Transforming the Fashion Industry's Supply Chain: An Analysis of Public Perceptions and Willingness to Pay for Sustainable Transformation

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Abstract

The basis of this thesis is a business idea based on building a sustainable supply chain for the fashion industry by transforming its upstream activities through a consultancy firm. The aim of this thesis was to determine the most problematic upstream activities and identify the sustainability initiatives that are most impactful in countering these problems. The impact was measured through a quantitative analysis of consumer's WTP an additional cost (25%) for a sustainability initiative. Four sustainability initiatives were shortlisted after analysing the social and environmental impacts of the upstream activities, product composition, recycle/repair/reuse, transparency, and responsible sourcing. An online survey was conducted, and participants were presented with scenarios representing each initiative. Linear regression model was used to identify if demographics or the influence of sustainability had any impact on the participant's WTP for each initiative. The purpose of this analysis was to determine if there was a pattern in the general population on how they perceive different initiatives. The results of this analysis indicated that participants that were more influenced by the social and environmental impacts were more likely to pay 25% more for a product that is composed of recycled materials. It further revealed that females were more likely to pay 25% more for a brand that is actively taking initiatives to recycle/repair/reuse, and age has a negative impact on this initiative, while income has a positive impact on this initiative. No significant impact was observed for the transparency initiative, whereas females were more likely to pay 25% more for a product that is sourced responsibly.

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Keywords: sustainability initiatives, supply chain responsibility, upstream activities, WTP (willingness to pay), fashion.

Resumo

Esta tese propõe a construção de uma cadeia de abastecimento sustentável na indústria da moda, por meio de uma empresa de consultoria. O objetivo foi identificar as atividades upstream problemáticas e as iniciativas de sustentabilidade mais impactantes para combatê-las. Foi realizada uma análise quantitativa da disposição para pagar (WTP) por uma iniciativa de sustentabilidade, com um custo adicional de 25%. Quatro iniciativas foram selecionadas com base nos impactos sociais e ambientais, composição do produto, reciclagem/reparo/reutilização, transparência e obtenção responsável de matéria-prima. Um questionário online apresentou cenários representativos de cada iniciativa aos participantes. Uma análise de regressão linear mostrou que aqueles mais sensíveis aos impactos sociais e ambientais estavam dispostos a pagar 25% a mais por produtos com materiais reciclados. Mulheres demonstraram maior propensão a pagar mais por marcas com iniciativas ativas de reciclagem/reparo/reutilização, enquanto idade teve um impacto negativo e renda teve um impacto positivo nessa iniciativa. Não houve impacto significativo na iniciativa de transparência, mas mulheres mostraram maior propensão a pagar mais por produtos obtidos de forma responsável.

Título: Transformando a Cadeia de Abastecimento da Indústria da Moda: Uma Análise das Perceções Públicas e Disposição para Pagar por uma Transformação Sustentável

Autor: Noor-ud-din Ahmad Butt

Palavras-chave: iniciativas de sustentabilidade, responsabilidade da cadeia de abastecimento, actividades a montante, WTP (vontade de pagar), moda.

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1. Introduction

The global textile market size was estimated to be USD 993.6 billion in 2021 and is expected to grow at a compound annual rate of approximately 4.0% from 2022 to 2030 (Pillai, 2022). There are several factors playing a crucial role in driving this growth. The global population stands at almost 7.9 billion and is expected to reach 8.5 billion in 2030 (United Nations). Additionally, fast fashion, increase in disposable income, and development of e-commerce have massively contributed towards this growth. Evidently, from 2000 to 2014, the global clothing production was doubled, and the number of garments purchased per capita were increased by 60% (McKinsey & Company).

Consequently, fashion industry has become one of the biggest contributors of worldwide pollution, accounting for around 10% of global GHG emissions (World Bank, 2019) and is the second largest consumer of water resources. Being highly labour dependent, especially the upstream activities of its SC, the state of labour rights is also quite concerning. Overall, the current state of fashion industry is far from being sustainable, and to make it sustainable is not an easy task, as it is one of the most globalised industries today with a multitiered supply chain stretching out to multiple continents. Majority of the leading clothing brands with the highest brand value are based in either USA or European countries i.e., developed countries (Brand Finance), and they have outsourced their production to developing countries, mainly in the Asian region (World Trade Organisation, 2021), with little or no relationship with these suppliers. This lack of partnership has led to the lack of transparency and has increased the complexity of the supply chain and made it extremely difficult to keep control of environmental and ethical aspects. More than 70% of GHG emissions are contributed by the upstream activities (McKinsey & Company, 2020), and labour rights are continuously declining across these key sourcing locations (Deeley, 2021). However, the consumers today are more aware than ever before, and they are pressurising all the stakeholders to take necessary action towards making this industry sustainable. Hence, sustainability targets are being set by the existing companies, and new companies are entering the market with environmentally friendly products. To materialise these sustainability targets, companies would need support from experts, and professional consultants to either transform or establish various segments of their supply chain.

My business idea is to set up a consultancy firm that would specialise in building a sustainable supply chain for apparel companies aiming to establish or transform their upstream activities.

1.1. Problem statement

This thesis aims to address the environmental and social threats being posed by the fashion industry by exploring the potential of a professional consultancy firm that would provide support in developing a sustainable supply chain for apparel brands.

To address these threats, this thesis will begin by first analysing the current state of supply chain, and then identifying the major pain points along with strategies that are currently being adopted by the fashion brands to address these pain points. Lastly, the goal of this thesis is to recognize those areas that are most important to the consumers and if transformed, can successfully mitigate the impact of fashion industry on the planet. This will help us determine where to focus our efforts. Therefore, following research questions are proposed:

1) What is the current framework of the upstream activities, and what environmental and social impacts do they have?
2) Which stages are most problematic, and what initiatives have been taken by the apparel industry to address these problems?
3) How can these problems be used to build the company value proposition based on sustainability and how is this valued by the general population?

2. Literature Review

2.1. Historical development of the apparel industry

As this thesis addresses the environmental and ethical threats being posed by the upstream activities of apparel industry's supply chain, historical context must be given to understand how the current framework has developed over the period of time. Edmund Cartwright revolutionised the textile production with his invention of power loom in 1785. Power looms automated the weaving process, and textile manufacturing transformed from being a cottage industry to a commercial industry. Then started an era of mass production which continued to evolve for almost two centuries with remarkable innovations in processes and technology. Until the price competitiveness of the market and the rising costs of labour in the West (Europe & U.S.) forced the apparel companies to outsource their production to lower-wage countries, mainly in

Asia. Due to this globalisation, and the process of trade liberalisation in 2005, Europe and United States became top importers of apparel products (Stengg, 2021), and their main focus shifted to high-value activities such as R&D, design, marketing, and sales, while, developing countries with their cheap and readily available workforce utilised this opportunity to boost their economies and increase employment rate, for example, as of 2021, Bangladesh's textile sector provides employment to approximately four million people and is responsible for 84 percent of its exports (Berg et al, 2021). This became the traditional supply chain model, and although this model provided a cost advantage to such companies, it also resulted in longer lead-times with high amount of inventory and a subsequent risk of obsolescence (Christopher et al, 2004). However, over the next few decades, consumer demands evolved, as price was not the only factor influencing their decisions. With the rise of media, consumers were much more aware of latest fashion trends, and most importantly time became a priority. Hence, the industry could no longer compete on price alone, it had a constant need of introducing new product range on frequent basis (Bruce and Daly, 2006). To cater these needs, quick response strategies were introduced with demand-driven production and agile supply chain, which eventually led to the birth of a new concept we know today as fast fashion (Barnes and Lea-Greenwood, 2006). In contrast to the traditional 2-4 collections a year, fast fashion companies are launching as much as 20 collections a year, as it is in the case of Zara (Christopher et al, 2004). Such companies are onshoring the production activity, by sourcing trendy products from facilities located in their region for increased flexibility and responsiveness to the market, while sourcing basic products from traditional countries in Asia (Caro and Martínez-de-Albéniz, 2015). In the following part of this thesis, differences between these models will be analysed in terms of their upstream activities.

2.2. Current framework of the upstream activities

An apparel product generally goes through three elemental stages in the upstream activities of the value chain. Fibre production is the initial stage of any product and depending on its material composition there are multiple options available. These fibres are either extracted from natural materials such as cotton, linen, wool etc., or made synthetically through polymerisation such as polyester, nylon etc., or a combination of natural and synthetic fibres is used to create a blend for achieving certain properties, known as semi-synthetic fibres. According to an estimation in 2016 (Figure 1), the global apparel market is composed of 64% synthetic fibres, 30% natural fibres with 24% being cotton, and around 6% semi-synthetic fibres (Notten, 2020). In terms of geographical distribution, estimations drawn from production data by Quantis in 2018 demonstrates that China produces around 57% of the global fibres, followed by India with 13%. EU produces 7% of the global share, while USA contributes 4% and the remaining 19% is supplied by rest of the world (Notten, 2020).

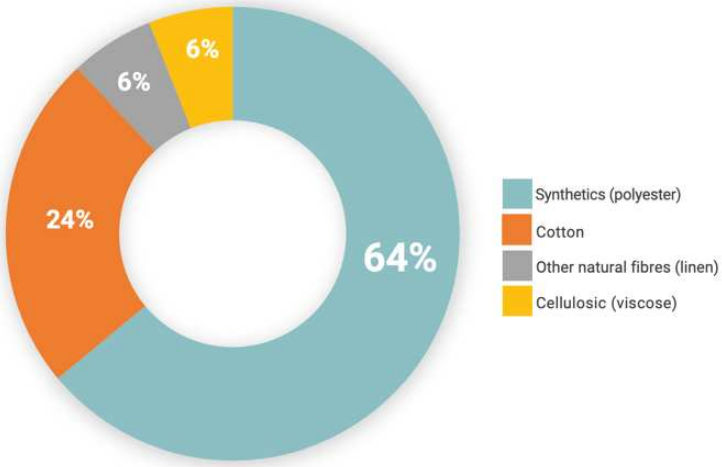

Figure 1: The global fabric market share (UNEP, 2020)

After the fibres are generated, they go through yarn preparation and fabric production. Depending on their usage and desired characteristics, yarns are either woven or knitted to produce fabric. Weaving and knitting are the most vastly used processes, however, other methods could be used to bond yarns such as felting. China dominates the global yarn preparation and fabric production as well, with a total contribution of 64% and 60%, respectively. India prepares 9%, and Pakistan produces 4% of the global yarns while the remaining 23% is contributed by rest of the world with Europe's contribution being only 1%. Similarly, in fabric production, China is followed by India, Bangladesh, and Pakistan, contributing 12%, 3%, and 2% respectively, while rest of the world produces the remaining 23% (Notten, 2020). Subsequent steps involve finishing of the fabric, and finally assembly of the apparel product, categorised as textile production stage.

Colour is the essence of any fabric, and one of the most appealing features of a garment, so naturally, finishing a fabric with the desired colour is a crucial stage of the value chain. Bleaching and dyeing are the main methods used to achieve the right colour, followed by various finishing methods as per the requirement of the fabric, such as sanding, washing, etc. These finishing methods are mainly used to improve the appearance and quality of the fabric. Regarding geographical split, 44% of bleaching/dyeing and finishing of the fabrics is processed in China, followed by 28% in Bangladesh, 11% in the EU, 16% in Turkey, and the remaining 1% in rest of the world (Notten, 2020). Lastly, once the fabric is ready, it is cut, sewed, and finished into the desired garment, and is ready to be shipped to the buyer. This manufacturing process is carried out by specialised teams with expertise in cutting, sewing, and washing (if required). Similar to the stages above, this process is also heavily weighted towards Asia, with 35% of the global apparel being prepared in China, 7% in Bangladesh, 7% in India, 6% in Vietnam, 11% in the EU, and the remaining 34% in rest of the world (Notten, 2020).

