashion logotypes.
By Mary Isabel Buenaventura.

3.2 Final experiment #iamsustainablefashion

Visual identity:

- ***Logotype*** (see **Figure 033**): two types of logos were designed for the brand. One is completely handwritten in black, and the other is a mix between type and a handwritten # with a colored line. The use of the hashtag related the brand name with social media and an online community. The lines can be colored in any variation found in the official color palette. This idea gives the logo dynamism in digital and printed versions. The handwritten combination with digital text gives the sense of human intervention.

- ***Color palette***: Johann Wolfgang von Goethe (1749 - 1832) was an important figure in the blossoming of 18th-century German literature. He also published writings about scientific themes including his experiences with painting that led to his ideas regarding color, which appeared in print in “Theory of Colors” (1810). By this time, people were familiar with the color theories of Sir Isaac Newton, the English scientist and mathematician. Newton had published “Opticks”, the results of his experiments on light and color, in 1704. In it, he stated that color came from light and was the result of physics. Most people accepted this idea, except Goethe. Goethe created his version of a color wheel and arranged the colors according to what he called their natural order. He also explored the impact of colors on emotions and attributed different qualities to certain colors. If you look closely at the color wheel in **Figure 034**, starting in the area with red and working down to yellow, you can see the word schön,

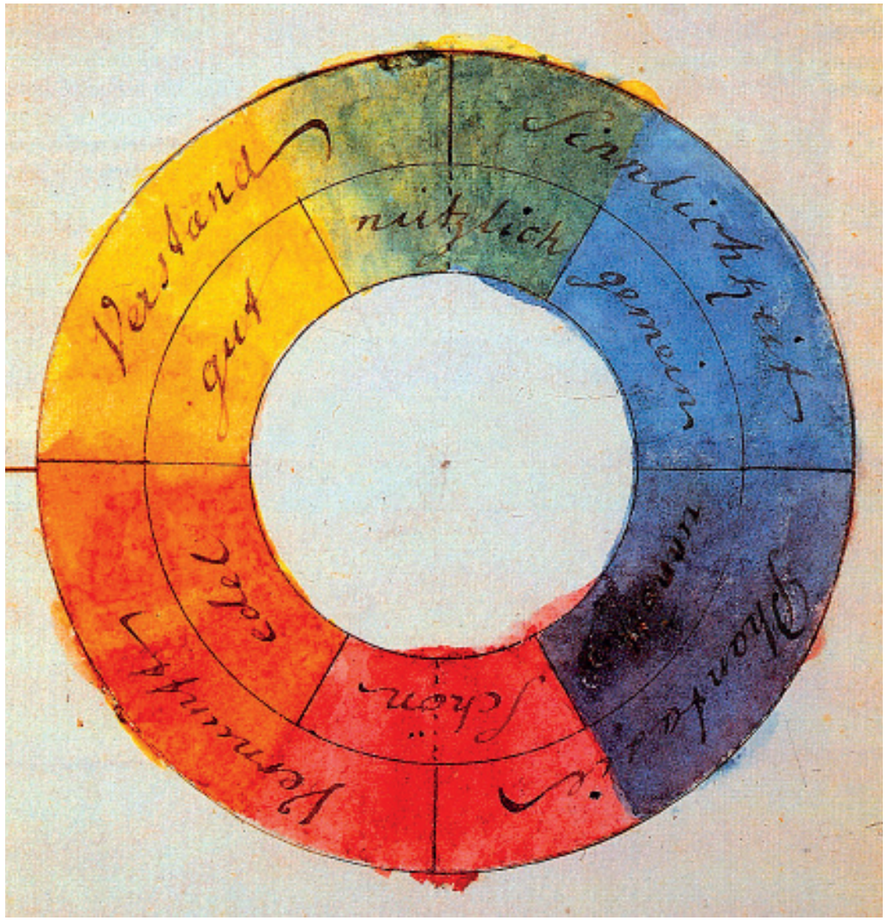


Figure 034: Color wheel from 'The Theory of Colors' (1810) by Johann Wolfgang von Goethe.

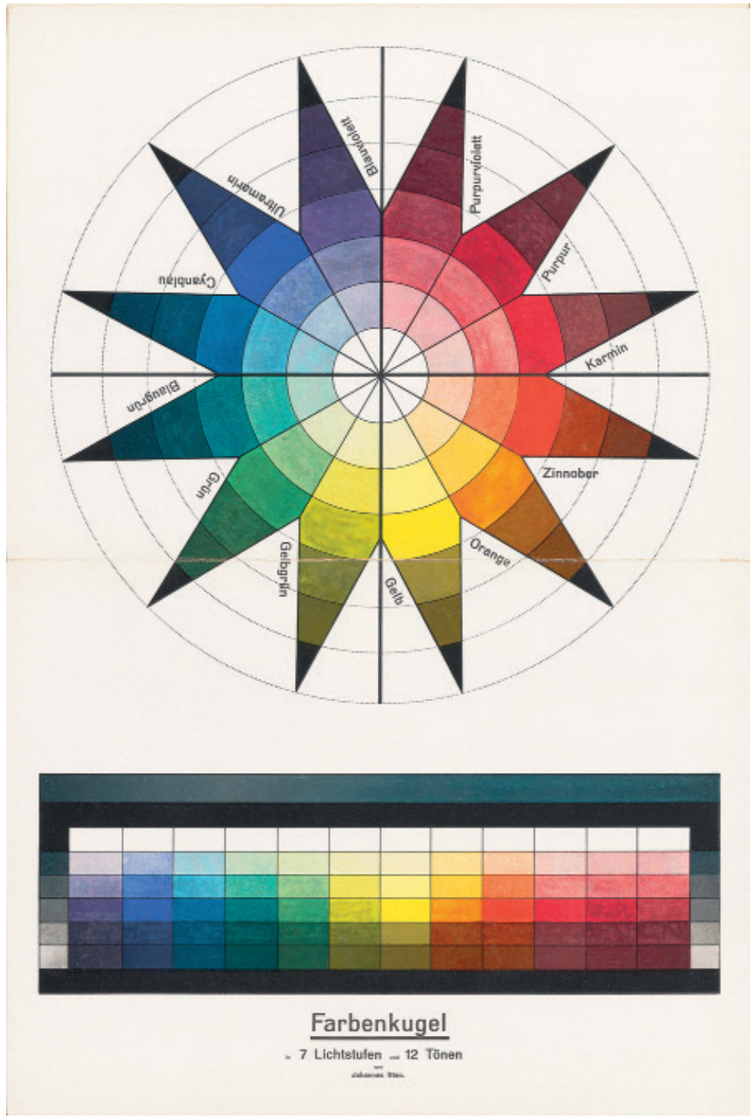


Figure 035: Color wheel from Farbenkugel in 7 Lichtstufen und 12 Tönen (Color sphere in 7 light values and 12 tones), Johannes Itten, 1921.

Figure 036: Chosen color palette for the design experiment.
By Mary Isabel Buenaventura.

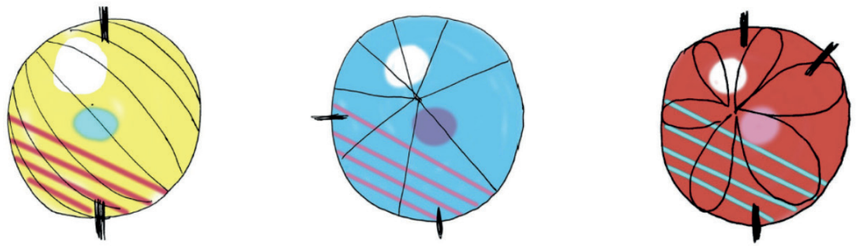


Figure 037: First experimentation sketches of data portraits, drawn by pencil and scanned. By Mary Isabel Buenaventura.

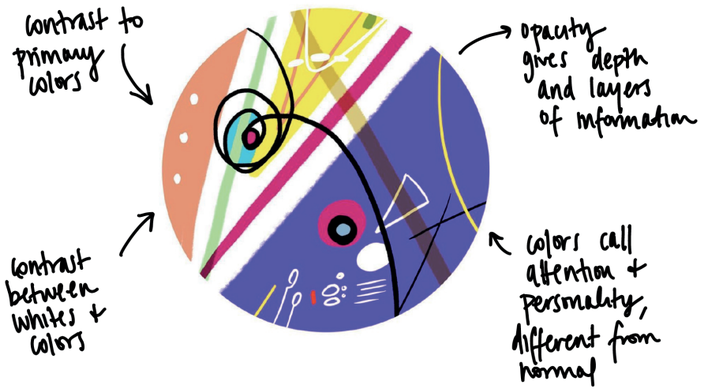


Figure 038: First experimentation sketches of data portraits, drawn digitally. By Mary Isabel Buenaventura.

which means beautiful; edel, which means noble; and gut, which means good. Each word corresponds to a section on the wheel. In Goethe's theory, yellow as the color nearest to the light, was bright and exciting. It stood for good. Red stood for gravity, dignity and attractiveness or beauty. Blue, on the other hand, was powerful, but in a slightly negative way- creating a cold impression (Goethe, 1810). This color wheel is the base of the color wheel used in the 20th century: by advertisers, commercial designers, artists, scientists' color theories to abstract expressionism, the Bauhaus school, chemists and photographers who recreated the colors of the world on film. This color wheel is organized by primary, analogous, hues, secondary, complementary, tints, intermediates, split complementary and shade colors. One example of this is the color wheel from Farbenkugel in 7 Lichtstufen und 12 Tönen (Color sphere in 7 light values and 12 tones) by Johannes Itten, 1921 (as seen on **Figure 035**). To give contrast to this popular approach to color, the palette shown in **Figure 036** was chosen for this experiment. This combination of bright colors is not typical in scientific data, and the idea is to also take advantage of the digital medium (RGB color mode).

- ***Data portraits:*** the data portraits in this experiment started as sketches in paper and pencil (see **Figure 037**), and later developed into hand-drawn digital drawings (see **Figure 038**). The opacity gives them depth and layers of reading information. The bright colors create contrast between black and white shapes, and call attention to the unique personality of each user.

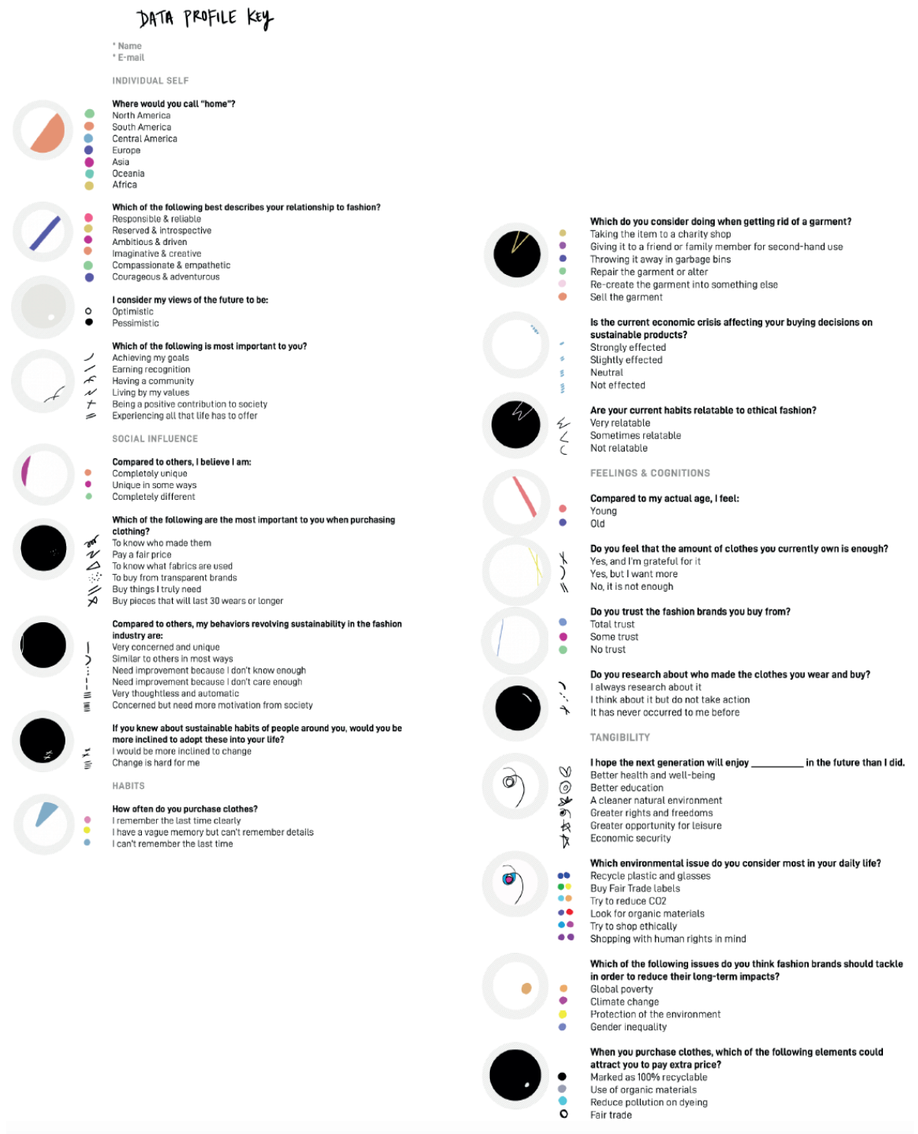


Figure 039: Final data key per question.
By Mary Isabel Buenaventura.

- ***Questionnaire***: the questions for the experiment were written based on the SHIFT framework and revised by Professor Volonté from Politecnico di Milano for their sociological content. Each answer has a graphic form which is translated in the final data key (see **Figure 039**), which is later used to draw the unique data portrait per user. The graphic content of each answer was designed through hand drawn sketches (see **Figure 040)**, and later done digitally. The final survey was published in Google Forms due to its accessibility, and in the experiment the questions are organized in a random order to maintain the experimental aspect of the investigation. Once the link is open, a message greets the user with a short explanation of the experiment, Instagram link and instructions (see **Figure 041**). Once the questionnaire is finished, the user receives a thank you message and an explanation of #iamsustainablefashion and a notice that they will receive an e-mail with their data portrait (see **Figure 042**).

Figure 040: Hand-drawn experimentations for data key graphics.
By Mary Isabel Buenaventura.

