



Digital Transparency in Fast Fashion:

Assessing the Impact of Digital Product Passport Implementation
in Fast Fashion on Consumers' Purchase Behaviors

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Title: Digital Transparency in Fast Fashion: Assessing the Impact of Digital Product Passport Implementation in Fast Fashion on Consumers' Purchase Behaviors

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Abstract

The fast fashion industry is widely known for its unsustainable practices and socio-environmental impacts. However, in recent years, consumers have increasingly valued and demanded greater product transparency and traceability. In response, the European Commission has proposed mandatory implementation of Digital Product Passports (DPPs) for all textile products sold in the EU by 2030. Similar to traditional passports, DPPs will act as unique digital identifiers, offering detailed information about a product's lifecycle, including its origin, materials, environmental impact, and disposal recommendations. Drawing on Signaling Theory, an experimental study was conducted to understand how DPPs can signal a brand's commitment to product transparency and influence consumer purchasing behavior. Specifically, it examined the impact of DPP presence (versus absence) on consumer purchase intentions and willingness to pay, while also exploring the moderating effects of perceived brand transparency and consumer perceived ethicality. The results show that perceived ethicality strengthens the positive impact of DPPs on willingness to pay only when perceived brand transparency is high, although it does not significantly affect purchase intentions. Overall, this dissertation provides valuable theoretical and managerial insights into the transformative potential of DPPs as track-and-trace tools in enhancing product transparency and traceability within fashion and how they can influence consumer purchasing decisions.

Key Words: Digital Product Passport (DPP), Consumer, Fast Fashion, Purchasing Intentions, Willingness-to-pay, Transparency, Traceability, Consumer Perceived Ethicality, Perceived Brand Transparency

Resumo

A indústria de fast fashion é conhecida pelas suas práticas insustentáveis e impactos socioambientais. No entanto, nos últimos anos, os consumidores têm valorizado e exigido cada vez mais uma maior transparência e rastreabilidade dos produtos. Em resposta, a Comissão Europeia propôs a implementação obrigatória de Passaportes Digitais de Produtos (DPP) para todos os produtos têxteis vendidos na UE até 2030. Semelhante aos passaportes tradicionais, os DPPs servirão como identificadores digitais únicos, fornecendo informações sobre o ciclo de vida de um produto, incluindo a sua origem, materiais, impacto ambiental e recomendações de eliminação. Com base na Teoria da Sinalização, foi efetuado um estudo experimental para compreender como os DPPs podem sinalizar o compromisso de uma marca com a transparência do produto e influenciar o comportamento de compra do consumidor. Especificamente, foi examinado o impacto da presença (versus ausência) de DPPs nas intenções de compra do consumidor e na sua disponibilidade para pagar, analisando também os papéis moderadores da percepção de transparência e ética da marca. Os resultados mostram que a percepção da eticidade reforça o impacto positivo dos DPPs na disponibilidade para pagar apenas quando a percepção da transparência da marca é elevada, embora não afete significativamente as intenções de compra. Esta dissertação fornece contribuições teóricas e práticas relevantes sobre o potencial transformador dos DPPs enquanto ferramentas de rastreio e localização para melhorar a transparência e a rastreabilidade dos produtos no sector da moda e sobre a forma como podem influenciar as decisões de compra dos consumidores.

Palavras-Chave: Passaporte Digital do Produto (DPP), Consumidor, Fast Fashion, Intenções de Compra, Vontade de Pagar, Transparência e Rastreabilidade, Ética Percebida pelo Consumidor, Transparência Percebida da Marca

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List of Abbreviations

ANOVA 3 Analysis of Variance

DPP 3 Digital Product Passport

EC 3 European Commission

EGD 3 European Green Deal

ESPR 3 Eco-design for Sustainable Products Regulation

CPE 3 Consumer Perceived Ethicality

PBT 3 Perceived Brand Transparency

1. Introduction

1.1. Problem Definition and Relevance

The fashion industry is one of the largest global industries, being valued at over 1.7 trillion US dollars in 2023 (Statista, 2024a). Yet, along with these numbers lies a dark reality. Environmental harm, excessive resource use, and labor exploitation 3 although unethical and unsustainable practices 3 are all common in this sector's supply chains (Carter & Rogers, 2008). More specifically, the fashion sector is responsible for approximately 10% of global carbon emissions and nearly 20% of the world's wastewater (European Parliament, 2021). Also, over 92 million tons of clothing end up in landfills every year, with minimal efforts toward reuse or recycling (Niinimäki et al., 2020). The problem is so significant that the United Nations identified the fashion industry as the second most polluting industry, following only the oil and gas sector (United Nations, 2019).

These issues are largely driven by the rise of fast fashion (Niinimäki et al., 2020). Known for promoting frequent purchasing and a throwaway culture through irresistibly low prices and rapidly changing trends (Bick et al., 2018), fast fashion accounted for approximately 123 billion US dollars of the fashion industry in 2023 (Statista, 2024b).

However, as awareness of these negative impacts grows, consumers increasingly demand greater transparency, sustainability, and ethical accountability from brands, seeking convenience, affordability and information about how and where their clothes are made (Kim et al., 2020). However, with its fragmented and complex structure, the fast fashion business model often fails to provide clear and comprehensive information about product supply chains (Garcia-Torres et al., 2022). This lack of transparency makes it difficult for consumers to make well-informed and ethical purchasing decisions (Ospital et al., 2022).