The data above illustrates high dependency on Asia, specifically China, with regards to the upstream activities of the value chain. Furthermore, to understand the geographical distribution of stages across the value chain is fundamental in understanding the environmental and social threats being posed by the apparel industry, which are discussed in the later stage of this thesis. How a company chooses to perform these value chain activities in its supply chain depends on its business strategy and how it differentiates itself in the market.

Almost 57% of the global apparel are consumed by Europe and North America (Notten, 2020), and as stated above, majority of the apparel companies are also based in Europe and USA. However, since the production is so globalised, the decision to select a sourcing location is very crucial, and depends on a product's life cycle, as aligning SCM with the new product development is vital for succeeding in the market, because individual companies are no longer competing with each other, instead it's the complete supply chain competing (Purvis et al, 2013).

Generally, apparel companies opt to outsource the upstream activities of their supply chain to developing countries to increase their performance by utilising the expertise of their suppliers at a reduced cost (Kumar and Samad, 2008). Once a new product has been developed, apparel companies could either directly reach out to the suppliers in developing countries, or through a sourcing company which acts as a mediator, or a mix of both (Köksal et al, 2018). Selecting the right supplier in a globally dispersed network is quite complex, as it could lead to loss of sales if problems are encountered in the supply chain, hence, over the period of years, it has transformed from being an operational decision to being a strategic one. Therefore, number of factors influencing this decision has increased over time.

Jensen and Pederson have categorized these factors in four major groups, mainly: cost, human capital, business environment and interaction distance (Jensen and Pedersen, 2011). The importance of these factors might vary from a company to company depending on their capabilities. Offshore outsourcing increases the production lead time and makes it difficult for a firm to respond to market trends (Al-zubaidi and Tyler, 2004). Initially, a supplier develops samples using the specifications provided by the buyer, and mass production only begins once the samples are approved. The production period could generally take 90 days if the fabric and accessories are available to the supplier in its domestic market, if not, the production lead time could be 120-150 days (Kumar and Samad, 2008). Moreover, a buyer could also encounter quality issues which further lengthens the supply chain. To minimise these issues, third-party auditors or sourcing intermediaries are used by the buyers. Hence, though offshore outsourcing could provide huge cost benefits, it is only viable for seasonal orders in bulk quantities that have a long-term market demand (Kumar and

Samad, 2008). On the contrary, for short-term market demands, fast fashion companies are resorting to different sourcing strategies.

High fashion products generally being introduced by fast fashion retailers such as Zara (Inditex) & H&M have a short product life, as they are continuously being replaced by latest fashion trends. This requires fast fashion brands to have high flexibility and responsiveness in their supply chain, which is only possible through smaller collections with shorter lead times to reduce inventory costs and the risk of obsolescence (Christopher et al, 2004). Hence, avoiding locations that are too distant even if they offer cheaper manufacturing, and implementing a combination of offshore and onshore sourcing strategies to achieve an optimal mix of cost and time. Meaning, if the demand of a product is predictable, it is outsourced to low-wage countries, whereas, if the demand is unpredictable, suppliers in proximity are selected (Arrigo, 2020). For example, 57% of Inditex's suppliers are based in geographically proximate locations, the remaining 43% are based in Asian and South American regions (Kumar and Samad, 2008), that supply low-fashion products with longer product life.

Rather than following the traditional supply chain of overseas outsourcing, Zara has vertically integrated operations with just-in-time manufacturing that can design and deliver a product at the stores with a lead time of merely 2-4 weeks, compared to the standard lead time of 6-12 months (Aftab et al, 2018). Apart from its own manufacturing plants located in Spain, Zara outsources manufacturing to ODMs located in Portugal, Turkey, Morocco, and Bulgaria to minimise transportation time, and cost. Though the production cost is higher compared to the Asian countries, it offers more control over production volume, as such that unpopular items can be cancelled to avoid product markdowns and inventory costs (Tokatli, 2008). Consequently, Zara's annual unsold inventory is only 10% compared to the industry average of 17-20% (Aftab et al, 2018). Moreover, by producing limited quantities with just-in-time manufacturing, Zara is able to push customers into buying its products at full price, rather than having to liquidate inventory at marked down prices at the end of the season. Zara sells 85% of its products at full price with an inventory turnover of 12, compared to the industry average of 60-70% products and 3-4 inventory turns per year (Kumar and Samad, 2008).

Nonetheless, as the fashion industry keeps on growing, especially with the rise of fast fashion and e-commerce, environmental and social threats are growing as well. Consumers are consistently demanding cheap and trendy products, while retailers are persistently launching newer styles at extremely low prices with a very short life span, leading to the exploitation of resources. Consequently, environmental, and social impacts of this industry have become a global concern.

2.3. Environmental and Social impacts

Statistical data for this part of the thesis has been taken from the UN – 'Sustainability and Circularity in the Textile Value Chain' report released in October 2020, which used 2016 as the baseline year for analysis, and from the 'Fashion on Climate' report published by McKinsey & Company in collaboration with Global Fashion Agenda in 2020.

2.3.1. Impact from land usage

Use of land is one of the biggest contributors to the loss of global biodiversity, which is eventually affecting the whole ecosystem of the planet. Of the total land use linked with global apparel industry, 56% is due to fibre production, followed by 10% for yarn and fabric production and 22% for textile production (Figure 2). Cotton cultivation is the main reason for this excessive land usage, using almost 2.5% of the world's fertile land, which is quite concerning when we understand that only one third of the total fibres consumed globally are natural fibres. In comparison, regenerated or cellulosic fibres do not require as much land, however, in 2018 viscose production consumed around 140 million trees, and the number is only growing. Synthetic fibres, however, do not require a large area of land to be produced.

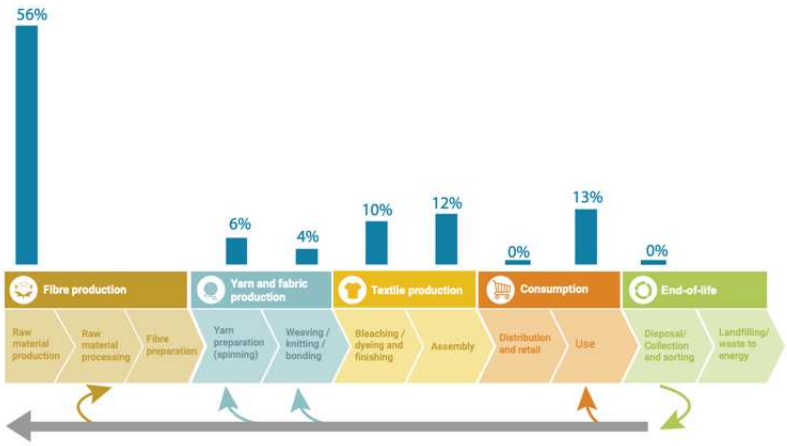

Figure 2: Land usage of the apparel industry (UNEP, 2020)

2.3.2. Impact on water resources

Water consumption is another major concern, as 215 trillion litre of water is consumed annually by the global apparel industry. Of the total freshwater consumed globally by the apparel industry, 21% is due to fibre production, 14% due to yarn and fabric production and 29% due to apparel production (Figure 4). In terms of fibre production, cotton has a very high consumption of water compared to other fibres. Data released by WWF suggests that it takes almost 2700 litres of water to produce an average cotton shirt (World Wildfire Fund, 2014). This usage of water has a huge impact on the water resources available for humans

and other industrial purposes, although this impact varies geographically depending on the level of water scarcity. With regards to the water scarcity footprint, raw material production (mainly of cotton) contributes the most, i.e., 33% across the global apparel value chain, followed by 21%, 16%, and 10% by yarn preparation, fabric production, and bleaching/dyeing, respectively (Figure 3). Moreover, the impact on water resources is not just limited to water consumption, it extends to large amount of chemicals used in manufacturing processes that when released without proper treatment end up in water channels.

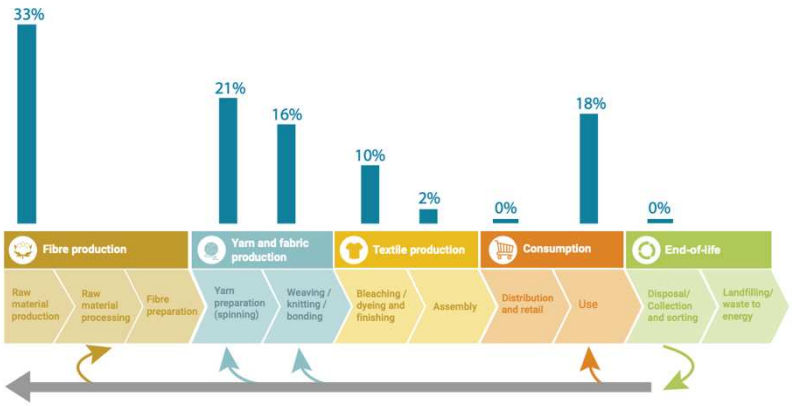

Figure 3: Water scarcity across the global apparel chain (UNEP, 2020)

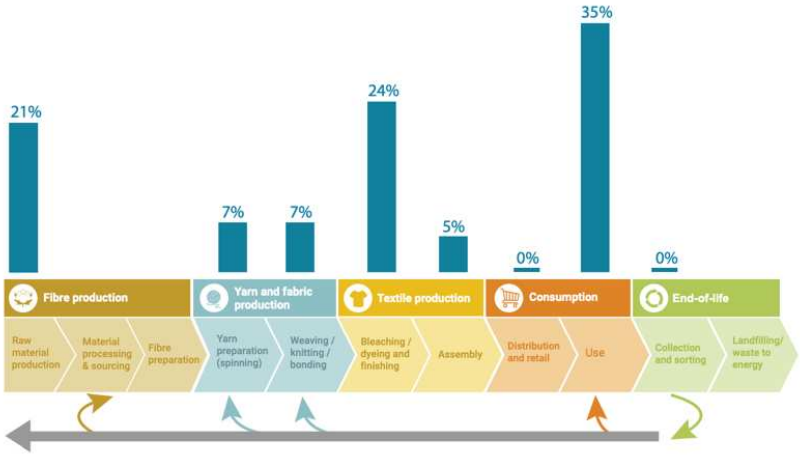

Figure 4: Freshwater usage across the global apparel chain (UNEP, 2020)

2.3.3. Impact on climate change

Global apparel industry has a significant impact on the climate change as well, accounting for almost 3.3 billion metric tons of greenhouse gases emitted annually, with upstream activities releasing almost 75% of it, because of their high energy consumption. This impact is higher than the impact created by all international flights and sea shipping combined (Ellen MacArthur Foundation, 2017). Wet processing stages of textile production such as bleaching, dyeing, and finishing requiring extensive amount of energy generated by burning fossil fuels, are the biggest contributor towards these greenhouse gases accounting for almost 36% of the total impact. Second biggest contributor in terms of upstream activities is the fibre production, mainly the synthetic fibres. Chemicals used for the production of synthetic fibres are mainly

extracted from non-renewable energy sources, primarily crude oil. Thus, heavily impacting the climate change with a contribution of around 12%. Yarn and fabric production together account for around 22% of the impact due to the energy consumed during the processes, which is mainly generated through non-renewable resources (Figure 5). Notably, emissions generated due to transportation in a globally dispersed supply chain network, and degradation in landfills is negligible compared to the high amount of emissions being produced by the production activities.