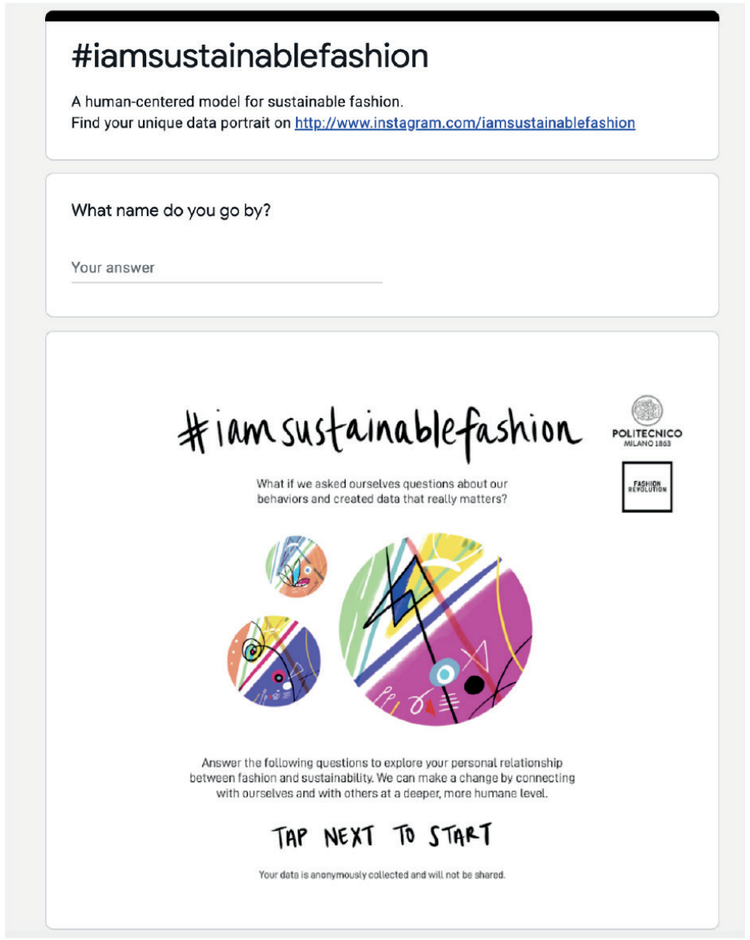


Figure 041: Experiment instructions and greeting message.
By Mary Isabel Buenaventura.

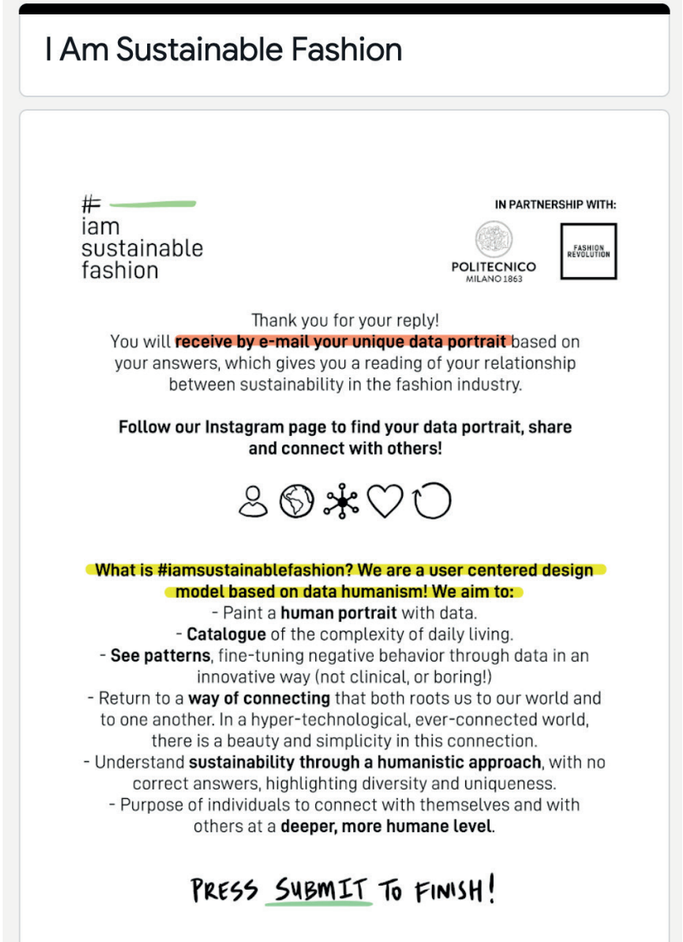


Figure 042: Closing experiment message.
By Mary Isabel Buenaventura.

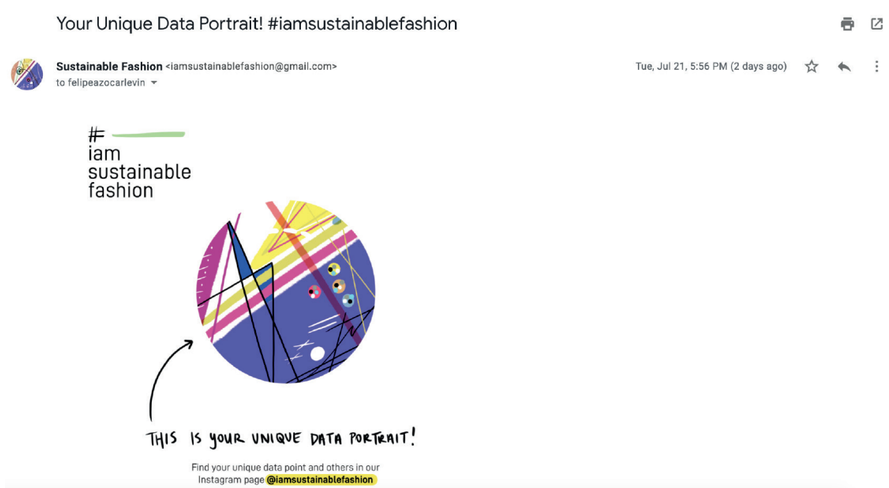
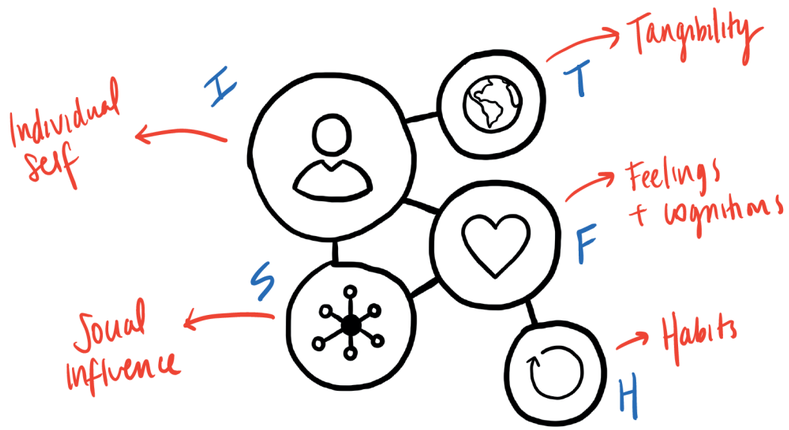


Figure 043: E-mail sent to the user after answering experiment. By Mary Isabel Buenaventura.



Based on *How to SHIFT Consumer Behaviors to be More Sustainable: A Literature Review and Guiding Framework*
Katherine White , Rishad Habib, and David J. Hardisty
PhD University of British Columbia - Specialists in Sustainability
Marketing and Consumer Psychology
American Marketing Association 2019

Figure 044: User based graphics based on SHIFT methodology for sustainable behavior change. By Mary Isabel Buenaventura.

- ***Categorization:*** in the e-mail sent to the user (see **Figure 043**), they will receive their unique data portrait and a categorization of their answers based on the SHIFT method. Each section has an icon, which is part of a larger web (see **Figure 044**). Under this drawing is a text explaining how that user relates to sustainability, and other key notes about other parts of the method so that they can analyze their current behaviors and actions (see **Figure 45 a** and **b**).

- ***Instagram and digital community:*** the Instagram account is a social community for people to see how others have responded to the same experiment (see **Figure 046**). It is also a tool to share awareness about the project. Apart from the data points, other information is shared, such as:

- Process photography of the experiment and other visualized data of the fashion industry and sustainability (see **Figure 047**).
- Definitions related to the project (see **Figure 048**).
- Experiment instructions in English and Italian, in square format and for stories (see **Figure 049 and Figure 050**).

All of this information is archived in a final excel file which is uploaded automatically with the user's anwsers.

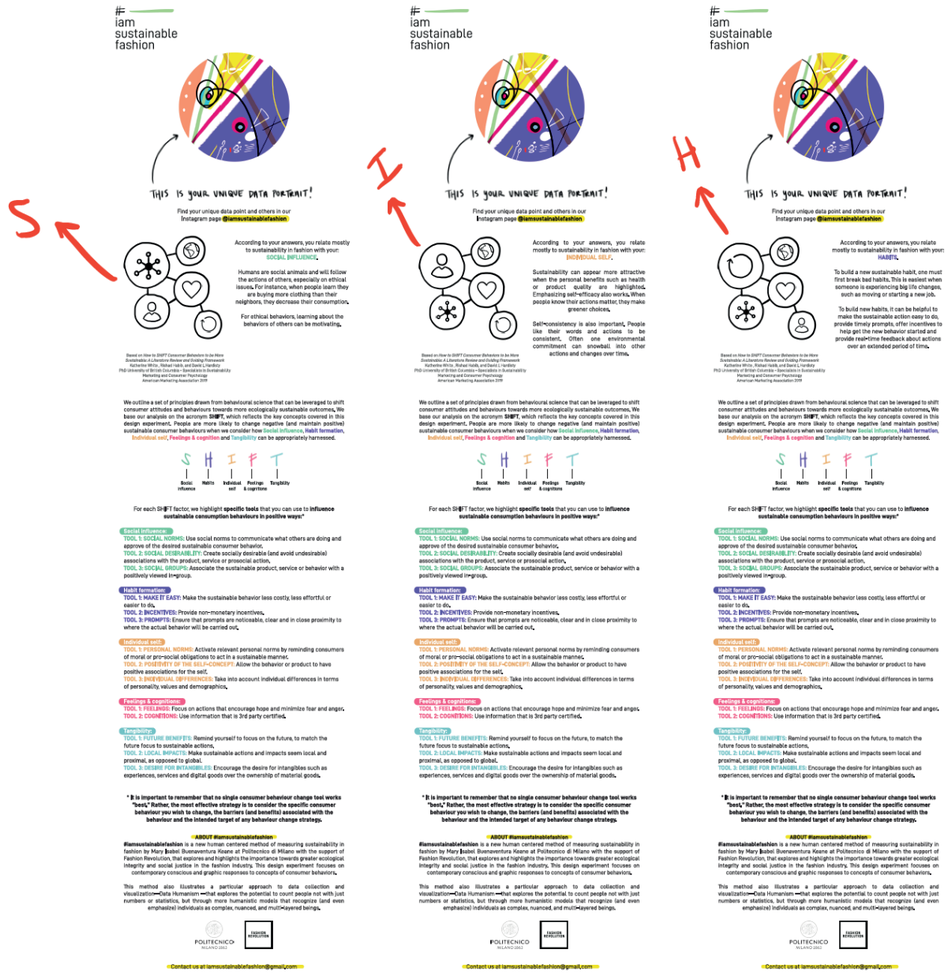


Figure 045 a

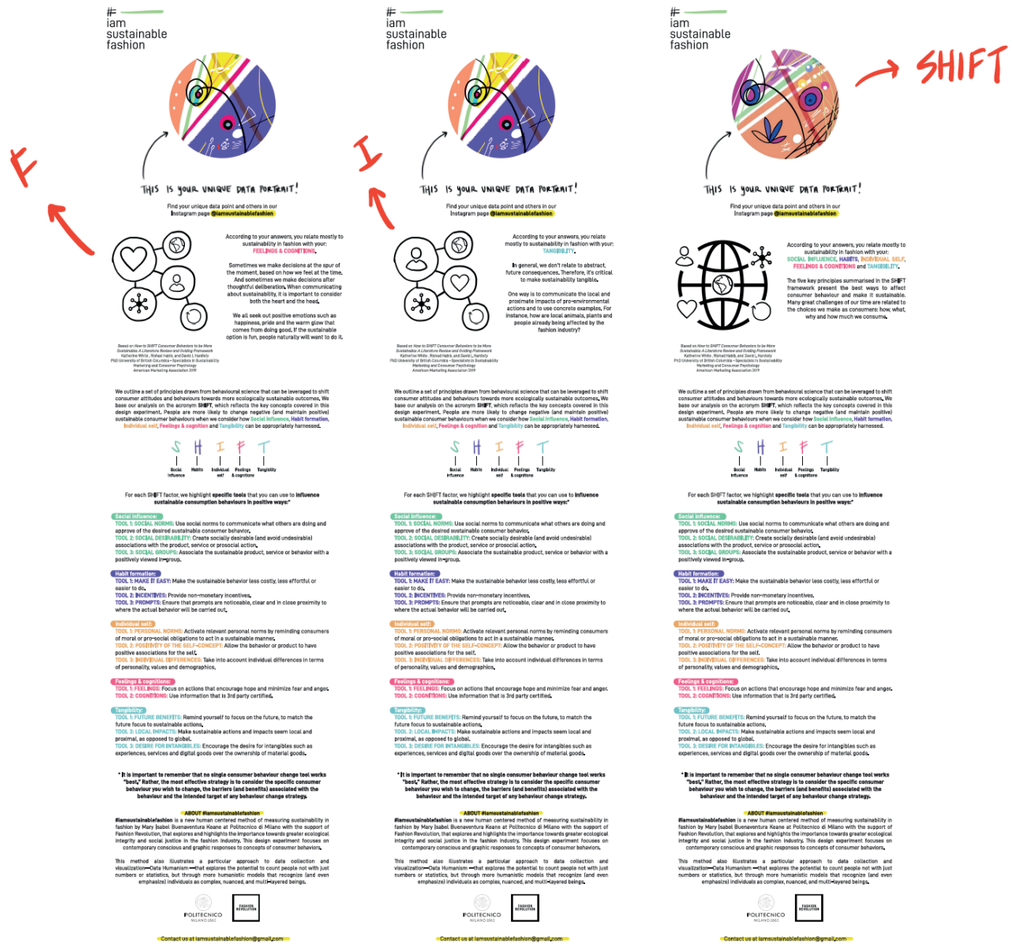


Figure 045 a and b: Personalized e-mail based of SHIFT methodology sent to the user after answering experiment. By Mary Isabel Buenaventura.

Figure 046: Personalized e-mail based of SHIFT methodology sent to the user after answering experiment. By Mary Isabel Buenaventura.

Figure 047: Process photography of the experiment and other visualized data of the fashion industry and sustainability. By Mary Isabel Buenaventura.

Figure 048: Graphics based on definitions related to the project. By Mary Isabel Buenaventura.

Figure 049: Graphics of experiment instructions in English/Italian, square format. By Mary Isabel Buenaventura. By Mary Isabel Buenaventura.