In response to the numerous challenges facing the fast fashion supply chain, digital technologies have emerged as promising tools to increase transparency and accessibility (Heim, 2022). One of the most innovative solutions to address the sector's information asymmetry was introduced in March 2022 as part of the EU Strategy for Sustainable and Circular Textiles. At the core of this strategy lies the implementation of Digital Product Passports (DPPs), which will become mandatory for all textile products sold in the European Union by 2030 (Bendzuck et al., 2024).

Each DPP will serve as a unique product identifier and comprehensive digital repository of the product's life cycle, including information on materials and methods used in manufacturing, distribution networks, carbon footprint, and environmental impact (Trustrace, 2023a). This innovative approach aims to enable authorities to carry out more effective checks and controls, empower consumers to make informed purchasing decisions, and facilitate the repair and recycling of products (Götz et al., 2022). Ultimately, DPPs have the potential to revolutionize transparency, standardization, and data sharing in the sector (Walden et al., 2021).

Previous research has provided valuable insights into the technical aspects and requirements of the DPP system, i.e., the digital infrastructure for creating and managing DPPs, as well as the conceptual design and industry-specific content (Jansen et al., 2023; Plociennik et al., 2022). However, a significant gap remains in understanding how DPPs impact consumer purchasing behaviors, such as purchase intentions (PI) and willingness to pay (WTP). This gap is particularly relevant in sectors like fast fashion, where consumers' increasing awareness of its environmental and social impact drives demand for greater transparency and traceability, significantly influencing their PI and WTP (Mol, 2015; Garcia-Torres et al., 2022).

Drawing on Signaling Theory, this study investigates how the presence of a DPP can influence consumer PI and WTP and how this relationship is moderated by consumer perceptions of the brand's transparency and further moderated by consumer perceived ethicality. Signaling Theory addresses how parties with access to different information communicate and interpret signals suggesting that cues can convey underlying qualities or intentions not directly observable (Connelly et al., 2011). In this context, DPPs can be seen as signals of a brand's commitment to product traceability and transparency, thereby influencing consumer PI and WTP.

This research aims to offer three significant contributions. First, it provides insights into how DPPs might impact consumer purchasing intentions and willingness to pay. This is extremely relevant since these are expected to become mandatory in the apparel industry by 2030, and this analysis not only prepares stakeholders for such regulatory changes but also addresses a critical research gap for academics and practitioners in understanding consumer behavior in response to DPPs. Second, by applying the signaling theory, this study investigates how DPPs serve as signals of a brand's commitment to transparency and traceability, thereby influencing consumer purchasing decisions. Third, this research addresses a gap in current literature by exploring the interplay between perceived brand transparency and consumer-perceived ethicality, rather than studying these factors in isolation. This approach enhances the

understanding of how these elements jointly influence consumer purchasing intentions, offering crucial insights for industry stakeholders striving to meet ever-changing consumer expectations.

1.2. Objectives and Research Questions

The primary objective of this dissertation is to examine how a Digital Product Passport (DPP) can impact consumer purchasing intentions (PI) and willingness to pay (WTP) in the fast fashion sector. Specifically, this study investigates the moderated-moderation effect of perceived brand transparency and consumer-perceived ethicality in this relationship. These insights will provide a deeper understanding of how implementing DPPs in this sector can influence consumer PI and WTP, revealing their transformative potential to go beyond enhancing product transparency and traceability, potentially shaping key drivers of consumer purchasing behavior.

The following research questions will, thus, be addressed:

RQ1: How does the presence of a Digital Product Passport (DPP) in fast fashion products influence consumers' predictors of purchase decisions?

With new legislation set to mandate the implementation of DPPs in the fashion industry within a few years, DPPs are becoming increasingly important. The first research question explores whether DPPs affect consumer predictors of purchase decisions, specifically their purchase intentions and willingness to pay (WTP). This question is important because it assesses the direct impact of DPPs on consumer decision-making in the fast fashion industry, where transparency is often lacking.

RQ2: Does the level of perceived brand transparency influence the relationship between the presence of a DPP and the consumer's purchasing intentions and willingness to pay?

While DPPs offer factual product transparency, consumers' perception of a brand's overall transparency might significantly impact consumer responses. This is particularly relevant in the fast fashion industry, where brands are often not perceived as transparent. The second research question explores whether perceived brand transparency influences the relationship between DPP presence (versus absence) and consumer purchase decision predictors. Prior literature on consumer trust and transparency suggests that brands perceived as honest and open are more likely to see increased consumer loyalty and willingness to pay higher prices (Kang & Hustvedt,

2014; Kim et al., 2020). This question aims to understand if perceived transparency can enhance the effectiveness of DPPs in influencing consumer purchasing behavior.

RQ3: Does consumer-perceived ethicality further influence the effect of perceived brand transparency on the relationship between DPP presence and consumers' predictors of purchase decisions?

Consumer-perceived ethicality can play a key role in shaping consumers' predictors of purchase decisions, particularly in the fast fashion industry, where ethical concerns are prevalent. The third research question investigates whether the effect of perceived brand transparency on the relationship between DPP presence (versus absence) and consumers' predictors of purchase decisions is further moderated by consumers' ethicality perceptions about the brand. Ethical consumption theory suggests that consumers who perceive a brand as ethical are more likely to be influenced by transparency efforts (Yang & Battocchio, 2021). Understanding this interaction can help brands design more effective sustainability communications and initiatives, ensuring that their efforts resonate with ethically-minded consumers.