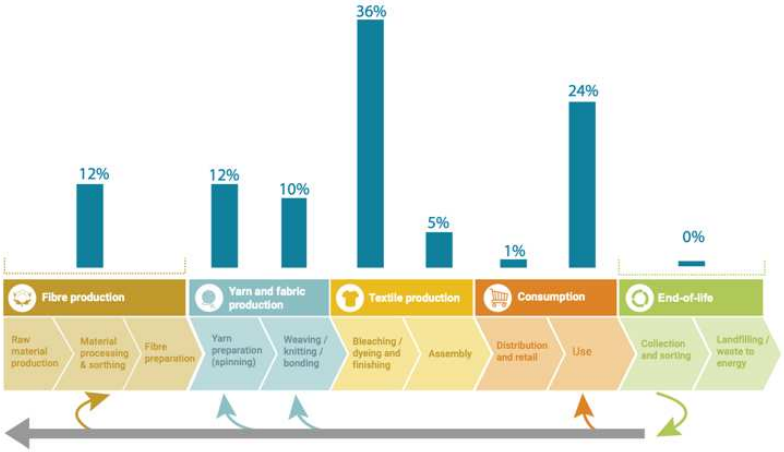

Figure 5: Climate impact across the global apparel chain (UNEP, 2020)

2.3.4. Impact on human health

Textile production requires a substantial use of chemicals at various stages. According to a study, 0.58 kg of different chemicals are required to produce 1 kg of textiles (Ellen MacArthur Foundation, 2017). Another study by Swedish chemical agency analysed 2,450 different chemicals used in textile production and discovered that almost 30% of these chemicals are harmful to human health, while 18% are harmful for the environment (KEMI, 2014). China alone consumes almost 42% of these textile chemicals due to its major share in the textile production. Wet treatment processes such as dyeing etc, have a high rate of toxins that can cause cancer in humans. A study investigated six garments, and found the use of various agents, chemicals and dyes that have a high potential for causing carcinogenic human toxicity (Sandin et al, 2019). Furthermore, production of cotton also has a high toxicity impact on humans, and most importantly, textile workers that come into contact with these chemicals are at high risk of various carcinogenic and non-carcinogenic diseases. Most of the production facilities are operating in countries that have poor chemical management systems, hence, the chemical waste is generally discharged into waterways that massively affect the local communities, since not only their drinking water is contaminated, but it also reduces biodiversity in their local communities.

2.3.5. Impact on biodiversity

Somewhere between 12-20% of total species are currently under a threat of extinction, and global apparel industry is playing a direct role in this injustice by degrading soil and contaminating water channels. Production, preparation, and processing of raw materials are generating most of the negative impact. 22.5% of insecticides, and 10% of global pesticides are used in the production of cotton which directly affects the natural habitat. Moreover, wet processes and treatments of textile are responsible for 25% of total industrial water pollution, significantly affecting the marine life (McKinsey & Company, 2020).

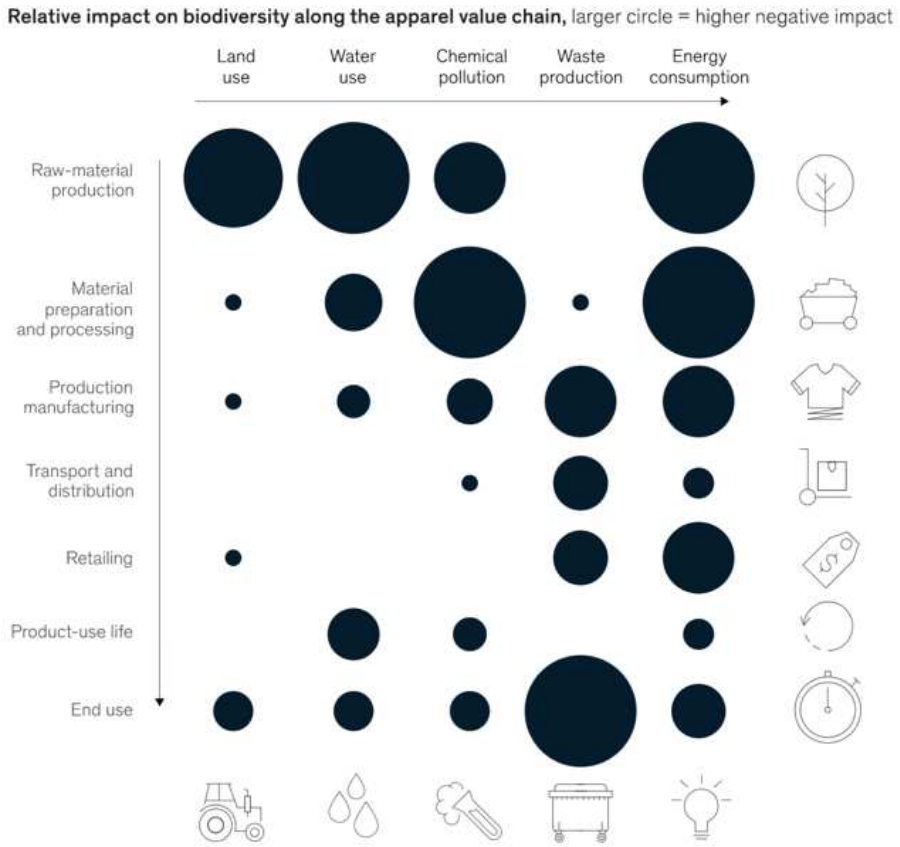

Figure 6: Impact on biodiversity across the global apparel chain (McKinsey & Company, 2020)

2.3.6. Social Threats

Most of the upstream activities are shifted to low wage countries for their significantly reduced costs. COGS (cost of goods sold) is estimated to be approximately 25% of the garment's price (FICCI, 2018), however, this cost reduction comes at a price. Apparel industry in developing countries offer one of the worst working conditions for the workers, with unsafe working environment, excessively long working hours, and extremely low wages. Labour rights have been continuously exploited by factories competing on very low margins to keep their companies profitable. The unfortunate collapse of Rana Plaza building in Bangladesh that killed 1,132 and injured more than 2,500 workers, mainly women and girls is a prime example of the

unsafe conditions, workers are being are forced to work in. Majority of these workers are women and girls, and they are often exposed to gender inequality, and sexual harassment at workplaces. Child labour is also a huge concern in this industry, especially in fibre production activities (Figure 8). Most of the upstream activities are low value activities and require low-skilled labour, hence, high amount of social risks are related to these activities. Fibre production is contributing the most to these social risks, accounting for 68% risk of fatal and non-fatal injuries, and 49% - 57% of other social risks such as child labour, forced labour, gender inequality, working below minimum wage, exposure to harmful toxins etc, followed by yarn and fabric production, and lastly, the textile production (Figure 7). There's a continuous pressure on these suppliers to offer lower prices, reduce lead times, and offer more flexibility, and in result workers are being forced to work long hours at minimum wages with no job security. Several NGOs and media outlets have tried to highlight these issues globally, and though, some retailers have tried to enforce some checks and balances, majority has been reluctant to change this model as they are directly profiting from this abuse of labour rights (Suleymanova, 2021).

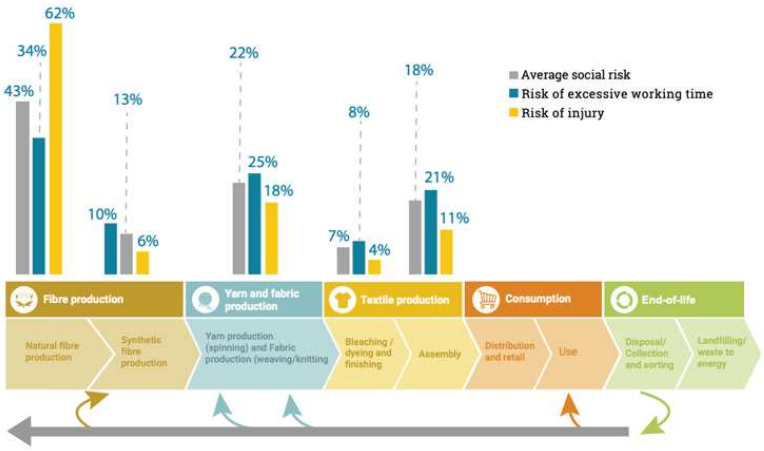

Figure 7: Social risks across the global apparel chain (UNEP, 2020)

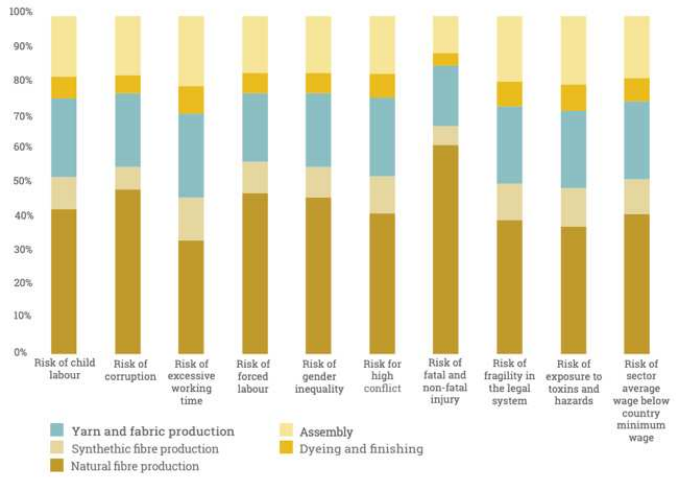

Figure 8: Social impact risk indicators across the global apparel chain (UNEP, 2020)

Almost all the upstream activities of the global apparel value chain pose an alarmingly high number of social and environmental threats. Due to the continuous pressure of consumers demanding cheaper and newer products, environmental and human resources are being exploited at a distressing rate. However, it is reasonable to conclude that fibre production and textile production are the most problematic stages with significantly higher impact compared to the rest of the value chain. In the following part of the thesis, initiatives that are currently being taken by the global apparel industry to counter these impacts, will be analysed.

2.4. Initiatives in fibre production

Since cotton farming has been associated with high social and environmental impacts, initiatives have been taken by farmers, manufacturers, and retailers to cultivate cotton in a sustainable way. One of these initiatives is a Better Cotton Initiative (BCI), comprising of more than 2,400 members throughout the value chain to reduce the impact of cotton cultivation. By raising awareness and educating farmers on sustainable farming practices to improve soil health, and reducing the amount of pesticides and insecticides, this non-profit organisation is targeting to reduce carbon emission by 50% in all the affiliated farms by 2030 (Better Cotton Strategy, 2030). As of 2021 annual report, they're actively operating in 24 countries and around 20% of global cotton production is being cultivated under this initiative (Better Cotton Annual Report, 2021). Similarly, there are other initiatives being taken at smaller scales for conventional cotton by concerned stakeholders. However, there is also a lot of interest by the consumers in organic products which has led producers to opt for organic cotton production. Organic cotton emits 50% less greenhouse gases compared to conventional cotton due to a minimal use of hazardous chemicals, and it is a much safer option for the farmers as well (McKinsey & Company, 2020). Third party certifications such as GOTS, are creating a community of producers, and manufacturers that are reducing the environmental impact. 70% fibres of a textile product must be organic in order to be GOTS certified. Simultaneously, there has been some impressive innovations in the field of synthetic fibres as well.

Plastic waste crisis has attracted many innovators to develop methods that can recycle this waste into synthetic fibres. Rather than relying on petroleum as a source of raw materials, utilising waste through a circular model, reduces greenhouse gas emissions. Several retailers have reduced their dependency on virgin polyester, such as Patagonia claims to have produced 91% of their polyester products using recycled polyester in their latest season (Patagonia, 2022). Companies such as REPREVE, and EVRNU are continuously innovating in these regenerative technologies, and supplying their fabrics to wide range of retailers.