Figure 050: Graphics of experiment instructions in English/Italian, Instagram story format. By Mary Isabel Buenaventura.

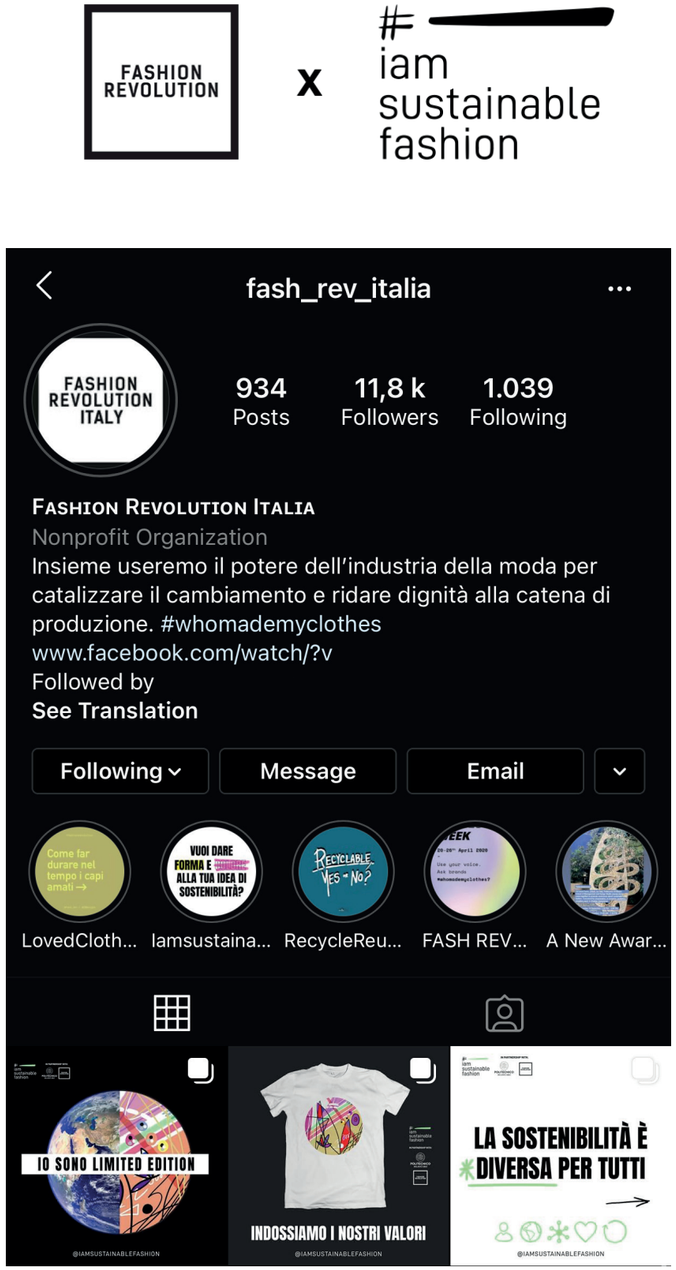


Figure 051: Real screenshot of Fashion Revolution Italia Instagram page with @iamsustainablefashion graphics uploaded. By Mary Isabel Buenaventura.

3.4 Fashion Revolution Italia

The purpose of this investigation was not only to create data, but also to create links between people and institutions. For my compulsory internship, I had the opportunity to work with Fashion Revolution Italia and Marina Spadafora (National Director). After a lot of work and communication, I was able to share the experiment in the Fashion Revolution Italia channels (see **Figure 051**).

This was an important step of success for the thesis project, since it gave me the opportunity to share the project in a real life situation. It went from intangible to tangible very fast. The opportunity to share the project in this channel was important, since it gave me the chance to explore the answers with users who were actually committed to the topics of sustainability in the fashion industry, and helped me build an online community with these answers.

Furthermore, I had to create specific graphics in order to share them with the Fashion Revolution Italia representatives. This involved traveling to Vicenza, Italy and have meetings with Matteo Ward at WRÅD Focus Design in order to find the most effective way to communicate months of investigation. This was a challenge, since communication in the world of sustainability requires new ways and methods, and I also had to be very clear with the instructions and purpose of the experiment to catch the user's attention.

The final experiment was online open from September 1 - October 10, 2020. In the Fashion Revolution channel, the experiment link was in the bio and a three week calendar was planned with graphic content posted to the feed every Tuesday, and on stories every Tuesday, Thursday and Sunday. These instructions were posted always with the same graphics on Stories three times a week, and they were also posted after the designed graphic on the feed (see **Figure 052 a** and **b**). These graphics were the following (explained below):

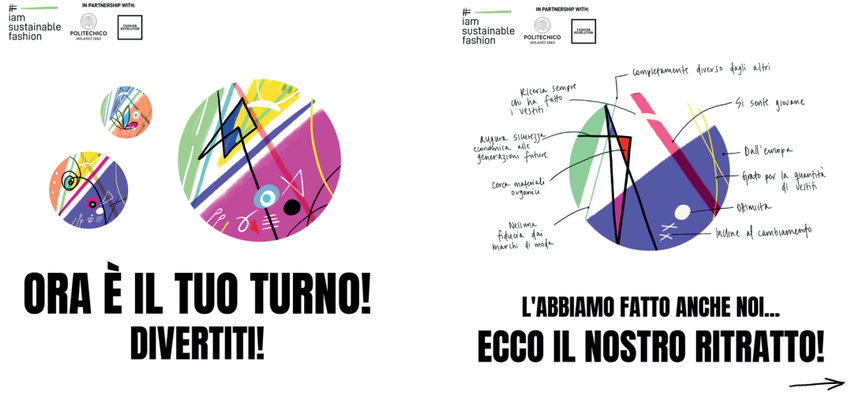


Figure 052 a

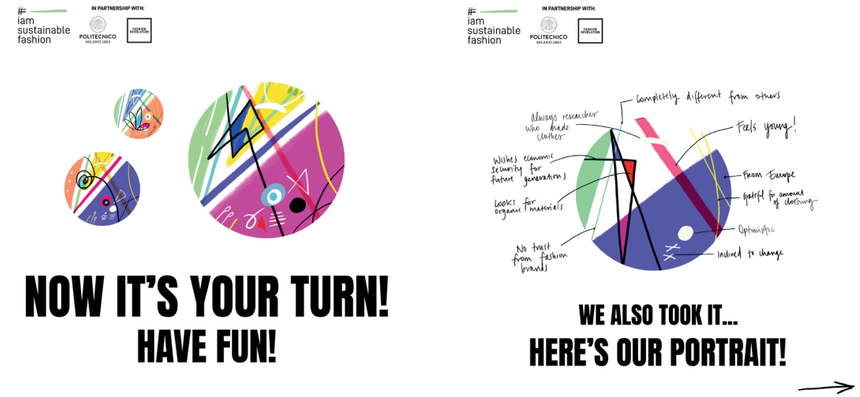


Figure 052 b

Figure 052 a and b: Graphics that indicate experiment instructions in English and Italian for Fashion Revolution Italia. By Mary Isabel Buenaventura.

Figure 053: Week 1 graphics for Fashion Revolution Italia.
By Mary Isabel Buenaventura.

Figure 054: Week 2 graphics for Fashion Revolution Italia.
By Mary Isabel Buenaventura.

- ***Week 1 / September 8*** (see **Figure 053**): Introduction to the experiment, based on the SHIFT concept of Individual Self. Approaching sustainability in the collective and individual sense by introducing sustainability as an idea that is different for everyone, without perfect ideals. The caption text also explains that #iamsustainablefashion is a data model based on their perception of sustainability in the fashion industry.

- ***Week 2 / September 15*** (see **Figure 054**): Added concepts of values and decisions making (in relation to Feelings & Cognitions of SHIFT methodology) by combining the unique data portrait to a t-shirt. The caption of the photo also makes reference that a t-shirt reveals a complex picture that goes beyond the world of design, runways and trends to include overconsumption and waste.

- ***Week 3 / September 22*** (see **Figure 055**): Graphics are related to the importance and future scope of the experiment by presenting a comparison between the planet and a unique data portrait as limited edition. This idea embraces how unique the user is and to think about the relationship he/she has with the world.

- ***Week 1-3:*** Share Instagram stories and web banner (see **Figure 056**).

Sharing the experiment in the Fashion Revolution Italia channel was a very successful way to share the final experiment, where users had the chance to interact with the social pages of @iamsustainablefashion on Instagram (**Figure 057**)**.** On a personal note, I never thought so many users would share their unique data portrait and engage with the experiment as they did. **Figure 057 a** and **b** shows some examples of users that shared their portrait and tagged us. In the next chapter, the findings and conclusions of the experiment are addressed, as well as future ideas and results.

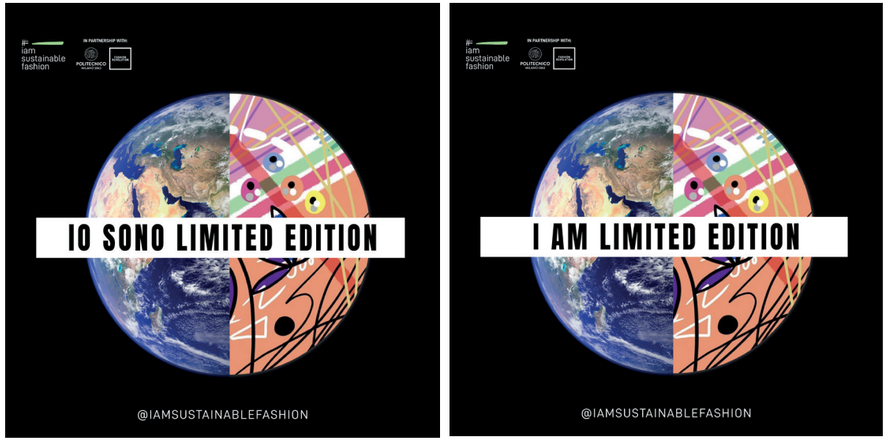


Figure 055: Week 3 graphics for Fashion Revolution Italia.
By Mary Isabel Buenaventura.

Figure 056: Web banner graphics for Fashion Revolution Italia.
By Mary Isabel Buenaventura.

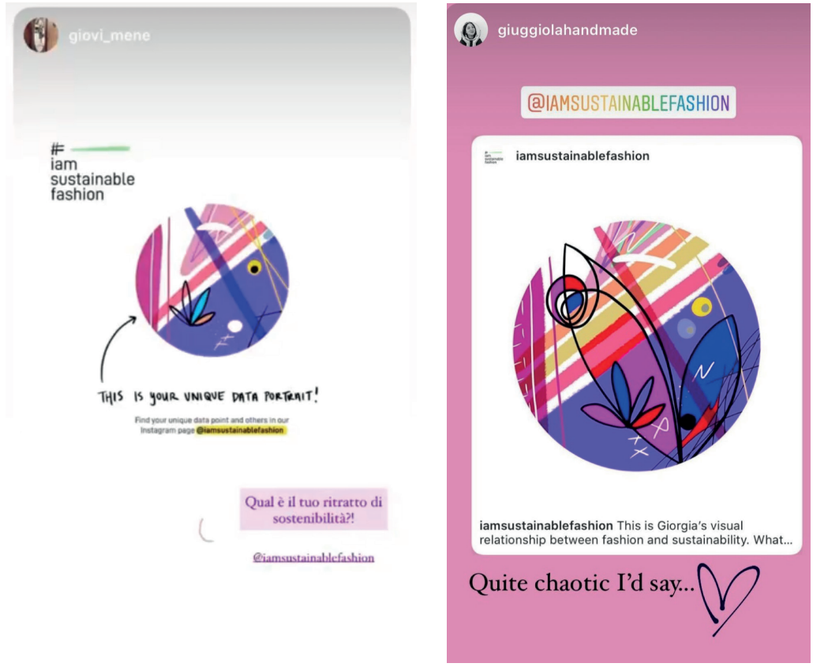


Figure 057 a: Examples of users that shared their portrait and tagged the experiment on social media.

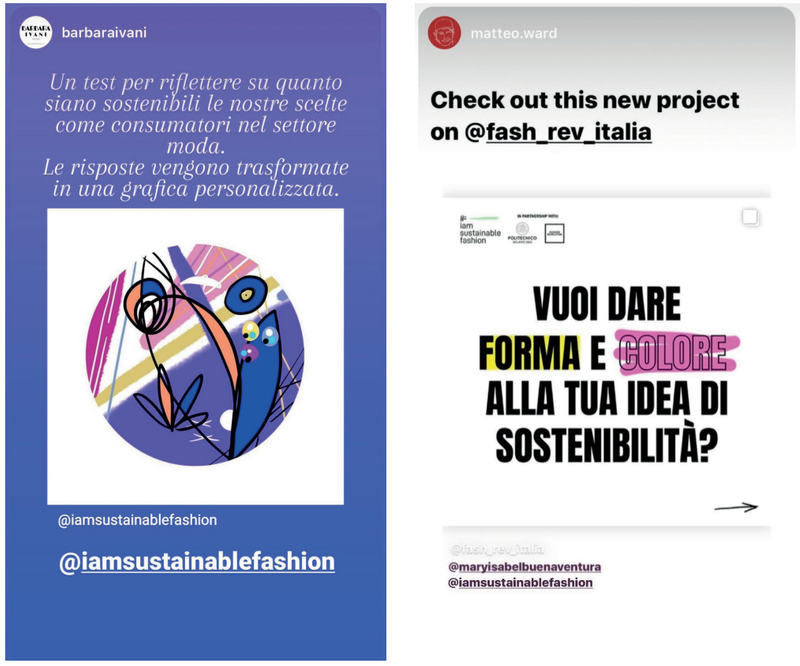


Figure 057 b: Examples of users that shared their portrait and tagged the experiment on social media.

Part 4:
Key Findings

4.1 Future Scope

This research has been conducted across eleven months (February - December 2020) which was not sufficient to explore the many other directions of enabling a system for sustainable fashion design and data humanism. The following sections suggest some recommendation for future works.

#iamsustainablefashion is a project that has a future scope in mind. During this year, the creation of the project and the initial experiment was completed. However, this project was created with the intention of being a long term model with more than one part (explained below):

Part 1: Experiment (see **Figure 058**)

- Creation of the experiment with the support of Politecnico di Milano advisors (design aspect: Paola Bertola and Angelica Vandi, sociological aspect: Paolo Volonté).
- Creation of graphics and theoretical frameworks.
- Partnership with Fashion Revolution Italia and to run the experiment for 5 weeks, visualize and share results .

Part 2: Public Exhibition (see **Figure 059**)

- Enable the experiment in a public exhibition. A big condition in this point is that this place must be of interest of fashion (example: Milano Fashion Week).