1.3. Thesis Structure

This dissertation begins with an introduction that describes the underlying problem, its relevance, the objectives of the study, and the main research questions, as well as an overview of the structure of the dissertation. This is followed by a comprehensive review of existing academic literature. An analysis of the fashion industry is presented, focusing on fast fashion and its significant negative impacts, followed by a discussion of traceability and transparency in (fast) fashion supply chains. The emergence of Digital Product Passports is then explored as a potential solution to these issues, along with an analysis of how their implementation can influence consumers' purchasing decisions and be shaped by their brand perceptions. Based on this analysis, a set of hypotheses is formulated to guide the empirical investigation of this dissertation. The next chapter describes the methodology and data collection process, followed by a complete analysis of the results. Finally, a discussion of the main conclusions and their implications is given, as well as an analysis of the study's limitations and suggestions for future research.

2. Literature Review

2.1. The Fashion and Fast Fashion Industries: Environmental & Social Impacts

The fashion industry is a major global economic force, creating numerous employment opportunities and driving substantial consumer spending (Gazzola et al., 2020). However, alongside its financial contributions come high environmental and social costs. Fashion production is notoriously resource-intensive, with high water consumption, chemical usage, and waste generation (Shen, 2014). Socially, the industry faces issues such as poor working conditions, long hours, and low wages, among others (Bick et al., 2018).

These effects have been greatly shaped by fast fashion's emergence and rapid expansion, a business model characterized by rapid, low-cost mass-production cycles designed to meet the demands of ever-changing fashion trends (Bick et al., 2018). By offering irresistibly low prices, fast fashion fosters a culture of overconsumption and disposability, reshaping consumer purchasing habits and worsening waste accumulation. Every year, 92 million tons of the 100 billion garments produced end up in landfills (Niinimäki et al., 2020). For instance, producing a single cotton t-shirt consumes 2,700 liters of fresh water, equivalent to an individual's consumption over 2.5 years (European Parliamentary Research Service, 2020). Concurrently, to meet such relentless demand at competitive prices, fast fashion often outsources production to countries with inexpensive labor, where exploitative working conditions and human rights violations are common practices (Bick et al., 2018). In essence, fast fashion involves a direct and massive human and ecological cost, which is becoming increasingly unsustainable.

In response to these impacts, consumers are now actively and increasingly seeking out brands that prioritize transparency and adhere to ethical and sustainable practices (Singh et al., 2012). In other words, purchasing decisions are no longer solely influenced by product quality and price; environmental and social practices of brands have become key considerations too.

2.2. Transparency and Traceability in the Fast Fashion Supply Chain

Supply chains emerge as a primary source of concern when discussing sustainability issues in the fast fashion sector. These are commonly known for their complexity, opacity, and fragmented structure, largely driven by globalization (Garcia-Torres et al., 2022), often leading to a loss of control and accountability for companies (Rzeczycki, 2023). Čiarniene and Vienašindienė (2014) observe a trend where companies have increasingly adopted a vertical

integration approach within their supply chains in recent years. Outsourcing and subcontracting have become common practices, creating a fragmented supply chain that is difficult to monitor and regulate (Bubicz et al., 2021). In fast fashion, this process often spans several countries, with raw materials coming from one region, manufacturing in another, and distribution around the world (Turker & Altuntas, 2014).

While the transparency issues in fast fashion are quite clear, a deeper understanding of this concept is crucial for effectively addressing these problems.

Transparency can be broadly defined as the disclosure of information (Doorey, 2011; Mol, 2015), reducing information asymmetry between stakeholders and promoting informed decision-making (Fung, 2014). Yet, some researchers argue that it entails more than mere information disclosure, despite this one being fundamental. Schnackenberg and Tomlinson (2016) introduced two other dimensions: clarity and accuracy. In turn, Rawlins (2008) argued that transparency must fulfill three elements: be truthful, substantial, and useful, while actively involving stakeholders in identifying the information and communicating it in an objective and balanced way. Another key aspect highlighted in the literature is how transparency encompasses the relevance of the information provided about business practices and products to all stakeholders (Brandão et al., 2018; Tapscott & Ticoll, 2003).

Sodhi and Tang (2019) conducted a full study on supply chain transparency and identified three main elements: (1) supplier information, (2) workplace safety compliance among suppliers, and (3) environmental impact across the supply chain, such as standards on energy usage or water consumption. Egels-Zandén and Hansson (2016) further suggest that transparency in the fashion industry involves disclosing information on traceability and sustainability conditions at suppliers. This becomes even more transformative in the fast fashion sector, where the complex and opaque supply chains can benefit greatly from enhanced traceability.

By definition, traceability is outlined by the International Organization for Standardization (ISO) as the ability to trace the history of an object's supply chain (ISO 9000). The United Nations Global Compact (2014) extends this concept by emphasizing the importance of tracking a product's history, application, location, and distribution of its components. Joy and Peña (2017) define traceability in the apparel industry as providing accessible information about a product's manufacturing process and its environmental and social impacts, enabling consumers to make informed purchasing decisions. This aligns with Papú Carrone's (2020)

perspective, where traceability is viewed as a means to address the inherent opacity and complexity within fast fashion production systems. In either definition, traceability stands out as a key aspect of achieving supply chain transparency.

However, several researchers argue that in brand transparency, what truly matters is not how the organization perceives it but rather how stakeholders perceive this transparency (Albu & Wehmeier, 2014; Taiminen et al., 2015). For example, Yoo and Jeong (2014) define brand transparency as consumers' perception of a brand's effort to share information. Other scholars add another dimension to this perception: the quality of the information. According to Schnackenberg and Tomlinson (2016) and Foscht et al. (2018), transparency is fundamentally evaluated by the information's clarity, accuracy, and trustworthiness. This perspective emphasizes that transparency goes beyond mere information availability; it includes information credibility and reliability as consumers perceive it.