2.5. Initiatives in textile production

Since wet processing of textile products is one of the biggest contributors to environmental and social impacts, initiatives by consumers as well as innovators have been witnessed. Campaigns such as 'Detox My Fashion' have raised awareness and actively spoken against using hazardous chemicals, forcing stakeholders to implement policy changes, and set targets to eliminate such chemicals from textile production (Detox My fashion, Greenpeace). Regarding the innovations, DyeCoo is a notable example, with the invention of water and chemical free dyeing system for synthetic fabrics and yarns using CO2 (UNEP, 2020). Additionally, slow fashion is another initiative which originated from UK in an attempt to promote sustainability. It encourages slow-speed production allowing natural growth of fibres and resulting in reduced waste production. It allows the workers to dedicate more time to each item, aiming to extend the life of products. Slow fashion brands advocate buying fewer items but of finer quality (Jung and Jin, 2016). A Swedish brand, Nudie Jeans provides 100% organic denim jeans, and offers lifetime free repair services to its customers. It also offers a 20% discount when buying a new pair, if you return the old pair of jeans.

Supply chain responsibility (SCR) can be defined as a series of actions taken by companies to ensure ethical social and environmental practices throughout their supply chain. The element of SCR focuses on establishing a measurement system to assess the impact and progress of responsible practices. Practicing SCR extends sustainability to suppliers by either implementing assessment tools or collaborative practices (Gimenez and Tachizawa, 2012). Assessment tools are associated with evaluation of suppliers through various methods, such as company visits. Independent auditing firms are also onboarded to evaluate the performance of suppliers. For example, C&A conducts supplier audits via an independent auditing firm based on its social and environmental standards. If the supplier does not meet the requirements, it is given an opportunity to improve its conditions, and if a supplier still does not comply, C&A discontinues sourcing from that particular supplier (Winter & Lasch, 2016). Similar audits are conducted by other developed retailers as well. Moreover, with the continuous rise in criticism from the consumers, retailers have been forced to incentivize their suppliers to adopt sustainable business practices. When suppliers of the upstream stages are implementing poor social and environmental practices, it jeopardizes the image of the retailer as well (Roberts, 2003), as was witnessed in the case of Nike in 1996. H&M uses SIPP (Sustainable Impact Partnership Program), to reward high-achieving suppliers with long-term contracts. Similarly, EVERLANE has a code of conduct, which a supplier must comply to in order to begin a relationship (Wren, 2022). However, another way is a collaborative approach, which involves working directly with the suppliers and providing them with the appropriate support and trainings, and establishing long-term relationships with their suppliers as partners, rather than suppliers. Calida, for instance, relies only on a small group of suppliers with whom they have established long-term relationship with. 90% of its products are sourced

from just five suppliers (Turker and Altuntas, 2014). Studies have revealed that though both these approaches have a positive impact, assessment alone is not sufficient, and companies must engage in collaborative practices along with assessment tools to ensure sustainability throughout the network (Gimenez and Tachizawa, 2012). Such partnerships help improve the abilities of their suppliers and align their ideologies, hence much more effective in monitoring and implementing sustainable practices.

Nonetheless, working in a global supply chain and especially with developing countries, isn't very straightforward. Additionally, due to multiple factors, such as language barrier, cultural differences, and working ethics etc., it can become even more complex. Hence, sourcing intermediaries are used by retailers to broaden their range of suppliers and reduce risks. Li & Fung Ltd., is a prime example of such intermediaries. Operating in more than 50 countries with more than 10,000 suppliers on its panel, Li & Fung Ltd., is providing sourcing services to some of the major retailers worldwide (Belavina and Girotra, 2010). Being physically present in these producing countries, it is able to monitor these suppliers much more efficiently and effectively. In addition to better prices, ensuring quality and on-time deliveries, customers have reported ensuring environmental and social standards as one of the reasons they choose to work with Li & Fung Ltd (Loveman and O'Connell, 1995).

Nonetheless, though the above-mentioned initiatives are steps are in the right direction, they are insignificant in comparison to the rate at which the global apparel industry is impacting the environment and social values. The above-mentioned threats are present and growing at an alarming rate while these initiatives are active, thus, there is a need of consequential actions from every stakeholder throughout the value chain. Although, for the purpose of this thesis, only upstream activities were considered, downstream activities such as consumer demand have a direct impact on upstream activities. With a rise in consumption of apparel products especially due to fast fashion, the impact of upstream activities will naturally rise as well. Hence, there needs to be a collaborative effort if we are to restrict and reduce the impact of global apparel industry.

3. Methodology

3.1. Research Design

As discussed earlier, the purpose of this study is to understand how these sustainability initiatives are valued by the general population, and how can they be used to build the company value proposition. Hence, an online survey was conducted to collect quantitative data on consumer's willingness to pay approximately

25% more for a product with a sustainability initiative (see Appendix One). The percentage (25%) was not based on any literature, instead it was based on the research that 25% of a garment's price is its approximate COGS. WTP refers to the maximum amount of money that a customer is willing to spend on a particular product and signifies the product's intrinsic value in monetary terms (Schmidt and Bijmolt, 2020).

Four sustainability initiatives were presented in the survey to the audience. These initiatives have already been adopted by some brands in the fashion industry. Each initiative was presented as a scenario with two choices. One without the sustainability initiative (Brand A), and one with the sustainability initiative (Brand B). Participants were asked to assume that there is no difference in terms of quality and style between the products of each brand, and their preference should solely be based on their willingness to pay for the initiative. Out of these four scenarios, two scenarios had gender specific products i.e., based on the gender selection, male audience was presented with men garments while female audience was presented with women garments. Whereas, in the remaining two scenarios, unisex products were presented.

Quantitative data was collected on how willing the participants were to pay 25% extra for each initiative, along with their demographics. Furthermore, participants were also asked if their decision to buy an apparel is influenced by the environmental and social impacts of the apparel before the scenarios were presented to them. The aim of this survey was to identify if demographics and the influence of sustainability have any impact on the WTP for each initiative. This would help the researcher understand how these initiatives are viewed by the general public. Furthermore, for people who do consider the social and environmental impacts of products, it would be valuable to see their response towards each initiative, since individuals may vary in their priorities and knowledge. By collectively analysing this data, it would be possible to identify the target audience, and the key sustainability initiatives for the consultancy firm to focus on in building their value proposition. This information is essential for effective marketing and strategic decision-making.

3.2. Data Collection

The online survey was conducted using Google Forms (see Appendix One), consisting of twelve mandatory questions encompassing various aspects. An attention check (Appendix One*)*, was also introduced before presenting the final scenario to the participants to exclude unmotivated respondents who may affect the quality of the data. The survey was active from the 28th of March till the 4th of April and gathered 137 responses in total. 32 of these responses failed to pass the attention check and were excluded completely. Hence, responses obtained from 105 participants were analysed using SPSS version 28.0.

The survey was divided into two sections to obtain all the necessary information. First section was based on the demographics of the participants including questions about the age, level of education, geographical location (continents), occupation status, monthly net income, and the gender. In the second section, participants were first informed about the structure of the section i.e., they would be presented with four scenarios and each scenario would have a similar product in terms of style and quality being sold by two brands. Brand A would be without any sustainability initiative, while Brand B would have a different sustainability initiative in each scenario and priced higher due to its initiative. Participants were asked to select the willingness to purchase Brand B's product solely based on the information provided in each scenario. After the section description, participants were asked if environmental and social impacts have any influence on their decision to purchase a clothing product, using a 5-point scale, with 1 being 'strongly disagree', and 5 being 'strongly agree'. The products presented in scenario 1 and 2 differed for the participants based on their gender, whereas in scenario 3 and 4 gender neutral products were presented. Lastly, in each scenario, products of Brand B were priced 25% higher compared to Brand A.

Scenario 1 was based on the 'Product Composition' initiative (Appendix One), with male participants being presented with a pair of shorts, while the remaining participants were presented with a pair of leggings. In terms of the shorts, Brand A's product was composed of 100% polyester, whereas Brand B's product was composed of 100% recycled polyester. Similarly, with regards to leggings, Brand A's product was composed of 78% polyester and 22% elastane, whereas Brand B's product was composed of 78% recycled polyester and 22% elastane. Both the Brand B's products were priced higher (25%), and the participants were asked how willing they would be on a 5-point scale to purchase Brand B's product considering its 'Product composition' initiative, with 1 being 'extremely unwilling' and 5 being 'extremely willing'.

Scenario 2 was based on the 'Recycle/Repair/Reuse' initiative (Appendix One), with male participants being presented with a pair of men denim jeans, while the remaining participants were presented with a pair of women denim jeans. In both the options, Brand A represented a fast fashion brand that releases 10-12 collections each year. On the contrary, Brand B represented a slow fashion brand with only 3-4 collections a year and offering the following additional services to its customers: 10% discount on the new pair of jeans if you return the old pair to help the brand recycle, and repair services if the product is damaged while in use. Brand B's products were priced higher (25%), and the participants were asked how willing they would be on a 5-point scale to purchase Brand B's product considering its 'Recycle/Repair/Reuse' initiative, with 1 being 'extremely unwilling' and 5 being 'extremely willing'.

Scenario 3 was based on 'Transparency' initiative (Appendix One), with all the participants being presented with a plain white t-shirt. Brand A only disclosed that the product was made in Bangladesh, whereas Brand

B disclosed the names and origins of the stakeholders involved in the following upstream stages: raw material supplier, fabric processing, manufacturing. It further disclosed the transportation details of the product as well. Brand B's product was priced higher (25%), and the participants were asked how willing they would be on a 5-point scale to purchase Brand B's product considering its 'Transparency' initiative, with 1 being 'extremely unwilling' and 5 being 'extremely willing'.

Scenario 4 was based on 'Responsible sourcing' initiative (Appendix One), with all the participants being presented with a plain hoodie. Brand A disclosed no information on the kind of relationship it maintains with its suppliers, whereas Brand B disclosed a complete list of all its suppliers and claimed to have a long-term relationship with all of them. Moreover, it also ensured that all of its suppliers comply with the code of conduct in terms of sustainable and ethical work practices. Brand B's product was priced higher (25%), and the participants were asked how willing they would be on a 5-point scale to purchase Brand B's product considering its 'Responsible sourcing' initiative, with 1 being 'extremely unwilling' and 5 being 'extremely willing'.

3.3. Data Analysis

3.3.1. Sample Characterization

Five demographic indicators (age, gender, education, geographical location, and monthly income) were selected to further investigate their impact on the sustainability initiatives. To gain insights into the characteristics of the participants, a descriptive statistical analysis was conducted on all five demographic indicators. The aim of this analysis was to provide a complete overview of the demographic variables present within the analysed population. In total, responses from 105 participants were considered for this research with male participants being the majority (50.5%) (Figure 9), and most predominant age range was between 25 and 34 years old (56.2%) (Figure 10). In terms of the completed educational level, Bachelor's degree was the most prevalent (45.7%) (Figure 11), and regarding the geographical location, the continent with the highest incidence was Europe (69.5%) (Figure 12). Lastly, less than €1000 and the range of €1001 - €2000 were the most selected options for the monthly net income i.e., 28.6% each (Figure 13). Detailed description of the demographic characterization is present in *Appendix two*.