Part 3: Digital Application (see **Figure 060**)

- Development of a mobile application, where users can automatically fill out the experiment and create and share their data portrait. This app will also

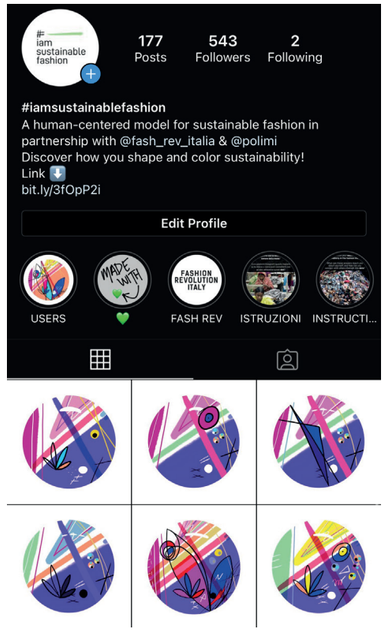


Figure 058: Final Instagram page. For the finished result, check http://www.instagram.com/iamsustainablefashion

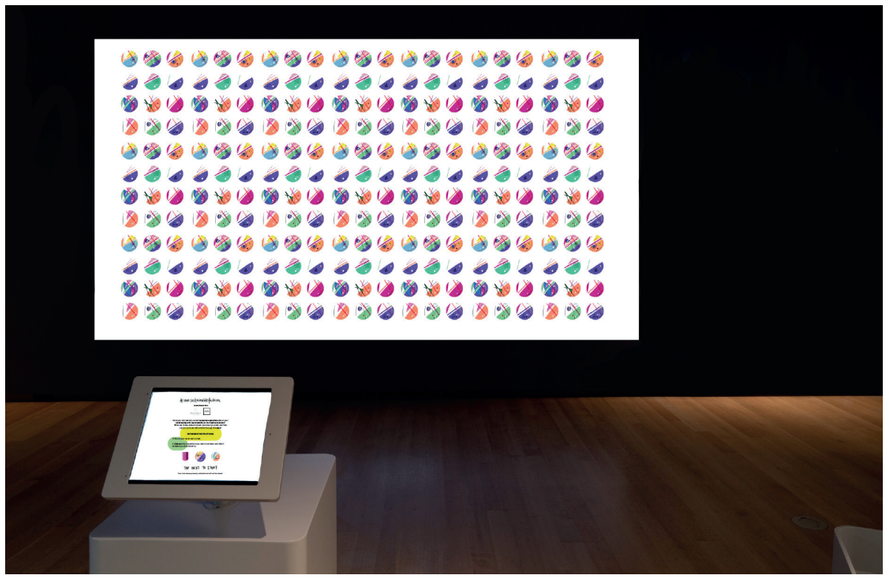


Figure 059: Public exhibition mock up.
By Mary Isabel Buenaventura.

allow a closer understanding of each symbol in the data portrait. Furthermore, a digital application could enhance better communication by connecting with wider audiences and propose the interactive user led design innovation through utilization of a digital app. These applications would be helpful especially for young designers or the public, to motivate and trigger them to practice sustainable design.

Part 4: Collaborations with Fashion Brands and Educational Institutions

(see **Figure 061**)

- Collaborate with fashion brands: as stated in this research, sustainable fashion design needs to be integrated with mainstream fashion designers and design directors at manager level, in order to cement sustainability into the business ethos. Furthermore, the role of fashion design consultancy is important for the fashion industry, as mainstream designers commonly assess fashion design information at the early design development process. Therefore, future research could include the mainstream fashion designers and multidisciplinary design team as central actors in the transformation process, considering them as 'change agents' and users of the experiment that impact on fashion design practices and business operations.
- Share the systemic model based on the experiment to fashion brands (explained in section 2.3 of this investigation) with a benefit corporation approach.
- Collaboration with educational institutions: various organizations and education sectors demand sustainable design education and curriculum incorporation of sustainable fashion design practices. This experiment can be integrated into an educational model for students of all ages to understand the interconnection of sustainable fashion design with creativity and user experiences as a central objective. A new learning system can be developed for sustainable fashion design education, incorporating the experiment and interactive processes.

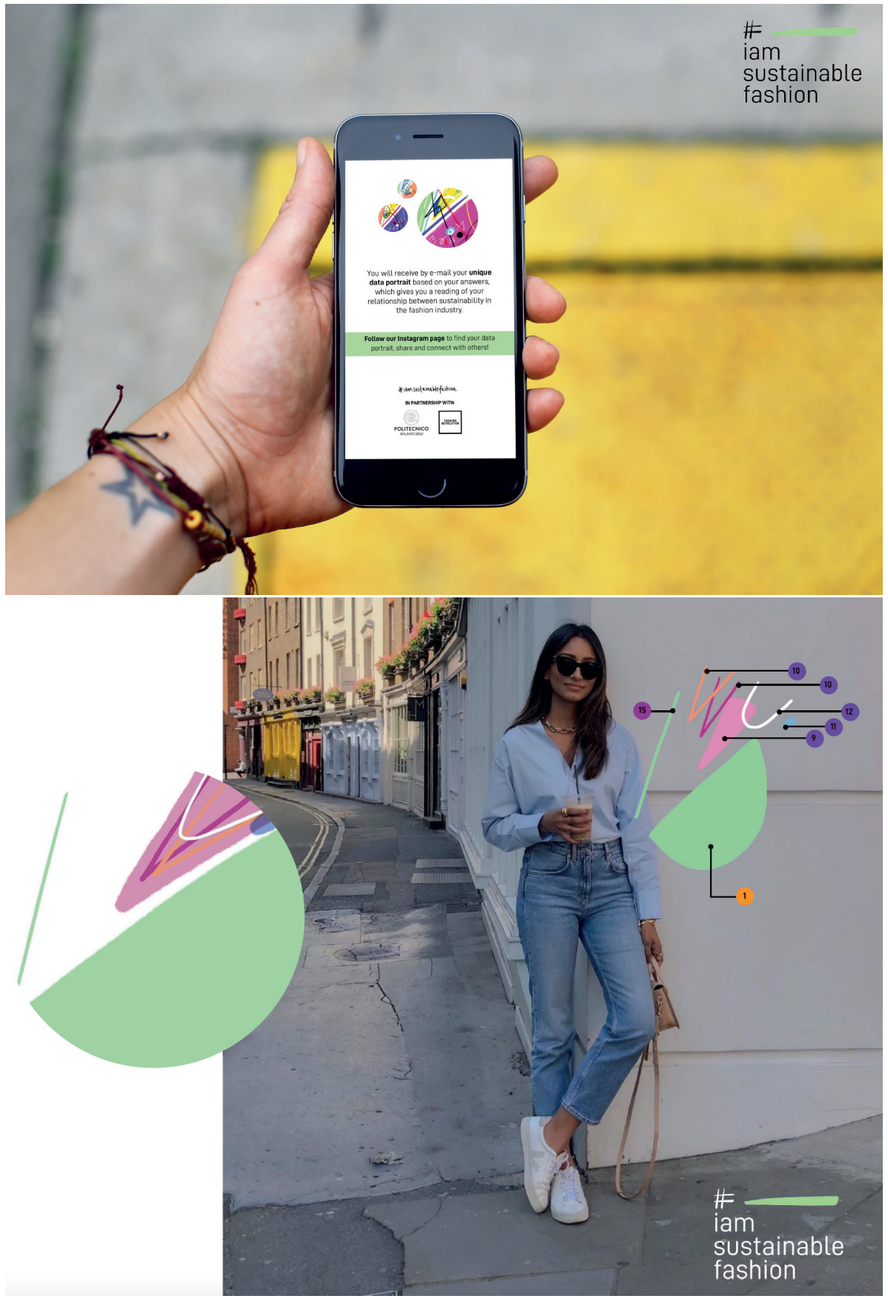


Figure 060: Digital application mock up.
By Mary Isabel Buenaventura.

Figure 061: Brand collaboration mock up.
By Mary Isabel Buenaventura.

4.2 Key Findings

The experiment #iamsustainablefashion was carried out for over 5 weeks in the Fashion Revolution channels, with a total of 438 users. These key findings and macro trends are a result for the experiment. The key findings allow for insights about sustainability in the fashion industry today and allow for new ways this method can be applied in the future.

Social Influence:

- Users recognize their individuality, but still relate to others (73.3%). Most people do not feel completely different (13.7%).
- When purchasing clothing, all results obtained over 30%. These results are interesting since users may find them all important, or may not know how to distinguish the importance between them. The most voted answer was to buy things I truly need (57.8%).
- Regarding behaviors of sustainability in the fashion industry, results varied between being very concerned and unique (40.7%) and need improvement because they don't know enough (32.9%). Very thoughtless and automatic behavior and need improvement because I don't care enough (both 6.4%) were the least voted, which shows that consumers have some kind of worry between their behaviors and the fashion industry.
- People 's behaviors are extremely likely to change if they see people around them being sustainable (97.1%).

Habits:

- Most people remember the last time they purchased clothing. I remember the last time clearly obtained 52.4% and I have a vague memory but I can't remember details 36.1%.
- When getting rid of a garment, most people give them to a friend or family member (70.7%). Furthermore, 58.6% take the item to charity shops or repair the garment (48.2%). A very small percentage throws the item in garbage bins (4.5%).
- The current economic crisis is affecting customer's buying decisions on sustainable products in a moderate way (31.8%). 16.4% is not effected.
- Most people consider their habits relatable to sustainable fashion (56.9%), a very low percentage doesn't (4.3%).

Individual self:

- Most users are from Europe, since the main channel was Fashion Revolution Italia. If this experiment was repeated, a larger community would be necessary.
- Responsible & reliable and imaginative & creative have more than 40% of votes in order to define the relationship they have with fashion. This contrast is very interesting, and links back to the initial definition of fashion in the first chapter, since humans use fashion as a tool of expression but there is also a need to have a responsible relationship with it.
- People are mostly optimistic about the future (71%), interesting in relation to be living in times of a pandemic.
- Most people prioritize their relationship to living by their values (60.3%) and being a positive contribution to society (62.4%). Earning recognition is the least voted by far (7%). These results are important in relation to sustainable fashion, since it is a collective effort for the future that is lead by personal values.

Feelings and cognitions:

- Most people feel young (71.8%).
- 75.1% of users find that the amount go clothes they own is enough and that they are grateful for it. This is interesting in relation to sustainable fashion since most people realize they have enough clothing to live with.
- Users tend to have some trust (73.3%) on the fashion brands they buy from. This may be to the fact that the question states to the brands they buy from, which could imply they have more knowledge of the production process. It is also important to note that the word some is also vague, implying there is still room for distrust. Total trust was voted the least (13.5%) and no trust in the middle (17.1%).
- Most people research (51.5%) or at least consider (49.5%) who made their clothes. Only a small percentage (2.5%) has never thought about it at all. It is important to mention that most people that answered this experiment were users of Fashion Revolution Italia, so they have some relation or interest in the fashion world.

Tangibility:

- Users hope that the future generations enjoy a cleaner environment (70.5%) and greater rights and freedoms (67%). Most people don't consider greater opportunity for leisure (15%).
- In daily life, people mostly consider recycling plastic and glasses (73.3%) and shopping ethically (64.7%). Buying fair trade labelling is the least considered (23.9%). This may be the reason since the most voted options are the most present and popular in society. Certifications and labelling are harder to comprehend.
- Most people consider that fashion should tackle protection of the environment (77.3%) and climate change (74.2%). Moreover, the other options in the

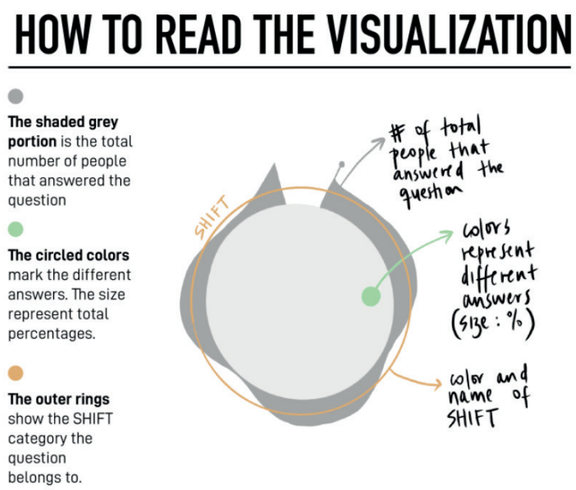


Figure 062: Visualization key for all graphics relating to experiment answers based in the SHIFT method. By Mary Isabel Buenaventura.

experiment were also highly voted (global poverty 64.9% and gender inequality 44.1%). This could be interpreted as users found them all considerable answers or they do not know how to differentiate them between importance.

- When purchasing clothes, users voted they would pay an extra price for fair trade (64.1%) and organic materials (55.5%). Marked as 100% recyclable (48.1%) and reduce pollution on dyeing (45.9%) received similar results.
- In tangibility, people consider recycling more, but wouldn't pay an extra price for it. However, people would pay more for fair trade, but consider it less in their daily lives.

Bellow are the final figures of the experiment. Each SHIFT section is shown though a bar graphic summarized by question that includes analytical handwritten comments (see **Figures 063, 065, 067, 069** and **071**) . Each question also includes a graphic visualization based on data humanism (see **Figure 062**, the visualization data key).