In recent years, consumers have increasingly demanded (and expected) greater transparency from brands (Kim et al., 2019). This demand often translates into a search for online information regarding a company's products and the sustainability of its supply chain (Sodhi and Tang, 2019). Despite technological advancements that facilitate access to information, many consumers still struggle to find comprehensive details about companies' sustainability efforts (Ozdamar Ertekin & Atik, 2015). This issue is particularly pronounced in fast fashion, where sourcing decisions are mainly driven by cost and speed, overshadowing considerations of transparency and traceability (Bhardwaj & Fairhurst, 2010). As a result, consumers frequently lack clear insights into the actual sustainability practices of fast fashion companies.

Given these challenges, the need for innovative solutions to improve transparency and traceability is clear. Several academics have highlighted the transformative potential of technologies such as blockchain and RFID in enhancing supply chain traceability and transparency within the industry (Rejeb et al., 2019; Ebinger & Omondi, 2020; Lee & Zhang, 2023). These technologies offer promising avenues for addressing the current deficiencies and meeting consumers' evolving demands.

2.3. Digital Product Passports: A Transformative Tool in Fast Fashion

In March 2022, the European Commission (EC) published the proposal for the new EU Strategy for Sustainable and Circular Textiles under the framework of the European Union Green Deal (European Commission, 2022a). At its core was the implementation of Digital Product

Passports (DPPs), a new Eco-design for Sustainable Products Regulation (ESPR). Two years later, a provisional agreement on this regulation establishes that the EU DPP will become mandatory in the coming years for specific product categories, such as batteries, textiles, and electronics, among others (European Commission, 2024). For instance, this digital dossier will be mandatory for all textiles and apparel by 2030 (Bendzuck et al., 2024).

This rule will apply to all products on the EU market, whether produced inside or outside the EU (GS1, 2023). Given that most supply chains nowadays operate on a global scale, the EU DPP rules are likely to be felt worldwide, pushing the various suppliers and producers to collect and report the required data.

This tool promises a new era of transparency and accountability in assessing a product's life cycle. But what exactly is a DPP and what information does it encapsulate?

The concept of a Digital Product Passport has been defined and expanded upon by various scholars and institutions, each adding details to its utility and implementation. The European Parliamentary Research Service (EPRS) defines a DPP as a data collection summarizing a product's components, materials, and chemical compounds, providing information on reparability, replacement parts, and disposal instructions (European Commission, 2024). Similarly, Götz et al. (2022) describe a DPP as an electronically accessible record of a product's origin, composition, repair, disassembly potential, and recyclability or disposal methods for its components at the end of their life. Walden et al. (2021) and Jansen et al. (2023) further emphasize the DPP's role in promoting a resource-efficient circular economy. From a technical perspective, Götz et al. (2022) explain that a DPP integrates a unique product identifier with data collected by various value chain actors, linking the product to its data via physical tagging. Alves et al. (2022) discuss the DPP's role in tracking indicators such as resource consumption (e.g., water, energy) and emissions (e.g., CO₂), which are crucial for promoting sustainability and accountability in production processes. Despite minor differences in definitions, there is consensus that the DPP serves as a unique product-specific data identifier, offering a transparent and traceable record of a product's lifecycle.

While the exact content of a DPP still requires further investigation and final approval (Adisorn et al., 2021), the European Commission (2022b) and Götz et al. (2022) have already outlined various key elements to be included:

- Product-specific data, which covers basic information about the product, such as the brand, date of manufacture, details about durability, ease of maintenance and reparability, among others.
- Material traceability data, which relates to the history of the supply chain and material sourcing, detailing product origins and components.
- Sustainability data, in a standardized, comparable format of the production process and distribution and its overall impact, including recyclability guidelines, carbon footprint, resource efficiency, and energy usage.

This information will be linked to a unique digital data carrier, easily accessible via a QR code (Quick Response code), RFID tag (Radio Frequency Identification tag), or another form of scannable technology (European Commission, 2022b). Given that it provides specific information about a product and its manufacturing process, rather than just company-level data, DPPs are seen as a way to move from <Brand Transparency= to <Product Transparency= (Ospital et al., 2022).

By mandating the adoption of Digital Product Passports, the EU is underlining that sustainability is not just a goal but a collective journey that transcends borders and industries. Its mandatory implementation promises several benefits. The most frequently mentioned are increasing transparency, traceability, and support for a more circular economy (Adisorn et al., 2021; Walden et al., 2021). This will be particularly useful in the fast fashion industry due to its complex and often opaque supply chains. As the European Commission (2022c) suggests, this not only gives authorities valuable information for effective control measures but also boosts consumer consciousness and empowers informed and conscious decision-making. Ultimately, this builds trust among various stakeholders (Adisorn et al., 2021; Götz et al., 2022).

While DPPs offer clear and important benefits, their associated challenges must also be addressed. For example, determining the specific information that should be included in a DPP throughout a product's life, from use to repairs, remains complex and under study (Götz et al., 2022). Walden et al., 2021 pointed out another challenge: maintaining the accuracy of DPP data and ensuring it is updated throughout the product's life cycle.