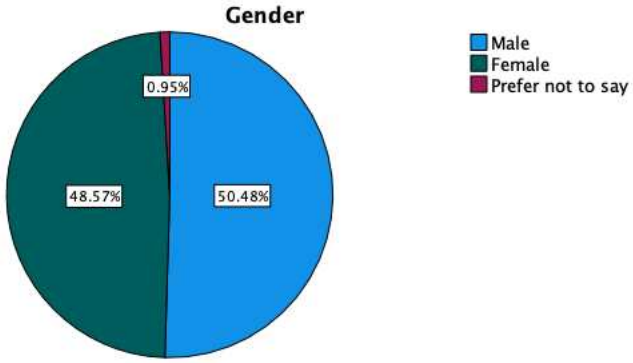

Figure 9: Gender distribution (survey data)

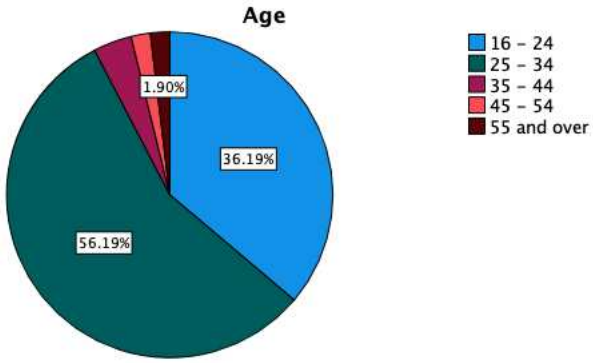

Figure 10: Age distribution (survey data)

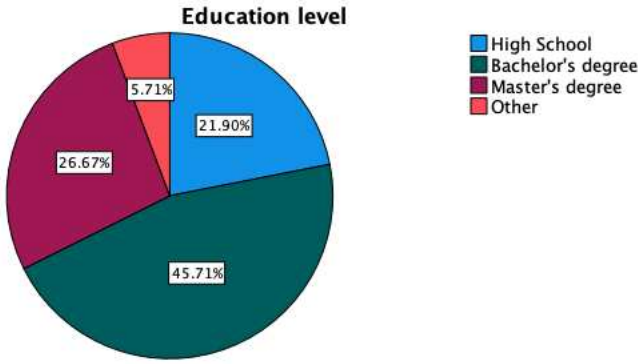

Figure 11: Education level distribution (survey data)

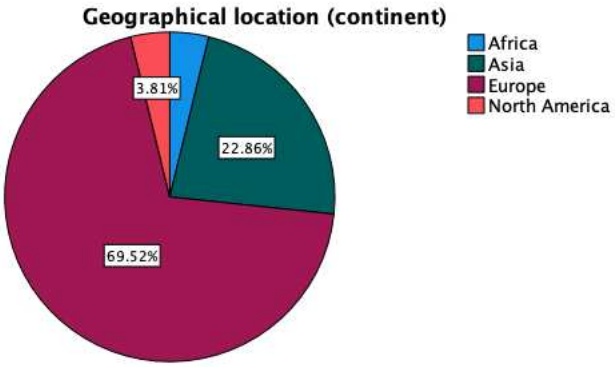

Figure 12: Geographical location distribution (survey data)

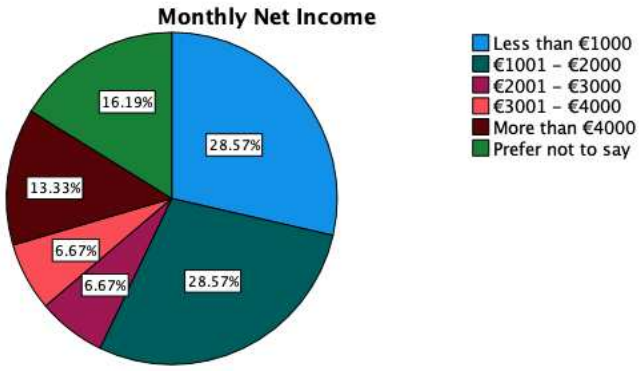

Figure 13: Monthly net income distribution (survey data)

3.3.2. Categorical data imputations & dummy variables

In the questionnaire/survey, three out of five selected demographics were categorical variables (gender, education, geographical location). Even though, numerical values were assigned to each option they didn't represent the data quantitatively. For example, with regards to education level, 'high school' was assigned number '1', while the option of 'other' was assigned number '5'. Numerically, option '5' would represent higher level of education completed, even more than 'Bachelor's degree' and 'Master's degree' which were assigned the values of '2', and '3' respectively. To counter this problem, and convert the responses into quantitative variables, options such as 'other' and 'prefer not to say' were treated as missing values, and mode imputations were applied where necessary. Mode imputation is one of the established techniques used to impute missing values for categorical data which was originally designed for numerical variables (Nishanth and Ravi, 2016). Moreover, a study based on missing value imputations concluded that for categorical data type, mode imputation performs the best (Tsai et al, 2018). Lastly, dummy variables were used for gender and geographical location before data could be analysed.

With regards to gender, one participant selected the option 'prefer not to say', hence, using mode imputation, it was replaced by 'male'. Moreover, dummy variables were used to code the values of this qualitative variable, assigning value '1' to males and '0' to females. Similarly, since almost 70% of the participants were based in Europe, two levels were created for geographical location as well i.e., 'living in Europe' and 'living in rest of the world', and assigned the values of '1', and '0' respectively. Furthermore, in terms of education level, six participants chose 'other', and therefore, they were replaced by 'Bachelor's degree' or '1' using mode imputation. Likewise, seventeen participants selected 'prefer not to say' regarding their monthly net income, and the smallest mode 'less than €1000' was imputed. Complete details of the descriptive statistics for each demographic are presented in the figure below.

Descriptive Statistics

		Age	Education level	Continent	Monthly Income	Gender
N	Valid	105	105	105	105	105
	Missing	0	0	0	0	0
Mean		1.77	2.22	3.47	2.96	1.51
Mode		2	2	4	1[a]	1
Std. Deviation		.775	.980	1.010	1.876	.557

a. Multiple modes exist. The smallest value is shown

Figure 14: Descriptive statistics for each demographic

Introducing dummy variables and mode imputations prepared our data for a regression model. As this research was focused on understanding the impact of demographics and influence of sustainability on WTP for various initiatives of fashion industry, multiple linear regression model was an ideal statistical model for such analysis, as it considers the dependent variable a function of multiple independent variables. In total 4 regression models were performed with 6 independent variables and a different dependent variable (sustainability initiatives) in each model.

3.3.3. Results/Findings

3.3.3.1. Product Composition

For the first initiative 'Product composition', the following equation was derived:

$$WTP_{Product\ composition} = \beta_0 + \beta_1 Gender_{male} + \beta_3 Age + \beta_5 Education + \beta_2 Location_{Europe} + \beta_4 Income + \beta_6 Sustainability\ Influence + \varepsilon$$

β_0 represents the intercept, while $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$, and β_6 are the parameters quantifying the impact on willingness to pay.

In this study, null hypothesis (H_0) states that there is no significant relationship between gender, age, education, location, income, and sustainability influence on the willingness to pay 25% more for product composition.

Descriptive Statistics

	Mean	Std. Deviation	N
Willingness to purchase from Brand B (product composition)	3.10	1.082	105
Gender	.51	.502	105
Age	1.77	.775	105
Education	2.05	.699	105
Location	.70	.463	105
Income	2.15	1.406	105
Sustainability Influence	3.02	.961	105

Figure 15: Descriptive statistics (Product Composition)

The analysis of descriptive statistics reveal that the average willingness to pay 25% more for a product with sustainable product composition is 3.10, with a standard deviation of 1.082 (Figure 15). It further reveals that the average influence of environmental and social impacts when purchasing a product is 3.02, with a standard deviation of 0.961. Analysing the summary of the model indicates an adjusted R-squared value of 0.088, meaning that the independent variables only explain 8.8% of the variance in the dependent variable (Figure 18). Furthermore, assessing the normality assumption of the dataset, data aligns closely to the straight line indicating normal distribution of residuals (Figure 16).

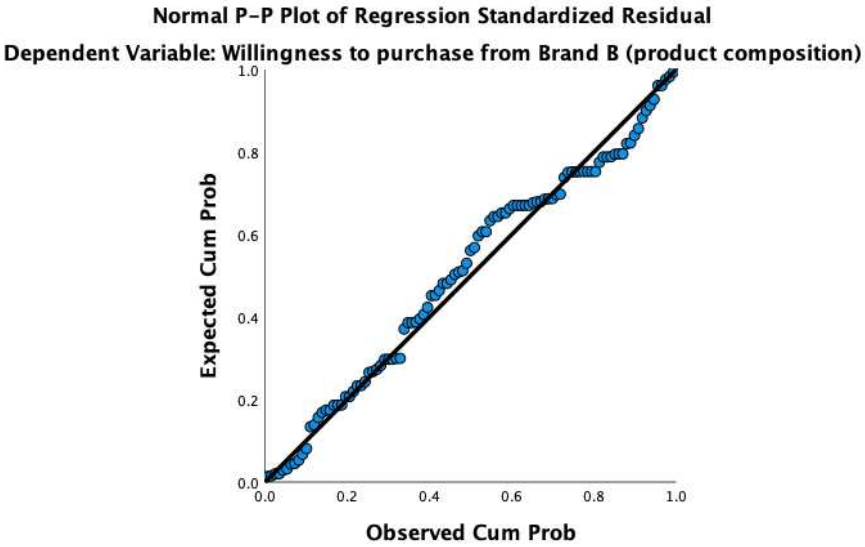

Figure 16: P-P plot (product composition)

Correlations

		Willingness to purchase from Brand B (product composition)	Gender	Age	Education	Location	Income	Sustainability Influence
Pearson Correlation	Willingness to purchase from Brand B (product composition)	1.000	-.189	.017	.095	.007	.065	.349
	Gender	-.189	1.000	-.115	-.208	-.022	-.003	-.300
	Age	.017	-.115	1.000	.304	-.142	.482	.096
	Education	.095	-.208	.304	1.000	.045	.374	.113
	Location	.007	-.022	-.142	.045	1.000	.102	.100
	Income	.065	-.003	.482	.374	.102	1.000	.012
	Sustainability Influence	.349	-.300	.096	.113	.100	.012	1.000

Figure 17: Correlations of the variables (product composition)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.375[a]	.141	.088	1.034	.141	2.673	6	98	.019

a. Predictors: (Constant), Sustainability Influence, Income, Location, Gender, Education, Age

b. Dependent Variable: Willingness to purchase from Brand B (product composition)

Figure 18: Model summary (Product composition)

Correlation values between 0.3 and 0.7 (0.3 and -0.7) indicate a moderate linear relationship, either positive or negative (Ratner, 2009). In the correlation results (Figure 17), few of these moderate linear relationships are observed, such as education and income (0.374), sustainability influence and willingness to purchase from Brand B (0.349) etc. F-statistics and its significance (P-value) explain the overall significance of the model, indicating if model as a whole is statistically significant, comparing the explained variation to the unexplained variation. F-statistic value of 2.673 suggests a relationship, along with significance =.019 (<0.05) means that the value of F-statistic is statistically significant and could not be by chance. Hence, we reject the null hypothesis in this scenario (Figure 19).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.138	6	2.856	2.673	.019[b]
	Residual	104.710	98	1.068		
	Total	121.848	104			

a. Dependent Variable: Willingness to purchase from Brand B (product composition)

b. Predictors: (Constant), Sustainability Influence, Income, Location, Gender, Education, Age

Figure 19: ANOVA (product composition)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	2.131	.538		3.963	<.001					
	Gender	-.203	.216	-.094	-.938	.350	-.189	-.094	-.088	.869	1.150
	Age	-.125	.156	-.089	-.798	.427	.017	-.080	-.075	.699	1.431
	Education	.048	.162	.031	.297	.767	.095	.030	.028	.802	1.247
	Location	-.123	.228	-.052	-.538	.592	.007	-.054	-.050	.926	1.080
	Income	.075	.088	.098	.858	.393	.065	.086	.080	.675	1.480
	Sustainability Influence	.372	.112	.330	3.333	.001	.349	.319	.312	.892	1.121

a. Dependent Variable: Willingness to purchase from Brand B (product composition)

Figure 20: Coefficients (product composition)

Analysing the impact of each predictor variable individually reveals that when keeping all other variables constant, increase in gender (female to male) decreases the WTP by 0.094, however, P-value of .350 (>0.05) indicates that this effect is not statistically significant. Increase in age also decreases the WTP by 0.089, but the P-value of .427 (>0.05) illustrates that the effect is not statistically significant. Increase in education shows an increase in WTP by 0.031, but the P-value of .767 (>0.05) suggest that this is not statistically significant as well. Increase in monthly net income also shows an increase in WTP by 0.098, but the p-value reveals the effect to be statistically insignificant (P-value = 0.393). Moreover, increase in location (being in Europe), decreases the WTP by 0.052, however, the P-value of 0.592 (>0.05) suggest that this effect is also statistically insignificant. Lastly, increase in sustainability influence (considering environmental and social impacts) increases the WTP by 0.330 and the P-value of .001(<0.05) reveal a statistically significant effect (Figure 20).