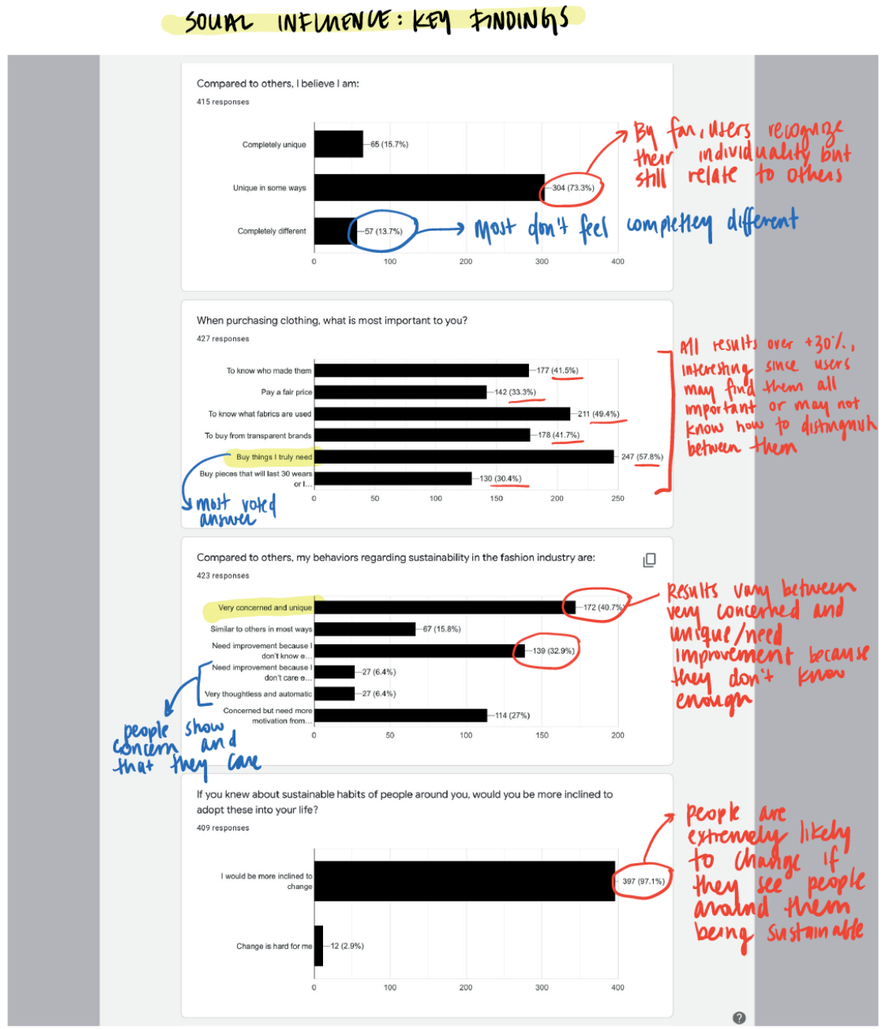
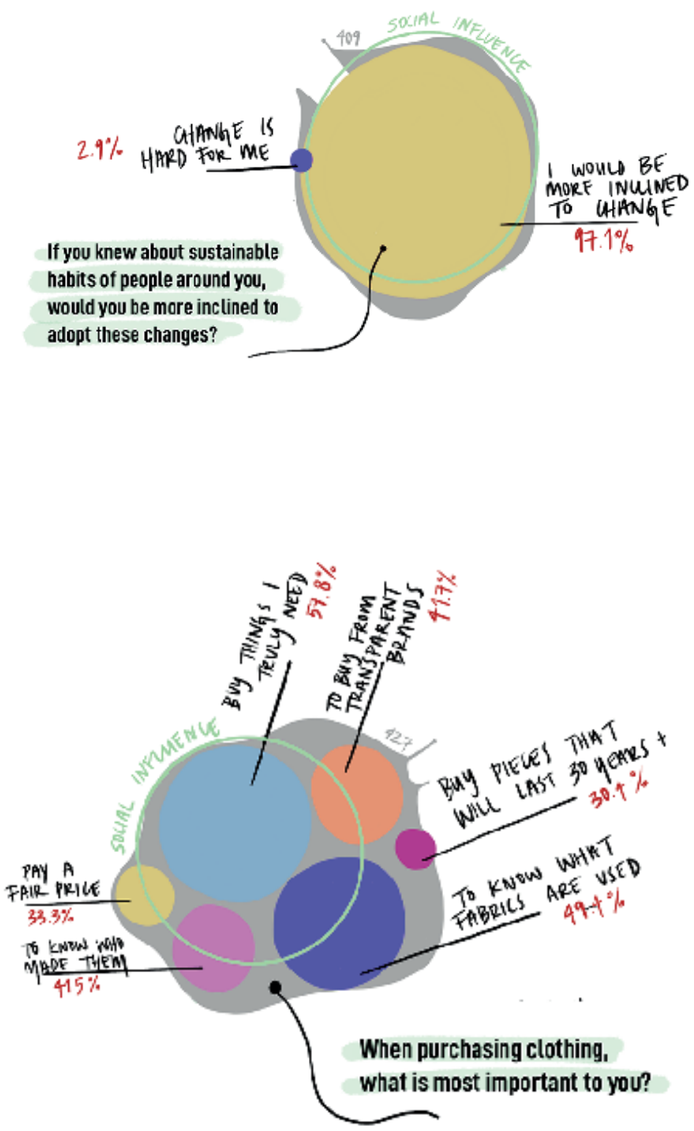
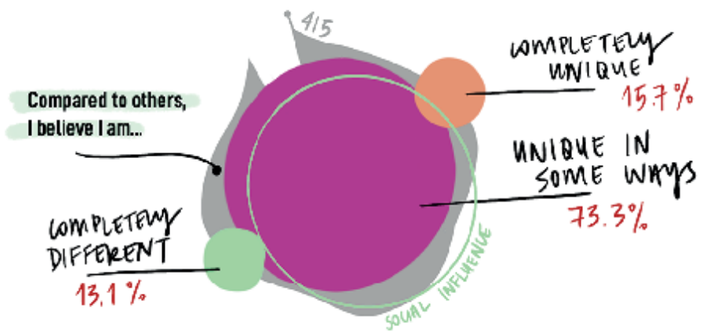


Figure 063: Bar graphs summarizing questions related to social influence (SHIFT method) with handwritten notes. By Mary Isabel Buenaventura.





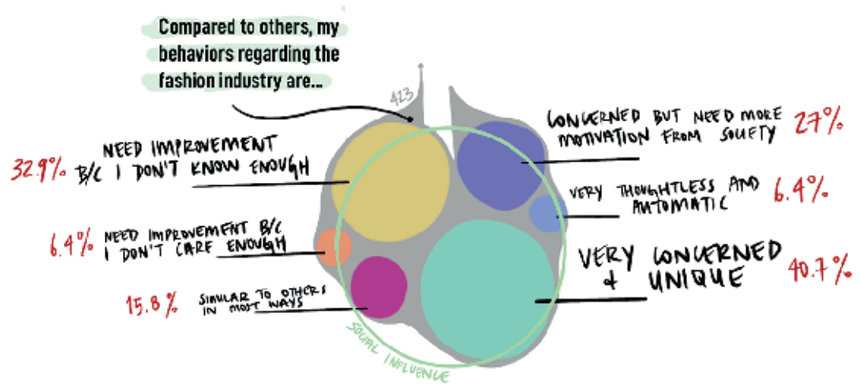


Figure 064: Graphic visualization summarizing questions related to social influence (SHIFT method). By Mary Isabel Buenaventura.

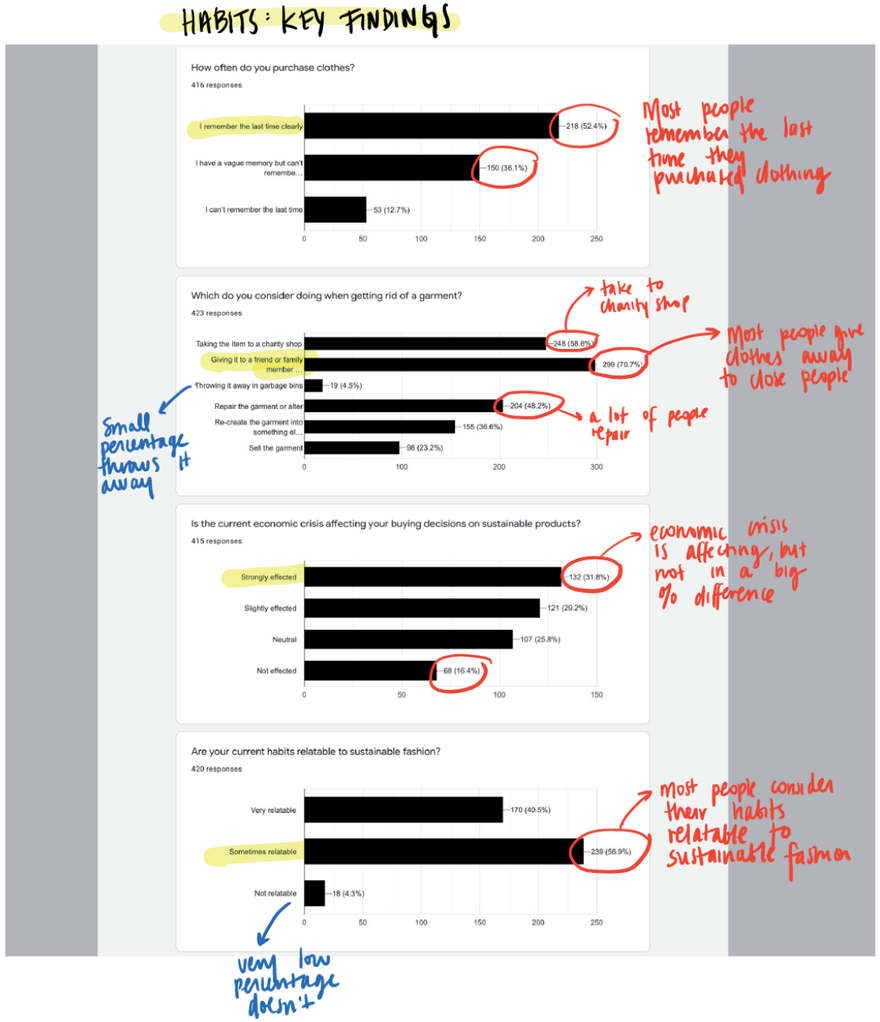
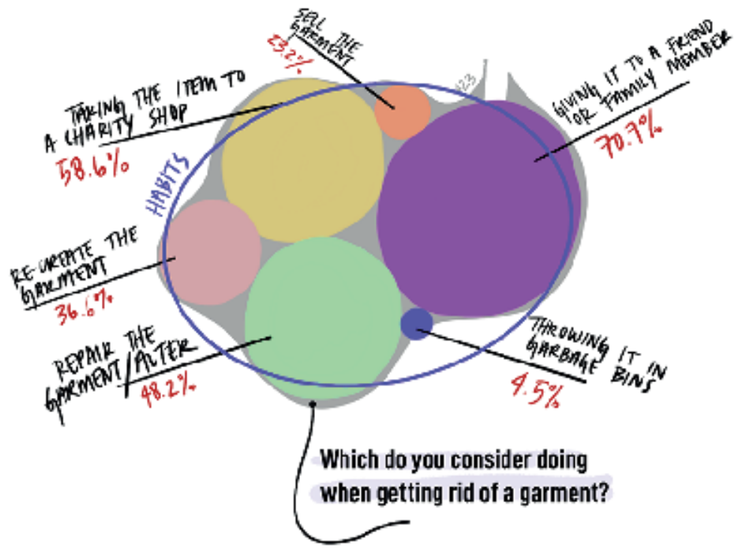
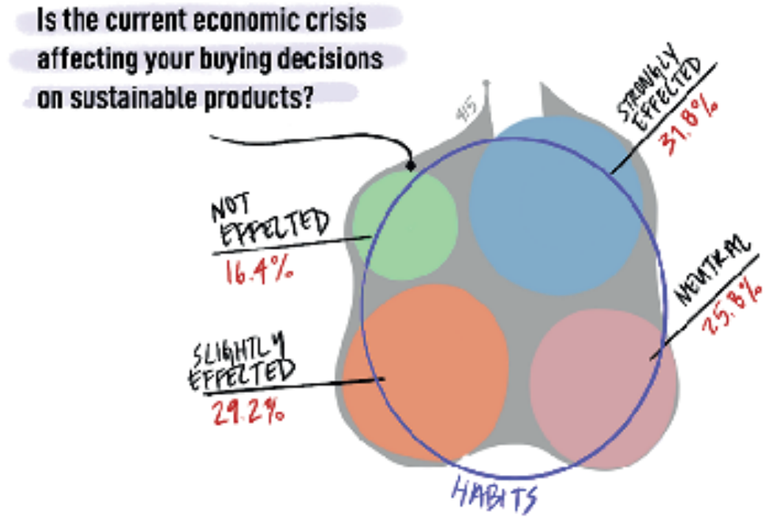
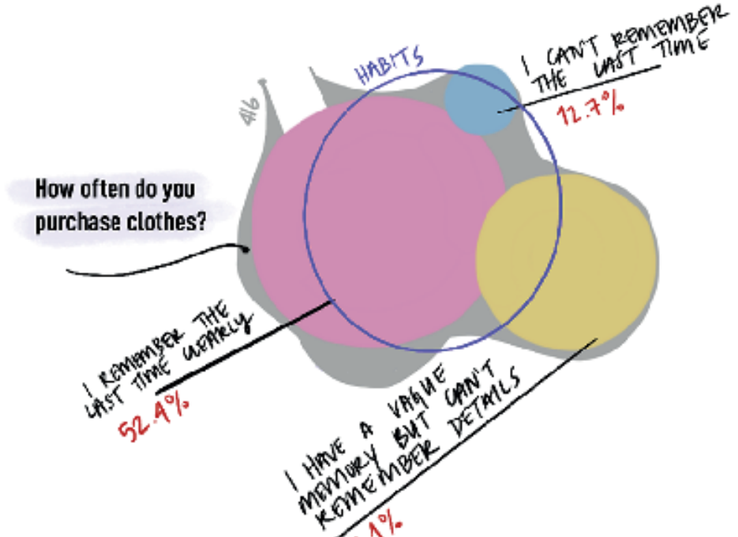


Figure 065: Bar graphs summarizing questions related to habits (SHIFT method) with handwritten notes. By Mary Isabel Buenaventura.







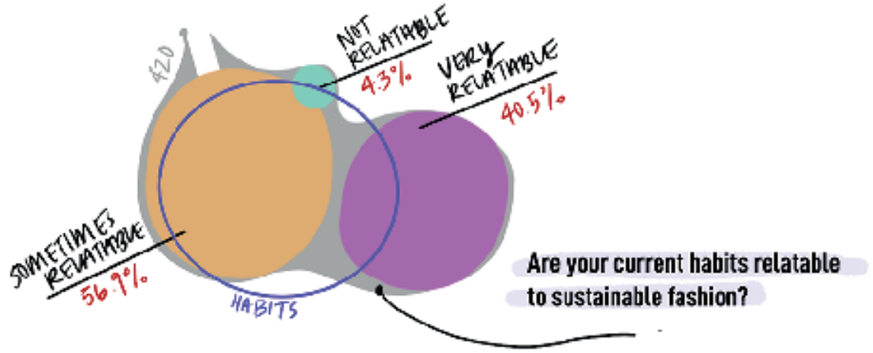


Figure 066: Graphic visualization summarizing questions related to habits (SHIFT method). By Mary Isabel Buenaventura.