Despite these challenges, and to proactively address them, some forward-thinking brands are slowly integrating digital product passports into their operations. Kappahl, a Swedish fashion apparel brand prominent in the Nordic countries, is at the forefront of this movement. Despite

its traditional association with rapid fashion cycles driven by cost considerations, Kappahl is positioning itself as a pioneer in sustainability and transparency within the fast fashion industry. In collaboration with Trace4Value, a project focused on traceability for sustainable value chains, Kappahl is actively participating in a pilot project focused on developing and implementing DPPs for selected textile products.

Since January 2024, Kappahl's customers can trace the value chain of specific products such as jeans. As of now, the possible different information gathered through the traceability part of the clothing description is the following: fiber and yarn suppliers, product processing unit, manufacturing, and fabric supplier, including, not exhaustively, the country of production, the address of the site and the number of employees. This initiative serves as a testing ground for the brand, its partners, and even customers. It marks a strategic effort by Kappahl to adopt more transparent and traceable practices, demonstrating its commitment to meeting evolving consumer expectations and advancing sustainable fashion practices.

However, despite the importance of product transparency within Fashion, it is important to note that additional factors may drive consumer purchasing decisions. Prior research indicates that consumers' perceptions of a company's transparency can amplify their purchase intentions (Kang & Hustvedt, 2014), but their aggregate ethicality perceptions about a brand, further moderate that relationship (Herédia-Colaço & Coelho do Vale, 2018), as reviewed next.

2.4. Consumer Perceived Ethicality

Brunk and Bluemelhuber (2010, p. 368) define Consumer Perceived Ethicality (CPE) as the "consumers' aggregate perception of a subject's (i.e., a company, brand, product, or service) morality." According to Fan (2005), an ethical brand is guided by core principles such as honesty, integrity, diversity, responsibility, quality, respect, and accountability. Building on this, Brunk (2010) identified six domains shaping these perceptions: consumers, employees, the environment, the local community and economy, the business community, and the overseas community.

CPE is particularly relevant to this research as it encapsulates consumers' overall perceptions of the ethicality of brands, which will likely impact how consumers process the information about how openly a brand communicates about its practices, products, and operations. This perception will likely significantly influence consumers' purchase intentions and willingness to pay for a product or brand.

2.5. Signaling Theory and Consumer Purchasing Behavior

Consumer purchasing behavior is influenced by a complex interplay of cultural, social, personal, psychological, and economic factors (Ramya & Ali, 2016). Two well-known indicators of a consumer's purchasing behavior are purchasing intentions (Newberry et al., 2003) and willingness to pay (Breidert et al., 2006). Purchasing intention refers to a consumer's readiness to buy a specific product at a given time or situation, indicating interest and likelihood of purchase (Lu et al., 2014; Kim & Ko, 2012). Willingness to pay (WTP) represents the maximum amount a consumer is willing to spend on a product or service, reflecting its perceived value (Shogren et al., 1994).

In the fast fashion industry, consumers' purchasing decisions are largely driven by factors such as accessibility and affordability (Joy et al., 2012). However, the sector's significant socio-environmental impacts, coupled with its inherent lack of transparency and accountability, have been undermining these motivations. In recent years, there has been a growing emphasis on the importance of product transparency and traceability in shaping consumer preferences, with modern consumers favoring brands that prioritize these aspects (McNeill & Moore, 2015).

Today, product transparency and traceability are often seen as indicators of a brand's commitment to ethical and sustainable practices (Kim et al., 2020). By openly sharing detailed information about their supply chain practices, brands can reduce information gaps and differentiate themselves in a competitive market (Connelly et al., 2011). DPPs serve as a means for brands to demonstrate their commitment to product transparency and traceability. This concept aligns with signaling theory (Erdem & Swait, 1998; Spence, 1973), which examines how one party typically the more informed communicates critical, hidden information to others through signals.

Signaling theory is particularly relevant in marketing and operations management because it helps explain how these signals impact consumer behavior and decision-making (Bergh et al., 2014; Taj, 2016). For instance, it elucidates how signals can convey product quality when consumers lack direct information, influencing their purchasing decisions (Wells et al., 2011), and their willingness to pay (Dopico et al., 2016). Considering that DPPs can effectively convey product attributes like quality, transparency, and sustainability to consumers, who often face information asymmetry in the fast fashion market, signaling theory is especially applicable to the current research.

Prior research consistently shows a positive correlation between consumer purchasing intentions, willingness to pay (WTP), and supply chain transparency in the apparel industry (Bhaduri & Ha-Brookshire, 2011; Egels-Zandén & Hansson, 2016; Kim et al., 2020). These studies converge on a central finding: companies that openly disclose supply chain details, such as manufacturing locations, histories, and working conditions, tend to experience higher consumer purchase rates and increased WTP. This suggests that product transparency and traceability significantly impact consumer purchasing decisions and their WTP.

Another factor that can significantly shape consumer purchasing behavior is consumer-perceived ethicality. Research shows that consumers are more likely to purchase and even willing to pay higher prices for, products they believe to be ethically produced (Creyer, 1997). Conversely, when consumers perceive a company lacking ethical standards, their purchase intentions decrease (Jin & Lee, 2019). This relationship between perceived ethicality and purchasing decisions is closely related to how transparent a brand is perceived to be about its ethical practices. Recent studies indicate that when consumers view a brand's production practices as ethical and transparent, they are more likely to trust the brand and are more inclined to make a purchase (Kim et al., 2020). More importantly, consumers' perception of a brand's ethicality directly shapes their overall view of its transparency (Kim & Lee, 2018; Reck et al., 2022). This aligns with the idea that brand transparency is not merely about the availability of information but also about how that information is perceived regarding clarity, objectivity, and proactivity (Sansome et al., 2024). As supported by signaling theory (Erdem & Swait, 1998; Spence, 1973), the perception of brand ethicality may, therefore, represent an important cue to consumers as they evaluate the information provided by the brand, namely its communication or information transparency. Should consumers perceive a lack of ethical information, they may infer that the brand withholds information, thereby reducing brand transparency perceptions (Lin et al., 2017).