VIF (variance inflation factors) reveal values between 1 and 1.48 for all the independent variables, certifying that there is close to no correlation between the variables, indicating no multicollinearity (Bhaduri and Ha-Brookshire, 2011).

3.3.3.2. Recycle/Repair/Reuse

For the second initiative 'Recycle/Repair/Reuse', the following equation was derived:

$$WTP_{Recycle/Repair/Reuse} = \beta_0 + \beta_1 Gender_{male} + \beta_3 Age + \beta_5 Education + \beta_2 Location_{Europe} + \beta_4 Income + \beta_6 Sustainability\ Influence + \varepsilon$$

β_0 represents the intercept, while $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$, and β_6 are the parameters quantifying the impact on willingness to pay.

Null hypothesis (H_0) states that there is no significant relationship between gender, age, education, location, income, and sustainability influence on the willingness to pay 25% more for a brand that is actively taking initiatives on recycling/repairing/reuse.

Descriptive Statistics

	Mean	Std. Deviation	N
Willingness to purchase from Brand B (Recycle)	3.76	1.148	105
Gender	.51	.502	105
Age	1.77	.775	105
Education	2.05	.699	105
Location	.70	.463	105
Income	2.15	1.406	105
Sustainability Influence	3.02	.961	105

Figure 21: Descriptive statistics (Recycle/Repair/Reuse)

The analysis of descriptive statistics reveal that the average willingness to pay 25% more for a Brand's initiatives of recycle/repair/reuse is 3.76, with a standard deviation of 1.148 (Figure 21). Analysing the summary of the model indicates an adjusted R-squared value of 0.130, meaning that the independent variables explain 13% of the variance in the dependent variable (Figure 24). Moreover, in the normal P-P plot data aligns closely to the straight line indicating normal distribution of residuals (Figure 22).

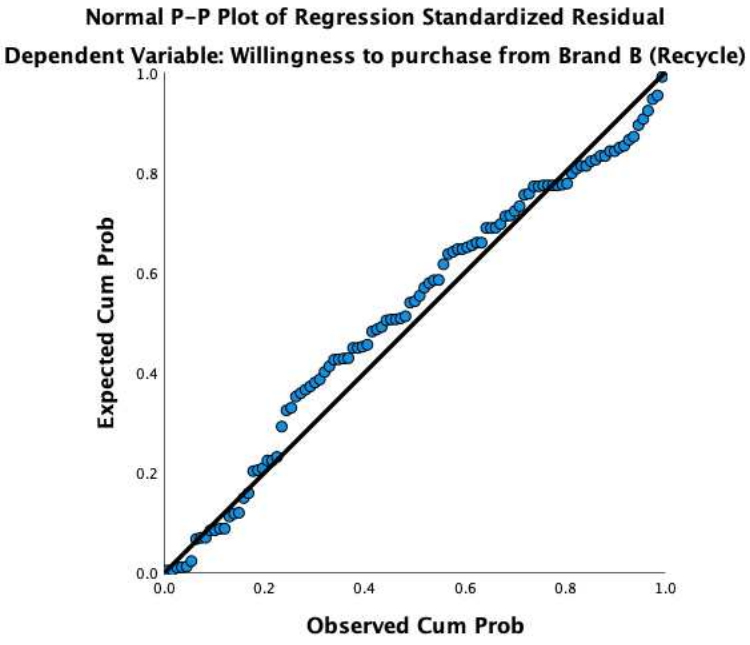

Figure 22: Normal P-P plot (Recycle/Repair/Reuse)

Correlations

		Willingness to purchase from Brand B (Recycle)	Gender	Age	Education	Location	Income	Sustainability Influence
Pearson Correlation	Willingness to purchase from Brand B (Recycle)	1.000	-.269	-.040	.194	-.047	.160	.222
	Gender	-.269	1.000	-.115	-.208	-.022	-.003	-.300
	Age	-.040	-.115	1.000	.304	-.142	.482	.096
	Education	.194	-.208	.304	1.000	.045	.374	.113
	Location	-.047	-.022	-.142	.045	1.000	.102	.100
	Income	.160	-.003	.482	.374	.102	1.000	.012
	Sustainability Influence	.222	-.300	.096	.113	.100	.012	1.000

Figure 23: Correlations of the variables (Recycle/Repair/Reuse)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.424[a]	.180	.130	1.071	.180	3.585	6	98	.003

a. Predictors: (Constant), Sustainability Influence, Income, Location, Gender, Education, Age

b. Dependent Variable: Willingness to purchase from Brand B (Recycle)

Figure 24: Model summary (Recycle/Repair/Reuse)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.664	6	4.111	3.585	.003[b]
	Residual	112.384	98	1.147		
	Total	137.048	104			

a. Dependent Variable: Willingness to purchase from Brand B (Recycle)

b. Predictors: (Constant), Sustainability Influence, Income, Location, Gender, Education, Age

Figure 25: ANOVA (Recycle/Repair/Reuse)

Results from the ANOVA test (Figure 25) indicate an F-statistic value of 3.585 with a significance of less than 0.003 (< 0.05) suggesting that the model is statistically significant. Hence, we reject the null hypothesis, and further look into individual variables to understand the variations.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	3.463	.557		6.216	<.001					
	Gender	-.511	.224	-.224	-2.280	.025	-.269	-.224	-.209	.869	1.150
	Age	-.385	.162	-.260	-2.379	.019	-.040	-.234	-.218	.699	1.431
	Education	.195	.168	.119	1.162	.248	.194	.117	.106	.802	1.247
	Location	-.343	.236	-.138	-1.455	.149	-.047	-.145	-.133	.926	1.080
	Income	.206	.091	.252	2.264	.026	.160	.223	.207	.675	1.480
	Sustainability Influence	.212	.116	.178	1.833	.070	.222	.182	.168	.892	1.121

a. Dependent Variable: Willingness to purchase from Brand B (Recycle)

Figure 26: Coefficients (Recycle/Repair/Reuse)

Increase in gender (female to male) decreases the WTP by 0.224, with the P-value < .025 (<0.05) indicates that this effect is statistically significant. Increase in age also decreases the WTP by 0.260, and the P-value

< .019 (<0.05) illustrates that the effect is also statistically significant. Increase in education shows an increase in WTP by 0.119, but the P-value of 0

.248 (>0.05) suggests that this is not statistically significant. Increase in monthly net income shows an increase in WTP by 0.252, and the P-value reveals the effect to be statistically significant (P-value < .026). Moreover, increase in location (being in Europe), decreases the WTP by 0.138, however, the P-value of .149 (>0.05) suggest that this effect is statistically insignificant. Lastly, increase in sustainability influence (considering environmental and social impacts) increases the WTP by 0.178, but the P-value = .070 (>0.05) reveals a statistically insignificant effect (Figure 26).

3.3.3.3. Transparency

For the third initiative 'Transparency', the following equation was derived:

$$WTP_{Transparency} = \beta_0 + \beta_1 Gender_{male} + \beta_3 Age + \beta_5 Education + \beta_2 Location_{Europe} + \beta_4 Income + \beta_6 Sustainability\ Influence + \varepsilon$$

β_0 represents the intercept, while $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$, and β_6 are the parameters quantifying the impact on willingness to pay.

Null hypothesis (H_0) states that there is no significant relationship between gender, age, education, location, income, and sustainability influence on the willingness to pay 25% more for a brand that has a transparent supply chain.

Descriptive Statistics

	Mean	Std. Deviation	N
Willingness to purchase from Brand B (Transparency)	3.57	1.159	105
Gender	.51	.502	105
Age	1.77	.775	105
Education	2.05	.699	105
Location	.70	.463	105
Income	2.15	1.406	105
Sustainability Influence	3.02	.961	105

Figure 27: Descriptive statistics (Transparency)

The analysis of descriptive statistics suggest that the average willingness to pay 25% more for a product with transparent supply chain is 3.57, with a standard deviation of 1.159 (Figure 27). Analysing the

summary of the model indicates an adjusted R-squared value of 0.028, indicating that the independent variables explain 2.8% of the variance in the dependent variable (Figure 29). Furthermore, in the normal P-P plot data aligns closely to the straight line indicating normal distribution of residuals (Figure 28).

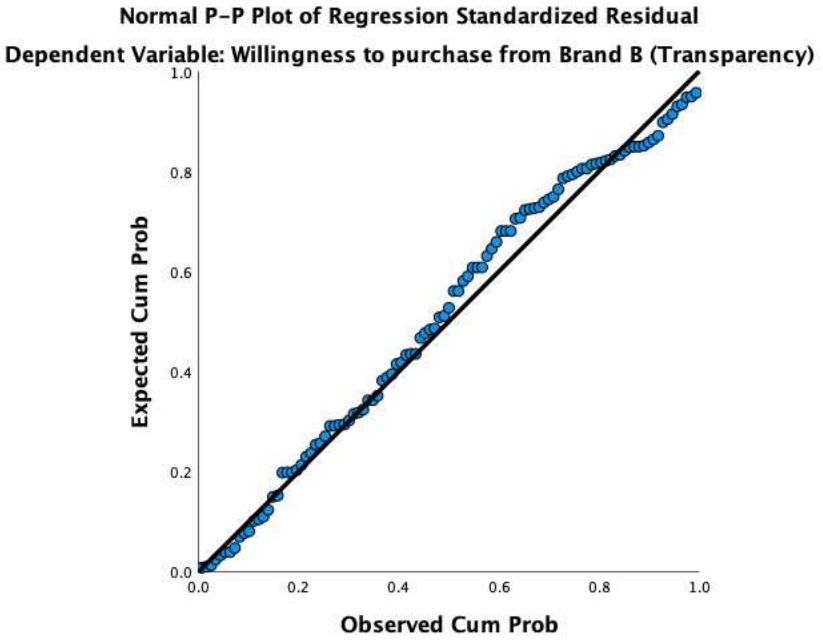

Figure 28: Normal P-P plot (transparency)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.290[a]	.084	.028	1.143	.084	1.504	6	98	.185

a. Predictors: (Constant), Sustainability Influence, Income, Location, Gender, Education, Age

b. Dependent Variable: Willingness to purchase from Brand B (Transparency)