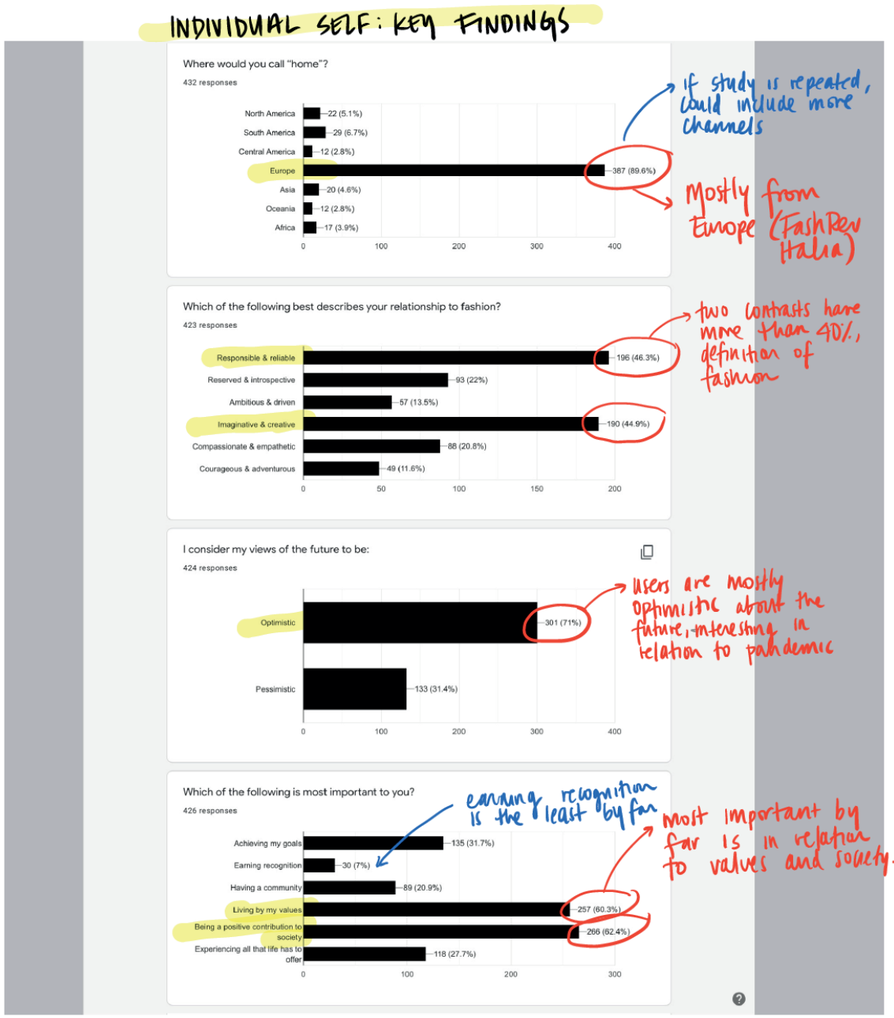
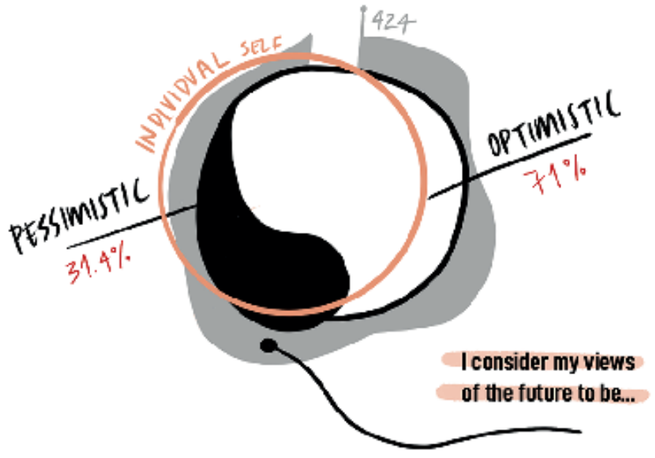
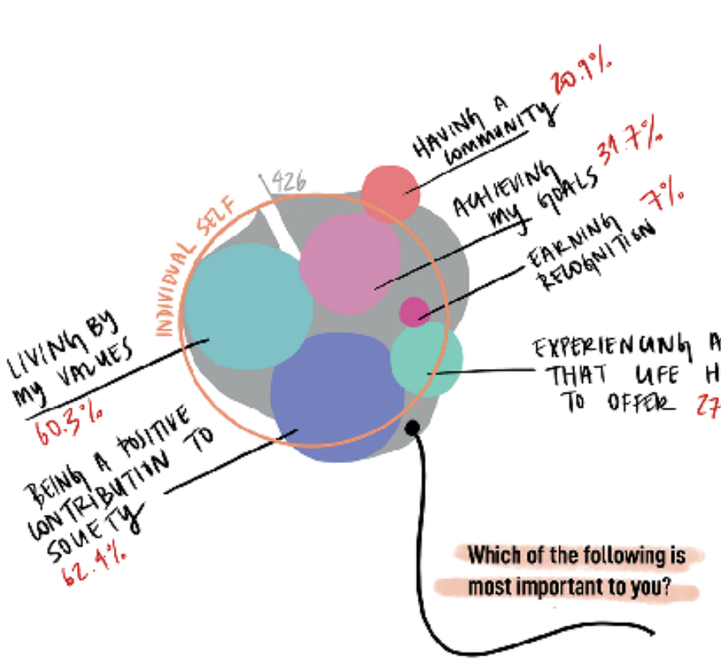
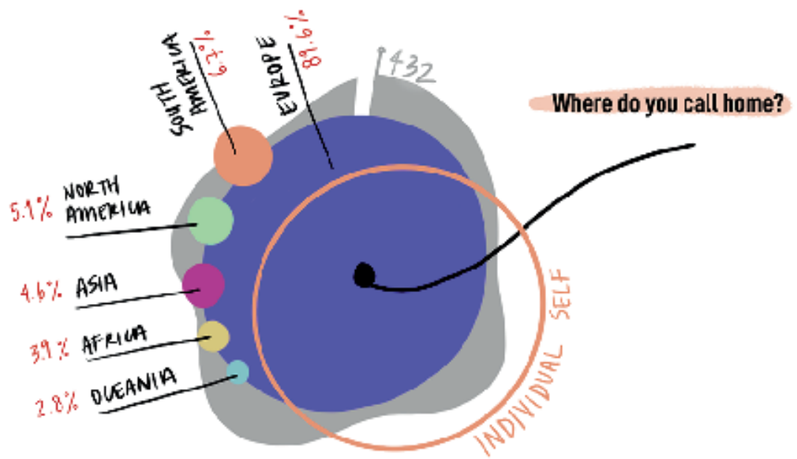


Figure 067: Bar graphs summarizing questions related to individual self (SHIFT method) with handwritten notes. By Mary Isabel Buenaventura.







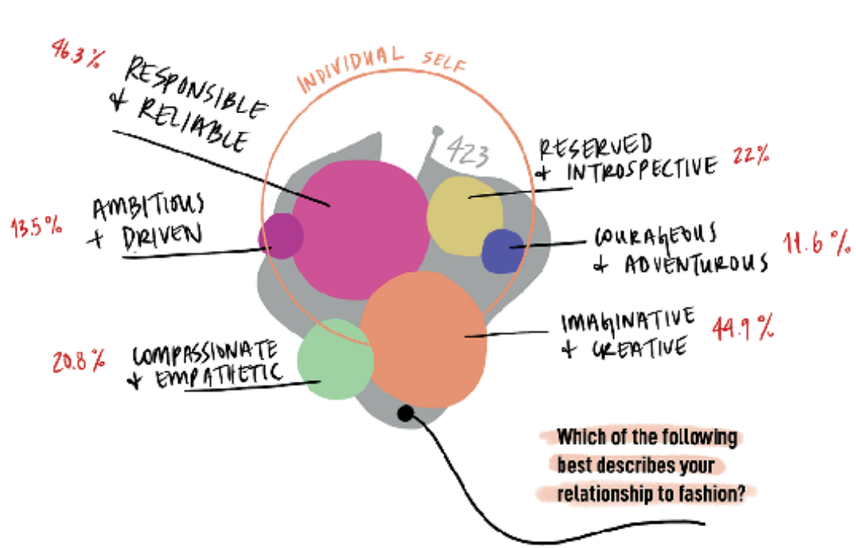


Figure 068: Graphic visualization summarizing questions related to individual self (SHIFT method). By Mary Isabel Buenaventura.

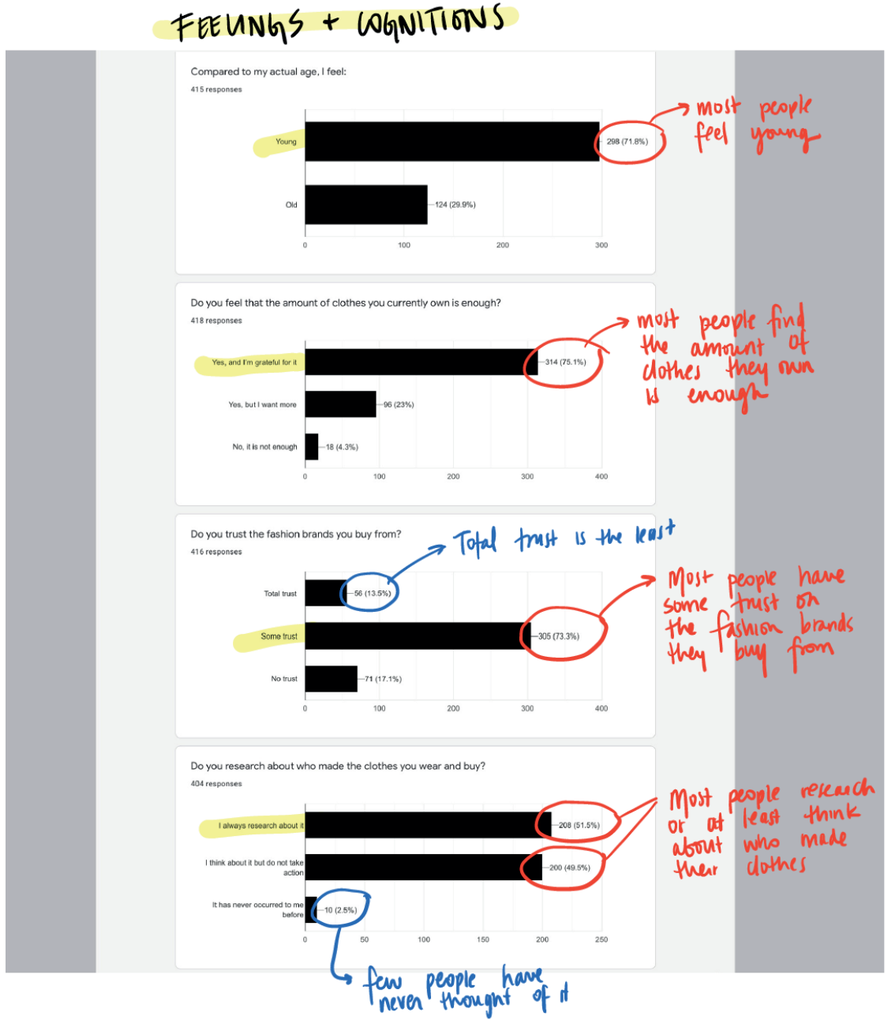
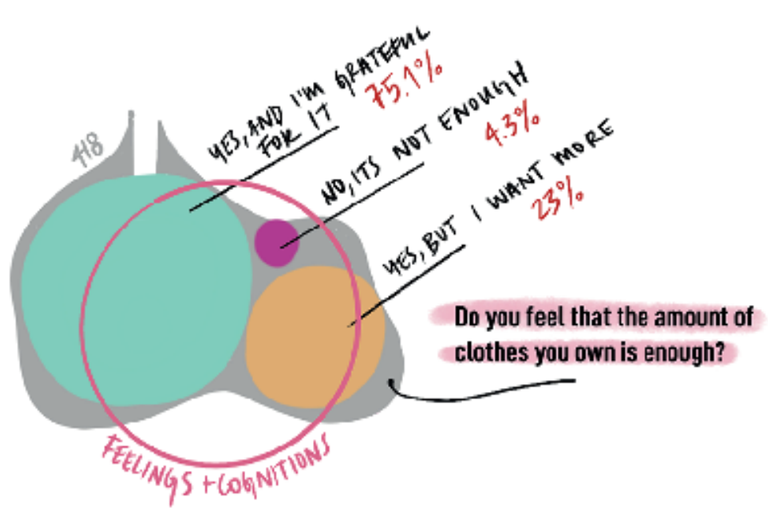
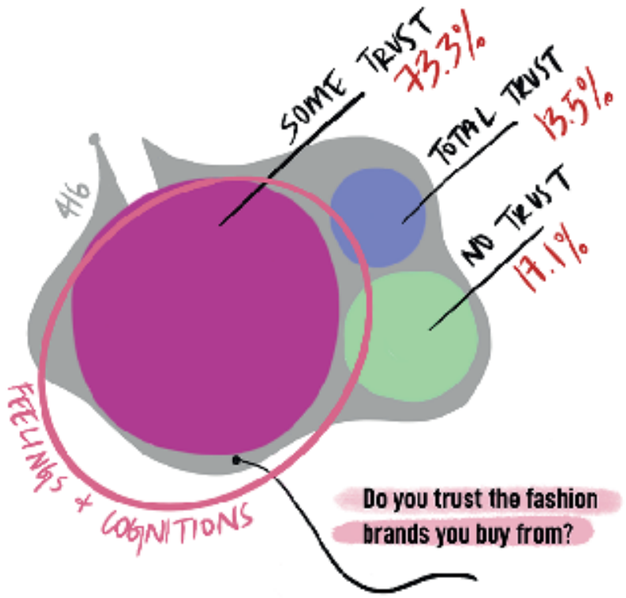
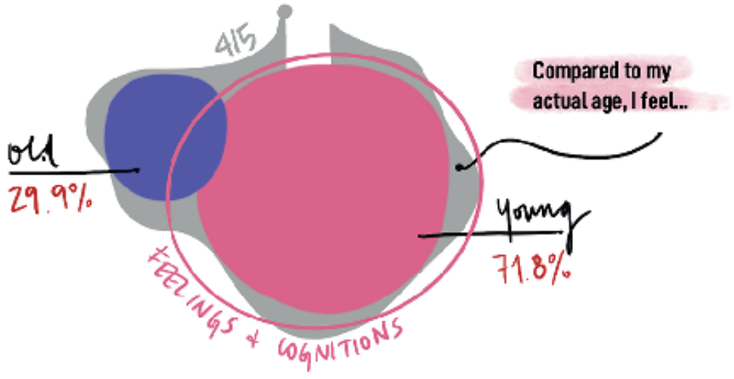


Figure 069: Bar graphs summarizing questions related to feelings and cognitions (SHIFT method) with handwritten notes.
By Mary Isabel Buenaventura.