3. Conceptual Framework and Hypotheses

3.1. Conceptual Framework

As previously mentioned, this research aims to understand the impact of the presence of a Digital Product Passport in a fast fashion product on the predictive factors of consumer purchasing decisions, i.e., purchasing intentions and willingness to pay. From the academic literature review, a set of hypotheses has been developed. These are integrated into a conceptual framework to be empirically tested in an experimental study. The independent variable is a Digital Product Passport's presence (versus absence) in a fast fashion product. The dependent variables include two predictive factors of consumer purchasing decisions: purchasing intention and willingness to pay. Additionally, this study explores the moderating role of perceived brand transparency between the presence of a DPP and purchasing intentions and willingness to pay; and also the moderated-moderation role of consumer-perceived ethicality on the aforementioned relationship. This relationship leads to the conceptual model presented below (Figure 1):

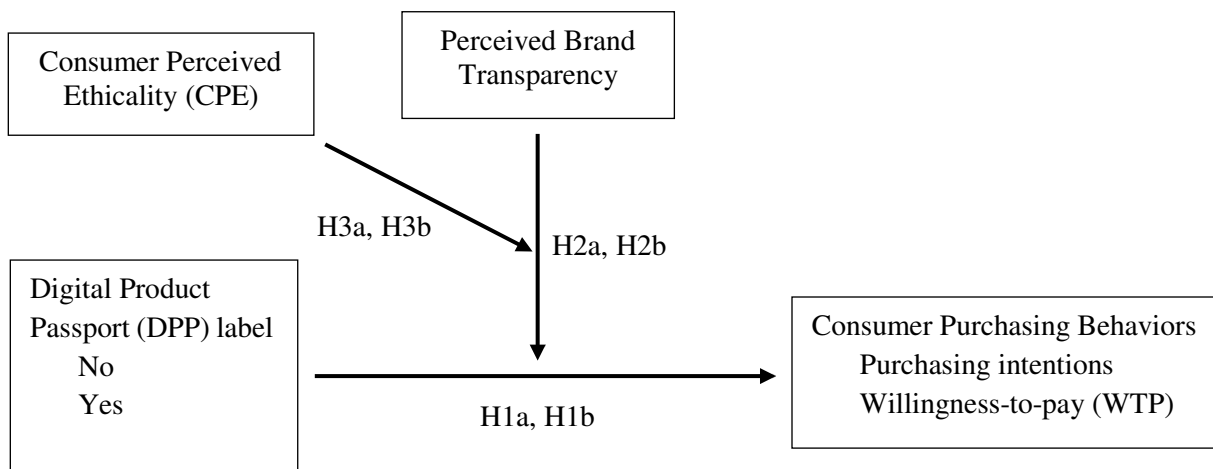


Figure 1: Conceptual Model

3.2. Hypotheses

In recent years, the fast fashion industry has faced increasing scrutiny due to its lack of transparency and traceability regarding its environmental and social impacts. This has led to a growing consumer demand for transparency about the products they purchase. Consumers now prioritize products that provide detailed insights into their manufacturing processes. For instance, research by Kim et al. (2020) confirms that product transparency significantly influences consumer purchase decisions, particularly when the information is perceived as fair and reliable. Additionally, it shows a positive correlation between consumer willingness to pay and supply chain transparency specifically within the apparel industry (Kim et al., 2020).

In response to these consumer preferences, Digital Product Passports have emerged as a solution to offer comprehensive lifecycle information about products, ranging from raw material sourcing to end-of-life disposal. Based on Signaling Theory, which suggests that entities use observable signals to convey qualities or intentions (Connelly et al., 2011), DPPs can signal to consumers a brand's dedication to product transparency, influencing their purchasing decisions. Thus, the presence of a DPP in a fast fashion product is expected to positively impact the predictive factors of consumer purchasing decisions, as outlined in the following hypotheses:

***H1:** The presence of a Digital Product Passport in a fast fashion product will positively impact consumer purchasing decisions, so that:*

***H1a:** The presence of a Digital Product Passport in a fast fashion product will positively impact consumer purchasing intentions.*

***H1b:** The presence of a Digital Product Passport in a fast fashion product will positively impact consumer willingness to pay.*

As previously discussed, consumer decision-making in the fast fashion industry increasingly prioritizes transparency. Modern consumers expect brands to be clear and accountable for their production processes and impacts. Studies indicate that brands openly disclosing this information tend to garner more consumer trust and purchases (Bhaduri & Ha-Brookshire, 2011; Egels-Zandén & Hansson, 2016). This suggests that companies now compete not only on traditional metrics like cost and quality but also on their commitment to openness and accountability (Dyer & Ha-Brookshire, 2008).

The primary objective of Digital Product Passports is to enhance transparency at the product level by providing structured information about its life cycle. This initiative is particularly crucial in the fast fashion industry, where negative perceptions about transparency and ethical practices are prevalent. While DPPs aim to inform consumers about individual products, their overall effectiveness in shaping purchasing decisions may hinge on how transparent consumers perceive the brand to be as a whole.