Figure 29: Model summary (transparency)

Correlations

		Willingness to purchase from Brand B (Transparency)	Gender	Age	Education	Location	Income	Sustainability Influence
Pearson Correlation	Willingness to purchase from Brand B (Transparency)	1.000	-.229	.029	.109	.113	.094	.180
	Gender	-.229	1.000	-.115	-.208	-.022	-.003	-.300
	Age	.029	-.115	1.000	.304	-.142	.482	.096
	Education	.109	-.208	.304	1.000	.045	.374	.113
	Location	.113	-.022	-.142	.045	1.000	.102	.100
	Income	.094	-.003	.482	.374	.102	1.000	.012
	Sustainability Influence	.180	-.300	.096	.113	.100	.012	1.000

Figure 30: Correlations (Transparency)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.781	6	1.963	1.504	.185[b]
	Residual	127.934	98	1.305		
	Total	139.714	104			

a. Dependent Variable: Willingness to purchase from Brand B (Transparency)

b. Predictors: (Constant), Sustainability Influence, Income, Location, Gender, Education, Age

Figure 31: ANOVA test (Transparency)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	3.095	.594		5.207	<.001					
	Gender	-.442	.239	-.191	-1.847	.068	-.229	-.183	-.179	.869	1.150
	Age	-.072	.173	-.048	-.416	.678	.029	-.042	-.040	.699	1.431
	Education	.052	.179	.031	.290	.772	.109	.029	.028	.802	1.247
	Location	.198	.252	.079	.787	.433	.113	.079	.076	.926	1.080
	Income	.078	.097	.095	.808	.421	.094	.081	.078	.675	1.480
	Sustainability Influence	.139	.123	.115	1.122	.265	.180	.113	.108	.892	1.121

a. Dependent Variable: Willingness to purchase from Brand B (Transparency)

Figure 32: Coefficients (transparency)

Results from the ANOVA test (Figure 31) indicate an F-statistic value of 1.504 with a significance of 0.185 (> 0.05) suggesting that the model is statistically insignificant. Hence, we accept the null hypothesis that the independent variables have no impact on WTP for a product with a transparent supply chain. Investigating the coefficients further illustrate that increase in gender (female to male) decreases the WTP by 0.191, with the P-value of .068 (>0.05) indicating that this effect is statistically insignificant. Increase in age also decreases the WTP by 0.048, and the P-value of .678 (>0.05) illustrates that this effect is also statistically insignificant. Increase in education shows an increase in WTP by 0.031, but the P-value of 0.772 (>0.05) suggests that this is not statistically significant. Increase in monthly net income shows an increase in WTP by 0.095, and the P-value > 0.05 reveals the effect to be statistically insignificant (P-value = 0.421). Moreover, increase in location (being in Europe), increases the WTP by 0.079, however, the P-value of 0.433 (>0.05) suggest that this effect is also statistically insignificant. Lastly, increase in sustainability influence (considering environmental and social impacts) increases the WTP by 0.115, but the P-value of .265 (>0.05) reveals a statistically insignificant effect (Figure 32).

3.3.3.4. Responsible Sourcing

For the fourth initiative 'Responsible Sourcing', the following equation was derived:

$$WTP_{Responsible\ sourcing} = \beta_0 + \beta_1 Gender_{male} + \beta_3 Age + \beta_5 Education + \beta_2 Location_{Europe} + \beta_4 Income + \beta_6 Sustainability\ Influence + \varepsilon$$

β_0 represents the intercept, while $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$, and β_6 are the parameters quantifying the impact on willingness to pay.

Null hypothesis (H_0) states that there is no significant relationship between gender, age, education, location, income, and sustainability influence on the willingness to pay 25% more for a brand that sources responsibly.

Descriptive Statistics

	Mean	Std. Deviation	N
Willingness to purchase from Brand B (Responsible Sourcing)	3.47	1.084	105
Gender	.51	.502	105
Age	1.77	.775	105
Education	2.05	.699	105
Location	.70	.463	105
Income	2.15	1.406	105
Sustainability Influence	3.02	.961	105

Figure 33: Descriptive statistics (Responsible sourcing)

The analysis of descriptive statistics suggest that the average willingness to pay 25% more for a product that is sourced responsibly is 3.47, with a standard deviation of 1.084 (Figure 33). Moreover, adjusted R-squared value of 0.068, indicates that the independent variables explain 6.8% of the variance in the dependent variable (Figure 34). Furthermore, in the normal P-P plot data aligns closely to the straight line indicating normal distribution of residuals (Figure 36).

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.349[a]	.122	.068	1.046	.122	2.264	6	98	.043

a. Predictors: (Constant), Sustainability Influence, Income, Location, Gender, Education, Age

b. Dependent Variable: Willingness to purchase from Brand B (Responsible Sourcing)

Figure 34: Model summary (responsible sourcing)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.867	6	2.478	2.264	.043[b]
	Residual	107.266	98	1.095		
	Total	122.133	104			

a. Dependent Variable: Willingness to purchase from Brand B (Responsible Sourcing)

b. Predictors: (Constant), Sustainability Influence, Income, Location, Gender, Education, Age

Figure 35: ANOVA test (responsible sourcing)

Results from the ANOVA test (Figure 35) show an F-statistic value of 2.264 with a significance of 0.043 (< 0.05) suggesting that the model is statistically significant. Hence, we reject the null hypothesis that the independent variables have no impact on WTP for a product that is sourced responsibly.

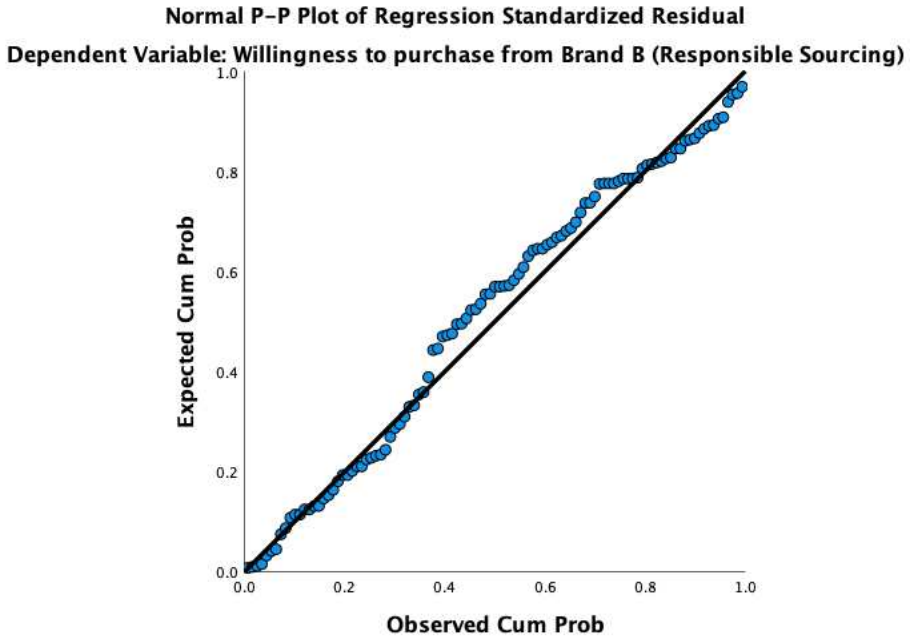

Figure 36: Normal P-P plot (responsible sourcing)

Correlations

		Willingness to purchase from Brand B (Responsible Sourcing)	Gender	Age	Education	Location	Income	Sustainability Influence
Pearson Correlation	Willingness to purchase from Brand B (Responsible Sourcing)	1.000	-.269	.060	.174	-.040	.098	.232
	Gender	-.269	1.000	-.115	-.208	-.022	-.003	-.300
	Age	.060	-.115	1.000	.304	-.142	.482	.096
	Education	.174	-.208	.304	1.000	.045	.374	.113
	Location	-.040	-.022	-.142	.045	1.000	.102	.100
	Income	.098	-.003	.482	.374	.102	1.000	.012
	Sustainability Influence	.232	-.300	.096	.113	.100	.012	1.000

Figure 37: Correlations (responsible sourcing)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	2.943	.544		5.408	<.001					
	Gender	-.445	.219	-.206	-2.030	.045	-.269	-.201	-.192	.869	1.150
	Age	-.101	.158	-.073	-.641	.523	.060	-.065	-.061	.699	1.431
	Education	.154	.164	.099	.936	.351	.174	.094	.089	.802	1.247
	Location	-.203	.230	-.087	-.882	.380	-.040	-.089	-.083	.926	1.080
	Income	.079	.089	.102	.886	.378	.098	.089	.084	.675	1.480
	Sustainability Influence	.195	.113	.173	1.726	.088	.232	.172	.163	.892	1.121

a. Dependent Variable: Willingness to purchase from Brand B (Responsible Sourcing)

Figure 38: Coefficients (responsible sourcing)

Analysing the coefficients illustrate that increase in gender (female to male) decreases the WTP by 0.206, with the P-value of .045 (<0.05) indicating that this effect is statistically significant. Increase in age also decreases the WTP by 0.073, but the P-value of 0.523 (>0.05) illustrates that this effect is statistically insignificant. Increase in education shows an increase in WTP by 0.099, but the P-value of 0.351 (>0.05) suggests that this is not statistically significant. Increase in monthly net income shows an increase in WTP by 0.173, and the P-value > 0.05 reveals the effect to be statistically insignificant (P-value = 0.378). Moreover, increase in location (being in Europe), decreases the WTP by 0.087, however, the P-value of 0.380 (>0.05) suggest that this effect is also statistically insignificant. Lastly, increase in sustainability influence (considering environmental and social impacts) increases the WTP by 0.173, but the P-value of .088 (>0.05) reveals a statistically insignificant effect (Figure 38).

4. Discussion

The following chapter will discuss the results and findings of the statistical analysis performed on our four sustainability initiatives to understand how the general population perceives them. The aim of this thesis was to identify key activities of the fashion industry that are most problematic in the eyes of the consumers and help fashion companies transform them as a consultancy firm. Firstly, the current state of upstream activities and their environmental and social impacts were analysed, and then the research looked at the current initiatives being taken by the fashion industry to reduce these impacts. Lastly, four key initiatives were shortlisted i.e., product composition, recycle/repair/reuse, transparency, and responsible sourcing, all of which could have a significant impact on reducing the environmental and social impacts. Nonetheless, understanding the perception of general public was very important as it is only the consumers that can enforce change in the fashion industry. Therefore, WTP to pay 25% extra for these initiatives was set as the parameter to comprehend how the general population views them.

Statistical analysis revealed that regarding the product composition, demographics had no significant impact. However, as the influence of environmental and social impact increases when deciding to purchase a product, WTP additional 25% increases significantly. This shows that people who are more concerned about the sustainability of the apparel products are willing to pay 25% more if the product is composed of recycled materials.

Moreover, in terms of recycle/repair/reuse initiative demographics also had an impact. Females were more likely to pay 25% more for a brand that releases less collections annually, offers repair services, and

promotes recycling by giving discount. Additionally, as the age has a negative impact on WTP, meaning younger population is more inclined towards paying 25% more for this initiative. Lastly, as the income increases, people are more likely to purchase from the brand with this sustainability initiative. However, location and education had no significant impact, and surprisingly, even the people who are influenced by social and environmental impacts had no significant impact of this particular initiative.