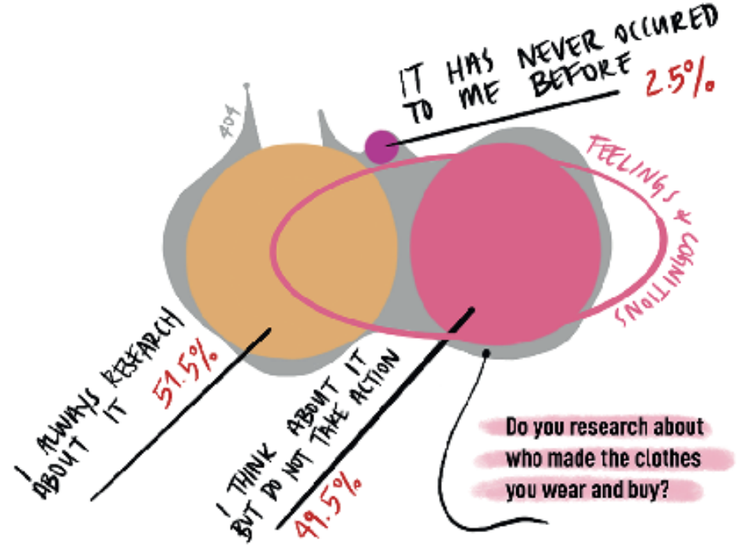


Figure 070: Graphic visualization summarizing questions related to feelings and cognitions (SHIFT method). By Mary Isabel Buenaventura.

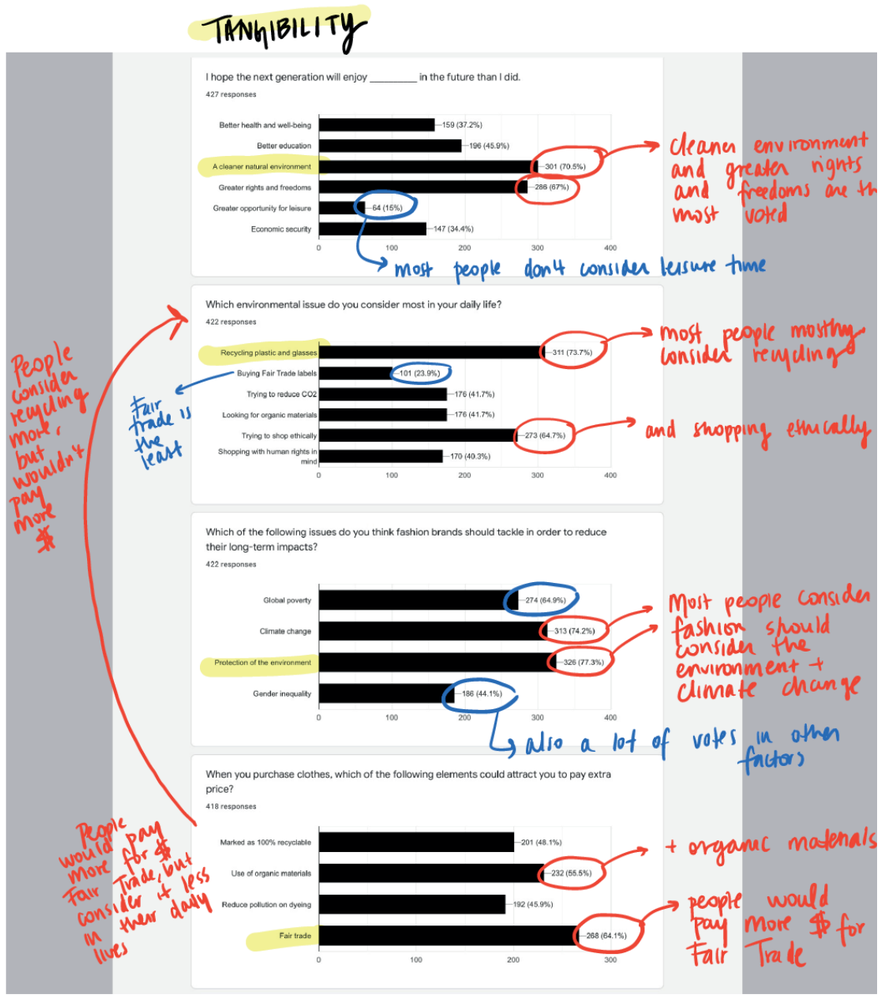
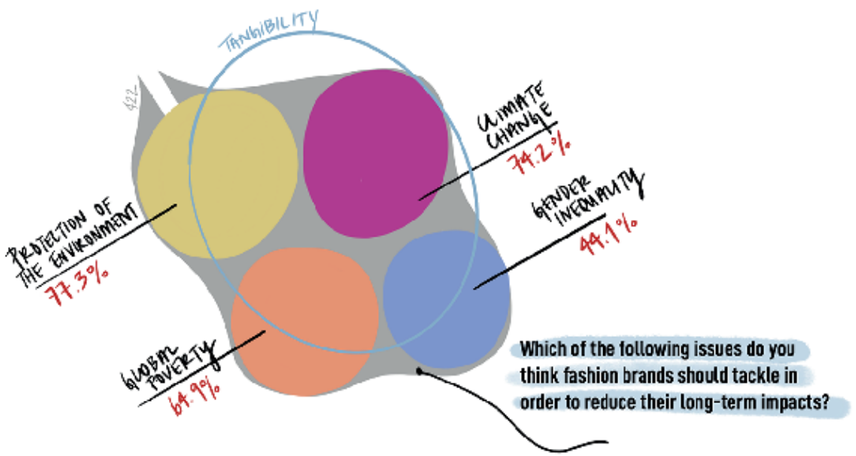
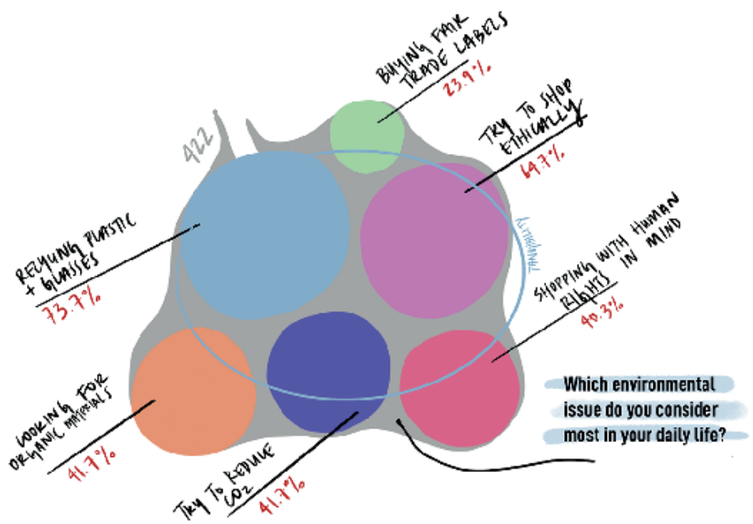
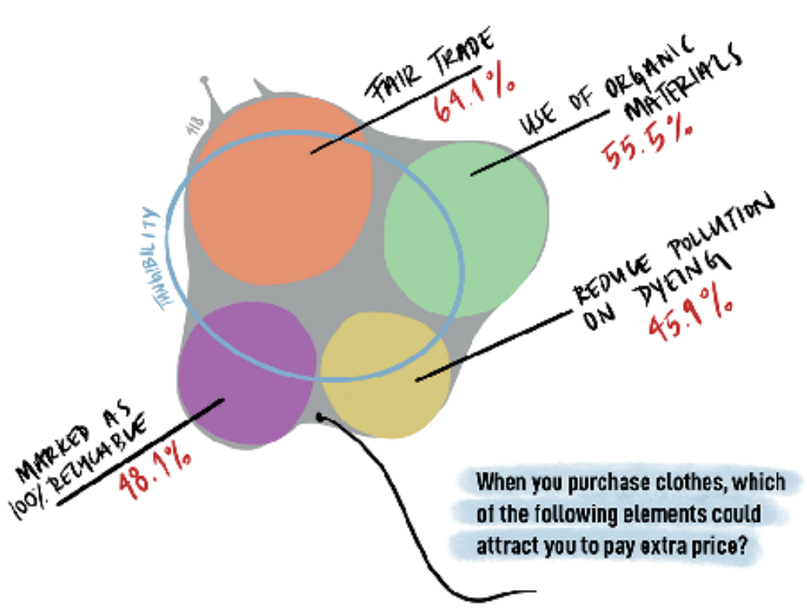


Figure 071: Bar graphs summarizing questions related to tangibility (SHIFT method) with handwritten notes. By Mary Isabel Buenaventura.







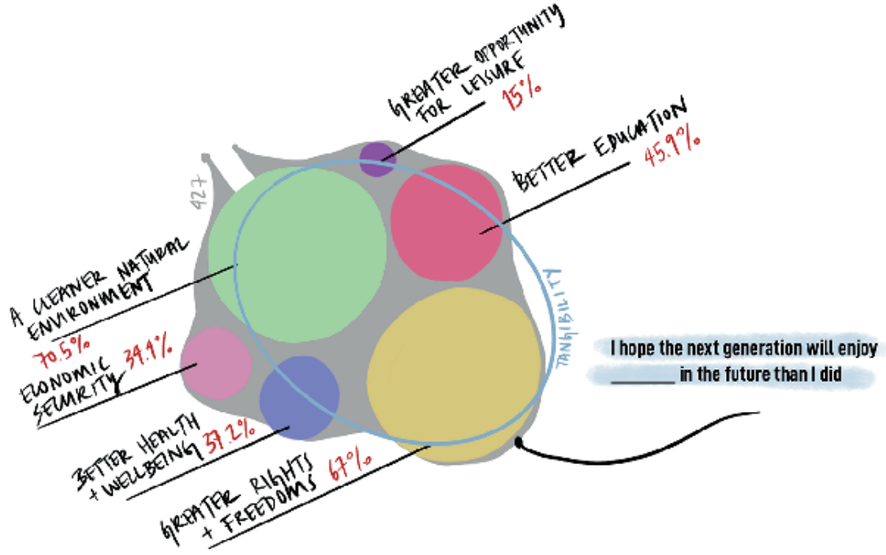


Figure 072: Graphic visualization summarizing questions related to tangibility (SHIFT method). By Mary Isabel Buenaventura.

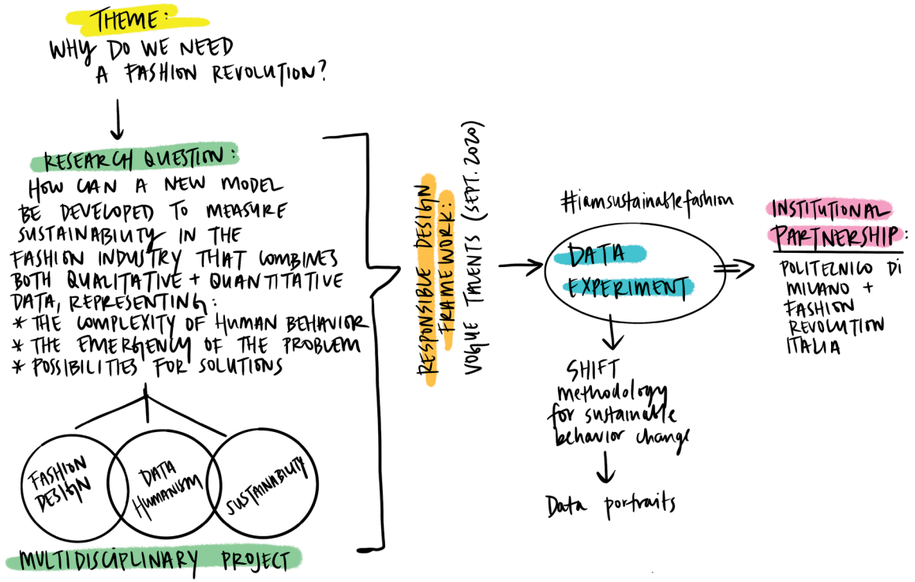


Figure 073: Master's thesis overview. By Mary Isabel Buenaventura.

4.3 Conclusions

This chapter presents the overall findings of the Master's degree thesis project. It demonstrates and reflects upon key findings of each section of the experiment, summaries the conclusions and the overall contribution of the knowledge gained and limitations uncovered.

The initial aim of the research was to create a new model of measuring sustainability in the fashion industry that combined both qualitative and quantitative data, representing the complexity of human behavior, the emergency of the problem and possibilities for solutions. In order to achieve this, the #iamsustainablefashion experiment was developed based on data humanism and the SHIFT method, targeting a human-centered platform for people to visualize their relationship to sustainability in the fashion industry. It was targeted to people that are interested in fashion: designers, artists, consumers, brand owners and managers, etc. This is why I teamed with Fashion Revolution Italia in order to share and obtain users for the experiment (see **Figure 073**).

The research has addressed the need for an enabling system and tool to support users and other stakeholders (both design involved people and the public) in order to facilitate sustainable fashion solutions through human centered processes at the idea generation stages of the design process. The central input for #iamsustainablefashion is to create awareness towards sustainability in a personal approach. A new conceptual framework for sustainable fashion design was proposed as well in order to backup the project, based on the Vogue Talents project of Milan Fashion Week of September 2020.

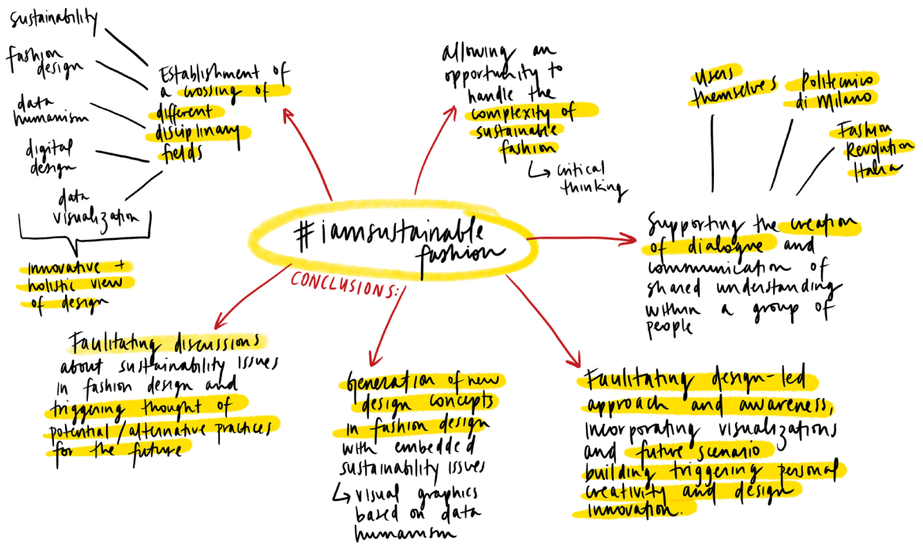


Figure 074: Master's thesis conclusions. By Mary Isabel Buenaventura.