Previous research has demonstrated that consumer perceptions of a company's transparency can significantly enhance their purchase intentions (Kang & Hustvedt, 2014). Additionally, consumers are willing to pay higher prices for products from companies they perceive as transparent (Bhaduri & Ha-Brookshire, 2011). Drawing upon signaling theory, it is reasonable to predict that the positive signals conveyed by DPPs are further strengthened by consumers' perceptions of brand transparency, suggesting that this enhanced perception of transparency can, in turn, positively influence purchasing behaviors.

Therefore, this study examines the moderating role of perceived brand transparency on the impact of DPPs on purchasing decisions. Specifically, it hypothesizes that the perceived transparency of a brand will strengthen the relationship between the presence (versus absence) of DPPs and purchase intentions and WTP. The second set of hypotheses is thus proposed:

***H2:** Perceived brand transparency will moderate the relationship between the presence (vs. absence) of a Digital Product Passport label in a fast fashion product and the predictive factors of consumer purchasing decisions, such that:*

***H2a:** The relationship between a Digital Product Passport label's presence (vs. absence) in a fast fashion product and consumer purchasing intentions will be stronger (vs. weaker) when consumer-perceived brand transparency is high (vs. low).*

***H2b:** The relationship between a Digital Product Passport label's presence (vs. absence) in a fast fashion product and consumer willingness to pay will be stronger (vs. weaker) when consumer-perceived brand transparency is high (vs. low).*

Additionally, recent market data indicate that consumers are increasingly willing to pay a premium for products they perceive as socially responsible or environmentally sustainable (Statista, 2020). At the same time, according to signaling theory, companies may use signals, such as certified seals of approval, to communicate important information about their practices

to consumers, thereby influencing their purchasing behavior (Spence, 1978). This principle applies to the context of Digital Product Passports (DPPs), which may effectively convey a product's quality, transparency, and sustainability, thus impacting consumer decisions.

Research by Creyer (1997) and Jin and Lee (2019) supports the idea that ethical perceptions influence consumer behavior. Despite the importance of these past studies, limited research has examined how a fashion brand's perceived ethicality and transparency interact when assessing product-related evaluation tools, such as detailed product descriptions (DPPs), and their impact on purchasing decisions. Kim et al. (2020) found that production transparency positively impacts purchase intentions, particularly when perceived as ethical. Additionally, Kim and Lee (2018) and Reck et al. (2022) suggest that perceptions of a brand's ethicality influence views on its transparency. This highlights the importance of understanding how CPE and perceived brand transparency interact to shape the effectiveness of DPPs in influencing purchasing behavior. Overall, it is hypothesized that the positive impact of DPPs on purchasing behavior may be moderated by perceived brand transparency, with CPE further strengthening this effect. As such, the strength of both CPE and perceived brand transparency will amplify the positive impact of DPPs on consumer behavior.

Accordingly, the third set of hypotheses is presented as follows:

H3: *The moderating impact of perceived brand transparency on the relationship between the presence (vs. absence) of a Digital Product Passport label in a fast fashion product and consumers' purchasing behaviors will be moderated by the level of consumer-perceived brand ethicality, so that:*

H3a: *The moderating impact of perceived brand transparency on the relationship between the presence (vs. absence) of a Digital Product Passport label in a fast fashion product and consumers' purchasing intention will be stronger (vs. weaker) when the level of consumer-perceived brand ethicality is high (vs. low).*

H3b: *The moderating impact of perceived brand transparency on the relationship between the presence (vs. absence) of a Digital Product Passport label in a fast fashion product and consumers' willingness to pay will be stronger (vs. weaker) when the level of consumer-perceived brand ethicality is high (vs. low).*

4. Methodology and Data Collection

4.1. Research Method

To test the proposed hypotheses, two experimental studies were conducted: a pilot study and a main study. For each study, an online survey was developed to quickly and cost-effectively gather a large number of responses. This method allowed respondents to participate regardless of their geographical location or time constraints, thus enhancing response rates, confidentiality, and anonymity of participants, which likely fostered honest participation and minimized potential response bias (Evans & Mathur, 2005). The online survey platform selected was Qualtrics due to its intuitive interface, which allows for an efficient collection of data from a large number of respondents in a time- and cost-efficient manner. In addition, it simplifies processes such as the randomization of questions and allows data to be easily exported directly into SPSS statistical software, streamlining data management. Both questionnaires were distributed through a link generated by the platform Qualtrics via WhatsApp groups, Instagram and LinkedIn.

Survey data collection drawbacks should also be taken into account. Firstly, it is not possible to clarify any doubts or issues that may arise when answering the survey. Secondly, it is not possible to ask follow-up questions which limits the depth of understanding of participants' answers. Also, the lack of control over the respondents' level of concentration and environment can compromise the validity of the data collected. Thus, to minimize these issues, the surveys were designed to be clear, concise, and anonymous with only closed-ended questions.

4.2. Sampling

The sampling technique used in this study was non-probability convenience sampling. Convenience sampling is a common non-probability sampling method in which participants are selected from the target population based on certain practical criteria such as their geographic proximity, accessibility, availability, or willingness to participate (Dörnyei, 2007). Additionally, this method offers advantages in terms of ease, cost-effectiveness, and time efficiency in data collection (Etikan & Babtope, 2019). However, as highlighted by several researchers, this sampling technique is likely to contain hidden biases since not all population members have an equal chance of being selected (Mackey & Gass, 2005; Sedgwick, 2013; Leiner, 2014).