With regards to the transparency initiative, neither the demographics nor the influence of sustainability had any significant impact on the WTP. Information such as names and origin of raw material suppliers, fabric processes, manufacturers and transportation details was not enough for consumers to pay 25% more. This was quite interesting to observe, as transparency is known to improve credibility and legitimacy (Bhaduri and Ha-Brookshire, 2011), and is much needed in the fashion industry considering its growing negative impacts, but the results conclude that this information on its own doesn't mean much to a consumer. Studies have revealed a positive relationship between production transparency and consumer's willingness to purchase a product, such as in the case of transparency project of Nudie Jeans (Egels-Zandén and Hansson, 2016). However, being transparent doesn't necessarily increase the COGS (cost of goods sold), hence, to pay 25% additional for just the transparency may seem unfair to the consumers. Hence, maybe a different method is required to evaluate the impact of transparency. Further research especially partnered with fashion companies is needed to measure consumer's WTP for transparency, and how transparency can act as a consumer tool to enforce a sustainable supply chain.

Lastly, regarding responsible sourcing only gender had a significant impact on the WTP. Females were more likely to pay 25% more knowing that the brand maintains a long-term relationship with all its suppliers and ensures that the code of conduct is strictly complied with. No other independent variable had a significant impact on the WTP. Responsible sourcing is the primary solution for environmental and social threats faced by the fashion industry, and it was very surprising to observe these results. However, the information provided to the participants might not have been enough for them to be willing to pay 25% more. Detailed information about the minimum wages of workers and their working conditions could be something consumers are able to relate with more.

5. Limitations

This study had several limitations, but three primary factors really restricted its ability to draw conclusions. Firstly, 105 participants were not enough for a big industry like fashion industry and much more responses (data input) were needed to properly analyse if the predictor variables had any impact on the initiatives. For example, because of the small sample pool, almost 60% of the participants were earning less than €2000 monthly net income, mainly because the survey was distributed among a lot of students, hence, the data range wasn't diverse enough.

Secondly, the scenarios presented to the participants were imaginative scenarios and didn't include several factors such as brand loyalty and image. When purchasing an apparel in reality, these two factors have a major impact on a consumer's choice. Lastly, the research was investigating four initiatives together, and this might have influenced the quality of research. Focusing the research on one initiative could have proven to be more effective in terms of reaching to a conclusion.

6. Conclusion

These findings raised several questions, as initially one would assume that education, income and being in developed countries (Europe) would have a direct impact on all of these initiatives, especially transparency and responsible sourcing, and if not based on demographics, people who do consider social and environmental impacts must value these initiatives at least. However, after analysing the results it seems that using WTP 25% more might not have been the best approach towards all initiatives. 'Product composition' initiative requires using organic materials or recycled materials which cost more than the traditional raw materials; hence, an expensive product is rational to a consumer. Similarly, releasing fewer collections annually and encouraging consumers to reuse/repair/recycle justifies the products being expensive. Hence, we observed significant impacts of gender, age, and income on this initiative. In contrast, the information provided to the participants on the transparency, and responsible sourcing initiatives was not enough to justify 25% additional price. Thus, a different approach was required to address the impact of these two initiatives. Detailed analysis is required of each initiative individually to develop a complete understanding.

Furthermore, since most of the upstream activities are based in the developing nations, developed nations are not fully aware of their social and environmental impacts. With the continuous increase in population and demand of clothing products, for a consulting firm that aims to transform the supply chain must play a role in raising awareness through various channels, such as publishing articles/blogs on various negative

impacts. With the current state of fast fashion, and rising demand per capita, disastrous outcomes are inevitable, hence, the most effective initiative would be to produce less, recycle, repair, and reuse. Additionally, due to a promising response towards this initiative, the researcher will continue to dig deeper into developing a streamlined process of garment repairing at a large scale.

Appendix

Appendix One: Questionnaire

Master's Thesis

Dear Participant,

I would like to thank you in advance for participating in this survey for my Master's Thesis at Católica Lisbon School of Business and Economics. Your participation is highly appreciated and very important for this research.

All the data collected will be dealt with utmost confidentiality, and will only serve the purpose of this academic research. Please be as honest as possible for the reliability of this research.

Thank you very much
Noor-ud-din Butt

~~* Indicates required question~~

The Fashion Industry

From 2000 to 2014, the
global clothing production was doubled, and the number of garments purchased
per capita were increased by 60%.

Being a highly globalised industry, this growth has also led to an increase in the negative social and environmental impacts all around the world, mainly in the production stages.
In order to address these impacts, various initiatives are being taken by stakeholders of the fashion industry. The purpose of this thesis is to understand how these initiatives/strategies are valued by consumers.

1. How old are you? *

Mark only one oval.

- 16 - 24 (1)
- 25 - 34 (2)
- 35 - 44 (3)
- 45 - 54 (4)
- 55 and over (5)

2. What is the highest level of education you have completed? *

Mark only one oval.

- ◯ High School (1)
- ◯ Bachelor's degree (2)
- ◯ Master's degree (3)
- ◯ Doctoral degree (PhD) (4)
- ◯ Other (5)

3. Which continent do you live in? *

Mark only one oval.

- ◯ Africa (1)
- ◯ Asia (2)
- ◯ Australia/Oceania (3)
- ◯ Europe (4)
- ◯ North America (5)
- ◯ South America (6)

4. What is your current occupation status? *

Mark only one oval.

- ◯ Student (1)
- ◯ Employed (2)
- ◯ Self-employed (3)
- ◯ Unemployed (4)
- ◯ Retired (5)
- ◯ Other (6)

5. What is your monthly net income? *

Mark only one oval.

- Less than €1000 (1)
- €1001 - €2000 (2)
- €2001 - €3000 (3)
- €3001 - €4000 (4)
- More than €4000 (5)
- Prefer not to say (6)

6. What is your gender? *

Mark only one oval.

- Male (1) *Skip to question 10*
- Female (2)
- Other (3)
- Prefer not to say (4)

Willingness to pay

In the following section, you will be presented with 4 scenarios. In each scenario, you will be presented with a similar product being sold by 2 different brands.

Brand A: Without the sustainability initiative
Brand B: With the sustainability initiative

For the purpose of this survey, please assume the following:
1) You have to buy one of the two products in each scenario
2) In terms of quality and style, both the products are similar and you like them equally

Products of Brand B are priced higher in each scenario due to its sustainability initiatives. Please select your willingness to buy the expensive product based solely on the information provided in each scenario.

7. My decision to buy a clothing product is influenced by its environmental and social impact? *

Mark only one oval.

- Strongly disagree (1)
- Disagree (2)
- Neutral (3)
- Agree (4)
- Strongly agree (5)

Scenario 1

Scenario 1 (product composition)

In this scenario, you're purchasing a pair of leggings.

Brand A:

- Product composition (78% polyester, 22% elastane)
- Price: €29.99

Brand B

- Product composition (78% recycled polyester, 22% elastane)
- Price: €37.99

8. Willingness to purchase from Brand B *

Mark only one oval.

	Extremely unwilling
1	
2	
3	
4	
5	
	Extremely willing

Scenario 2

Scenario 2 (Recycle, Repair, Reuse)

Brand A

- Fast fashion brand that releases approximately 10-12 collections in a year.
- Price: €39.99

Brand B

Releases 3-4 collections a year and offers the following services for its products:

- 10% discount on the new pair of jeans if you return the old pair and help the brand recycle its products.
- Repair services
- Price: €49.99

9. Willingness to purchase from Brand B *

Mark only one oval.

	Extremely unwilling
1	◯
2	◯
3	◯
4	◯
5	◯
	Extremely willing

Skip to question 13

Willingness to pay

In the following section, you will be presented with 4 scenarios. In each scenario, you will be presented with a similar product being sold by 2 different brands.

Brand A: Without the sustainability initiative
Brand B: With the sustainability initiative

For the purpose of this survey, please assume the following:
3) You have to buy one of the two products in each scenario
4) In terms of quality and style, both the products are similar and you like them equally

Products of Brand B are priced higher in each scenario due to its sustainability initiatives. Please select your willingness to buy the expensive product based solely on the information provided in each scenario.

10. My decision to buy a clothing product is influenced by its environmental and social impact? *

Mark only one oval.

- Strongly disagree (1)
- Disagree (2)
- Neutral (3)
- Agree (4)
- Strongly agree (5)

Scenario 1

Scenario 1 (Product composition)

In this scenario, you're purchasing a pair of shorts.

Brand A:

- Product composition (100% polyester)
- Price: €19.99

Brand B

- Product composition (100% recycled polyester)
- Price: €24.99

11. Willingness to purchase from Brand B *

Mark only one oval.

Extremely unwilling

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

Extremely willing

Scenario 2

Scenario 2 (Recycle, Repair, Reuse)

Brand A

- Fast fashion brand that releases approximately 10-12 collections in a year.
- Price: €39.99

Brand B

Releases 3-4 collections a year and offers the following services for its products:

- 10% discount on the new pair of jeans if you return the old pair and help the brand recycle its products.
- Repair services
- Price: €49.99

12. Willingness to purchase from Brand B *

Mark only one oval.

Extremely unwilling

1 ⬭

2 ⬭

3 ⬭

4 ⬭

5 ⬭

Extremely willing

Willingness to pay

Scenario 3 (Transparency)

Brand A

Discloses the following information on the production of the product

- Made in Bangladesh

Price: €14.99

Brand B

Discloses complete information of the following production stages

1. Raw Material suppliers (Names & Origin)
2. Fabric processes (Names & Origin)
3. Manufacturers (Names & Origin)
4. Transportation

Price: €18.99

13. Willingness to purchase from Brand B *

Mark only one oval.

Extremely unwilling

1

2

3

4

5

Extremely willing

14. Please select the option 'Extremely unwilling' for this question. *

Mark only one oval.

Extremely unwilling

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

Extremely willing

Scenario 4

Scenario 4 (Responsible sourcing)

Brand A

- Has not shared any information on the kind of relationship it has maintained with its suppliers
- Price: €29.95

Brand B

- Has disclosed the list of its suppliers
- Has a long-term relationship with all of its suppliers
- Ensures that all its suppliers comply with a strict code of conduct in terms of sustainable and ethical work practices
- Price: €37.55

15. Willingness to purchase from Brand B *

Mark only one oval.

	Extremely unwilling
1	
2	
3	
4	
5	
	Extremely willing

Thank you for your time!

Your response has been recorded

Appendix Two: Sample Characterisation

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	16 - 24	38	36.2	36.2	36.2
	25 - 34	59	56.2	56.2	92.4
	35 - 44	4	3.8	3.8	96.2
	45 - 54	2	1.9	1.9	98.1
	55 and over	2	1.9	1.9	100.0
	Total	105	100.0	100.0	

Education level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High School	23	21.9	21.9	21.9
	Bachelor's degree	48	45.7	45.7	67.6
	Master's degree	28	26.7	26.7	94.3
	Other	6	5.7	5.7	100.0
	Total	105	100.0	100.0	

Continent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Africa	4	3.8	3.8	3.8
	Asia	24	22.9	22.9	26.7
	Europe	73	69.5	69.5	96.2
	North America	4	3.8	3.8	100.0
	Total	105	100.0	100.0	

Monthly Net Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than €1000	30	28.6	28.6	28.6
	€1001 - €2000	30	28.6	28.6	57.1
	€2001 - €3000	7	6.7	6.7	63.8
	€3001 - €4000	7	6.7	6.7	70.5
	More than €4000	14	13.3	13.3	83.8
	Prefer not to say	17	16.2	16.2	100.0
	Total	105	100.0	100.0	

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	53	50.5	50.5	50.5
	Female	51	48.6	48.6	99.0
	Prefer not to say	1	1.0	1.0	100.0
	Total	105	100.0	100.0	

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