The overall feedback from the participants indicated that the experiment allows users to create more sustainable awareness and identified that taking sustainability to a more personal level based on education plays an important tole in generating new solutions. The experiment has helped establish sustainability in the fashion industry as a core objective, and provided tangibility for understanding, encouraging and communication based on a social media network. These approached strategies encourage users to understand sustainability in a more holistic view. Presenting the overall values of using the experiment and method can be essential to encourage user engagement for sustainable fashion design practices. A summary of the overall investigation conclusions is indicated (see **Figure 074**):

1. Allowing an opportunity to handle the complexity of sustainable fashion and develop personal and critical thinking.
2. Enabling the establishment of a crossing of different disciplinary fields, including sustainablility, fashion design, data humanism, digital design and data visualization, which allows a innovative and holistic view of design.
3. Facilitating discussion of sustainability issues in fashion design and triggering thought of what potential or alternative practices could exist for the future.
4. Capability to generate new design concepts in fashion design with embedded sustainability issues, such as visual graphics based on data humanism.
5. Facilitating design-led approach and awareness, incorporating visualizations and future scenario building triggering personal creativity and design innovation.
6. Supporting the creation of dialogue and communication of shared understanding within a group of people, between the users themselves and different institutions (Politecnico di Milano and Fashion Revolution Italia).

Sustainable fashion design is still not a well-established area and the notion of sustainability and fashion design is shifting and evolving throughout the time and context. This experiment provides a contemporary and specific opportunity to understand how participants are relating to sustainability during this time. Although sustainability should be embodied within philosophical or ethical consideration through cultural movement, there is a requirement of an enabling system that supports more informed decisions and creates a new alternative solution for future design, in order to facilitate sustainability as a cultural movement. As Madge (1997) defined green and eco-design, the dominant design research in fashion and textiles has been focused on a single environmental problem of the clothing life cycle. Although each stage of a single focused environmental problem is an essential contribution and equally important to sustainability, there is the need for significant recognition of the system and interconnection as a whole. This experiment, based on data humanism, helps people understand the need to take a holistic view.

This Master's degree project has enables participants to explore unstructured and complex issues in sustainable fashion design and to develop a systematic transformative model for facilitating sustainable fashion design. The research has addressed the gap between theory and practice by incorporating a theoretical framework into a practical level of a design led research.

Bibliography.

Banerjee, Bobby & Iyer, Easwar & Kashyap, Rajiv. (2003). Corporate Environmentalism: Antecedents and Influence of Industry Type. Journal of Marketing - J MARKETING. 67. 106-122. 10.1509/jmkg.67.2.106.18604.

Bhamra, T.A. and Lofthouse, V.A. (2007) Design for sustainability: A practical approach, Hampshire, England, Aldershot: Gower publishing.

Birtwistle, G. and Moore, C.M. (2007) Fashion clothing – where does it all end up?, International Journal of Retail & Distribution Management, vol. 35, no.3, pp.210 – 216.

Black, S. (2008) Eco-Chic: The Fashion Paradox, London, Black Dog Publishing Limited.

Bowman, K. (1997). American Fashion Embraces the Casual and Comfortable. American Enterprise Institute. https://www.aei.org/articles/american-fashion-embraces-the-casual-and-comfortable/

Brown, Tom J. and Peter A. Dacin (1997), “The Company and the Product: Corporate Associations and Consumer Product Responses,” Journal of Marketing, 61 (1), 68–84.

Chakrabati, M. (2003) Towards an Operational Definition of Sustainability, St Joseph’s College: Darjeeling, India.

Chapman, A. (2010) Mistra future fashion –Review of life cycle assessments of clothing, Oakdene Hollins Research & Consulting Mistra, Retrieved June, 2012, from http://www.oakdenehollins.co.uk/pdf.php w=2010_mistra_review_of_life_cycle_assessments_of_clothing.pdf&when=457

Chapman, J and Grant, N. (2007) Designers, Visionaries & Other Stories: A collection of sustainable design essays, London, Earthscan.

Chapman, J. (2005) Emotionally durable design, London, Earthscan.

Defra (2007) Sustainable clothing roadmap: meeting briefing note. The Department for Environment, London: Food and Rural Affairs (DEFRA), Retrieved June, 2013, from http://archive.defra.gov.uk/environment/business/products/roadmaps/clothing/documents/clothing-briefing-Sept07.pdf

Ellen McArtur Foundation, N. (2019). New Plastics Economy Global Commitment Spring 2019. https://www.ellenmacarthurfoundation.org/news/spring-2019-report

Ewen, S. (1988) All Consuming Images: The Politics of Style in Contemporary Culture, New York: Basic Books.

Farbenkugel in 7 Lichtstufen und 12 Tönen (Color sphere in 7 light values and 12 tones), Johannes Itten, 1921. Lithograph. 74.3 x 32.2 cm. From Bruno Adler, ed., Utopia: Dokumente der Wirklichkeit I/II (Weimar, 1921), foldout from inside cover. The Getty Research Institute, 85-B9544-2

Farrer, J. and Fraser, K. (2011) Sustainable vs unsustainable: articulating division in the fashion textiles industry, Anti-po-des Design Research Journal, vol.1, no.4, pp. 1-12.

Fuad-Luke, A. (2009) Design activism: Beautiful strangeness for a sustainable world, London, Earthscan.

Gam, H. J. and Banning, J. (2011) Addressing sustainable apparel design challenges with Problem-Based Learning, Clothing and Textiles Research Journal, vol. 29, no. 3, pp.202–215.

GCU Fair Fashion Center. (2020). GCU Fair Fashion Center. About the Fair Fashion Center. https://www.gcufairfashioncenter.org/about-fair-fashion-center

Global Fashion Agenda & The Boston Consulting Group. (2017). The Pulse of the Fashion Industry. https://static1.squarespace.com/static/5810348d59cc68e529b7d9ba/t/596454f715d5db35061ea63e/1499747644232/Pulse-of-the-Fashion-Industry_2017.pdf

Global Fashion Agenda. (2020). CEO Agenda 2020 — GLOBAL FASHION AGENDA. https://wordpress.globalfashionagenda.com/report/ceo-agenda-2020/

Guha, R. (2000) Environmentalism: A global history, New York, Longman.

Hig MSI Materials Sustainability Index, X. (2020). Higg Materials Sustainability Index (MSI). https://stage.msi.higg.org/page/learn-more

IUCN/ UNEP/ WWF (1980) World Conservation Strategy: Living Resource Conservation for Sustainable Development, Gland, Schweiz.

Jorgensen, U., Olsen, S.I., Jorgensen, S.M., Hauschild, M. & Hagelskjaer, L. (2006) Waste prevention, waste policy and innovation, Lyngby: Technical Institute of Denmark, Department of Manufacturing Engineering and Management (IPL).

Kunz, G. (2005) Merchandising theory, principles, and practice (2nd ed.). New York, NY: Fairchild Publications.

Lele, S. (1991) Sustainable development: A critical review, World Development, vol.19, no. 6, pp. 607-621.

Lupi, G. (2020). Data Humanism. GIORGIALUPI. http://giorgialupi.com/data-humanism-my-manifesto-for-a-new-data-wold

Madge, P. 1997, 'Ecological design: A new critique', Design Issue, vol.13, no. 2, pp. 44-54.

McDonough, W. and Braungart, M. (2002) Cradle to Cradle: Remaking the Way We Make Things, New York: North Pont Press.

O'Riorden, T. (1985) Research and Policy Review 6: Future Directions for Environmental Policy, Environment and Planning A, vol.17, no.11, pp. 1431-1446.

Papanek, V. (1985) Design for the Real World, (2nd. ed.), London, Thames and Hudson.

Prochaska, J. O., and Velicer, W. F. “The Transtheoretical Model of Health Behavior Change.” American Journal of Health Promotion, 1997, 12(1), 38–48.

Redclift, M.R. (2000) Sustainability: life chances and livelihoods, Routledge, London; New York.

Robinson, J. (2004) Squaring the circle? Some thoughts on the idea of sustainable development, ecological economics 48, pp.372.

Romana Rinaldi, Francesa. Fashion Industry 2030. Reshaping the Future Through Sustainability and Responsible Innovation. Bocconi University Press, 2019.

Saicheua, V., Cooper, T. and Knox, A (2012) Public understanding towards sustainable clothing and the supply chain, Retrieved June, 2013, from http://www.fashion.arts.ac.uk/media/research/documents/vaeovan-saicheua.pdf

Spedding C. (1996) Agriculture and the Citizen, Chapman and Hall, London, pp. 149–157.

The Business of Fashion and McKinsey & Company. (2016). The State of Fashion 2017. https://www.mckinsey.com/~/media/McKinsey/Industries/Retail/Our%20Insights/The%20state%20of%20fashion/The-state-of-fashion-2017-McK-BoF-report.pdf

The Business of Fashion and McKinsey & Company. (2019). The State of Fashion 2019. https://www.mckinsey.com/~/media/McKinsey/Industries/Retail/Our%20Insights/The%20State%20of%20Fashion%202019%20A%20year%20of%20awakening/The-State-of-Fashion-2019-final.pdf

The Textile Exchange. (2019). Preferred Fiber & Materials Market Report 2017. https://store.textileexchange.org/wp-content/uploads/woocommerce_uploads/2019/04/Textile-Exchange_Preferred-Fiber-Materials-Market-Report_2017-1.pdf

The United Nations. (2020). The 17 Goals Sustainable Development. https://sdgs.un.org/goals

Thorpe, A. (2007) The designer's atlas of sustainability, Washington DC: Island Press.

Thorpe, A. (2010), Design's Role in Sustainable Consumption, Design Issues, Vol. 26, No. 2, Pages 3-16.

Ward, M., Maino, S., & Guazzarini, S. (2020, September). Responsible Design. Vogue Talents. https://voguetalents.vogue.it/en/new-frontiers-of-awareness/responsible-design

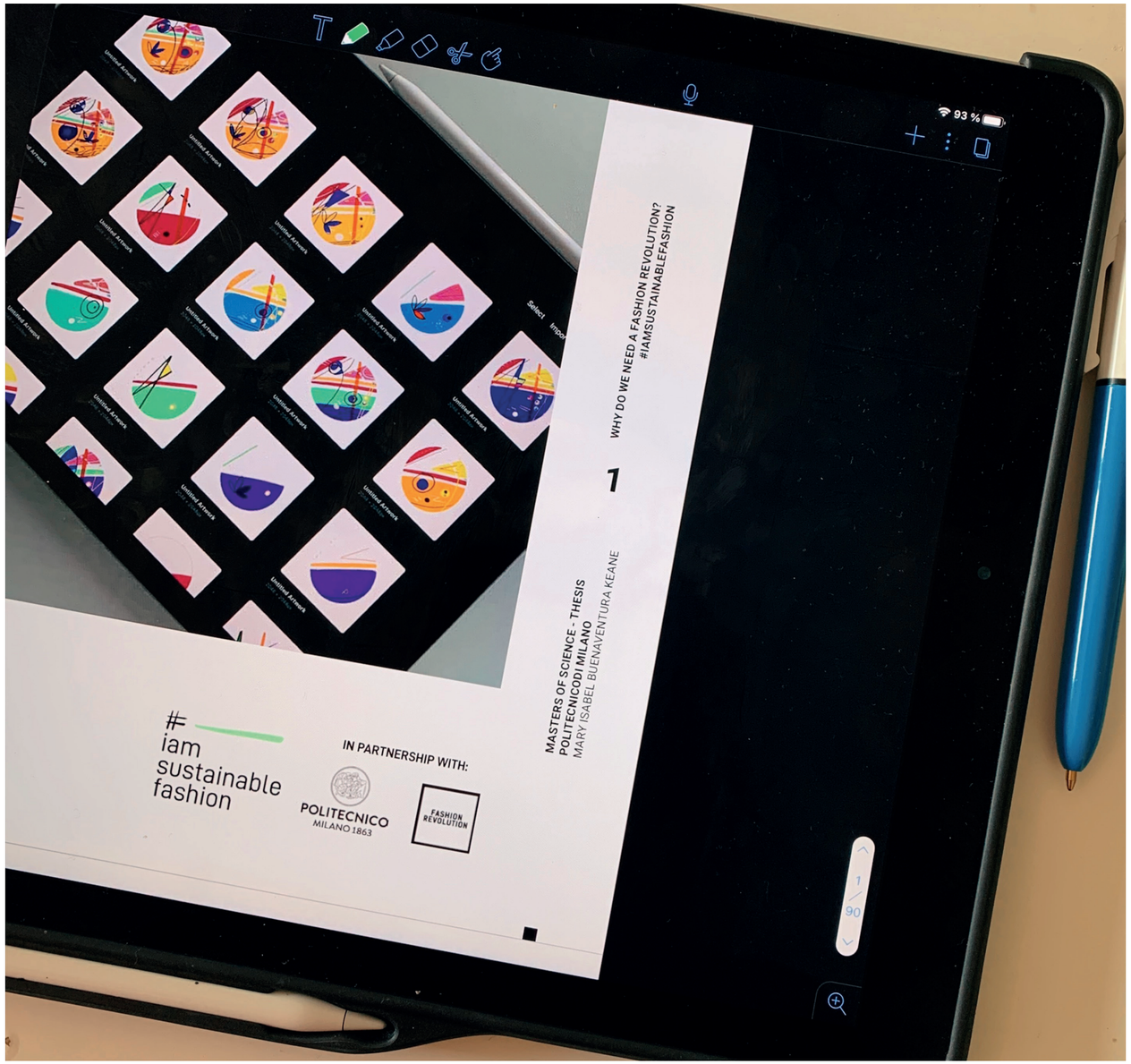
Welters, L. (2008) The Fashion of Sustainability, (Ed) Hethorn J, Ulasewicz C, Sustainable Fashion Why Now? : A conversation about issues, practices and possibilities, New York, Fairchild Books, INC.

White, K., Habib, R., & Hardisty, D. J. (2019). How to SHIFT Consumer Behaviors to be More Sustainable: A Literature Review and Guiding Framework. Journal of Marketing, 83(3), 22–49. https://doi.org/10.1177/0022242919825649

Whiteley, N. (1998), Design for Society, London, Reaktion Books.

World Commission on Environment and Development (WCED).1987, Our common future, Oxford, Oxford university press, pp. 54.

Yurchisin, J and Johnson, K.K.P (2010) Fashion and the Consumer (Understanding Fashion), Berg.



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