4.3. Design and Procedure

The study followed a 2 (Digital Product Passport: no, yes) between-subjects design, with participants randomly assigned to one of the two conditions to ensure unbiased distribution. The objective was to investigate how the presence or absence of the Digital Product Passport (DPP) label affected consumer purchasing decisions, specifically purchasing intentions and willingness to pay. Perceived brand transparency and consumer-perceived ethicality were measured as continuous moderator variables.

The questionnaire began with a brief introduction, informing participants that they would evaluate a t-shirt from the fast fashion brand ZARA. Depending on their assigned condition, participants saw either a standard ZARA label (No DPP) or a Digital Product Passport label. The DPP label was developed by the author of this study based on existing prototypes and included information such as water consumption, electricity usage, and CO₂ emissions, which are not provided on the standard ZARA label. To ensure participants understood the information, a concise explanation of the DPP concept was provided to those with that scenario.

Following the exposure to the manipulations, participants rated their agreement levels on multi-item scales, assessing the manipulation checks and the moderators' 3 perceptions of brand transparency and ethicality. Subsequently, they responded to questions regarding the dependent variables: purchasing intentions and willingness to pay. Finally, demographic information was collected, including gender, age, nationality, occupation, and annual income, to provide a comprehensive characterization of the sample.

4.4. Stimuli Development

In the main study, two distinct stimuli were developed. Participants were asked to envision themselves purchasing a t-shirt from the fast fashion retailer ZARA, a brand chosen for its widespread recognition and relevance in the industry.

Each scenario displayed one of the two possible labels affixed to that garment. The 8No DPP9 scenario presented a label directly sourced from ZARA's website, representing a typical label that participants might encounter in real-life shopping situations. It included standard label information such as composition, care instructions, country of origin, and shipping details. In contrast, the DPP scenario showed a fictitious label created by the author of this study. This label was more comprehensive, drawing inspiration from existing DPP prototypes developed

by various brands and organizations within the fashion industry and showcasing to mirror ZARA's typical label style while providing additional transparency and traceability features. It included specific details such as the liters of water consumed and kilograms of CO₂ emitted during the production of the t-shirt.

ZARA was chosen as the fast fashion brand for its widespread recognition as a mainstream brand in this industry. The beige T-shirt featured in both stimuli was selected for its unisex design, aimed at minimizing biases arising from misconceptions about the product. Both stimuli followed a similar structure, wording, amount of information, and visual content to minimize potential biases between them. The stimuli can be found in Appendix 1.

4.5. Research Instruments

As previously mentioned, two experimental studies were conducted using the online platform Qualtrics, a pilot study and a main study. The surveys were distributed anonymously through links shared via direct messages and social media to ensure a broad and unbiased sample. The following sections will describe the design of the studies and the variables examined.

4.5.1. Pilot Study

The pilot study aimed to validate the clarity and perception of stimuli and manipulations, focusing on consumers' perceptions of brand transparency and ethicality concerning the fast fashion brand ZARA, when presented with a label with or without a Digital Product Passport. Additionally, participants' familiarity with the fast fashion brand ZARA was assessed, revealing significant brand familiarity mean (measured on a 7-point Likert scale, from 1 3 Not at all familiar to 7 3 Very much familiar), which is crucial for contextual understanding ($M_{\text{Brand Familiarity}} = 5.89$).

This survey was fully answered by 42 participants who did not take part in the main study. After responding to the questionnaire, participants provided feedback on the clarity of stimuli, leading to necessary adjustments for the main survey.

A manipulation check was conducted to assess consumers' ethical perceptions of the displayed labels. An independent samples t-test showed a statistically significant difference in the means of both groups ($M_{\text{No DPP Label}} = 3.35$; $SD = 1.272$ vs. $M_{\text{With DPP Label}} = 4.21$; $SD = 2.000$; $t(39) = -1.552$; $p < .05$) (see table 2). These results indicate that participants exposed to the DPP label

perceived higher levels of ethicality than those who were not exposed, thus confirming the effectiveness of the manipulation and leading to confidently moving on to the main study.

Table 1 3 Pilot Study Manipulation Check 3 Perceived Brand Ethicality

	Mean	SD	t-test
No DPP Label	3.35	1.272	-1.55*
With DPP Label	4.21	2.000	

Note: ***p < .001, **p < .01, *p < .05, +p f 1

4.5.2. Main Study

An experimental study was conducted on the Qualtrics online platform to investigate how the presence of a Digital Product Passport label on a fast fashion product, compared to the absence of this label (represented by a standard Zara label), influences consumer purchasing decisions, specifically focusing on purchasing intentions and willingness to pay. The main study was launched on May 20th, 2024, and collected a total of 214 responses, with 176 fully completed submissions. Among these, 90 were under the no DPP scenario, and 86 were under the DPP scenario. Despite anticipated dropouts, which is common due to various reasons like distractions, the sample size still meets the requirements for a valid randomized experimental study design, as recommended by Maxwell and Delaney (2004).

4.6. Variables Description

All the measurement scales were adapted from previous studies.

To assess the level of agreement of respondents with provided statements, a 7-point Likert scale was used, where participants could indicate their responses as follows: 1 = 8Strongly disagree9; 2 = 8Disagree9; 3 = 8Somewhat disagree9; 4 = 8Neither agree nor disagree9; 5 = 8Somewhat agree9; 6 = 8Agree9; 7 = 8Strongly agree9 (Likert, 1932).

4.6.1. Manipulation Check

A manipulation check question evaluated participants' understanding of the product's journey through the displayed label as an indicator of internal validity. Participants rated their agreement with the statement, "After reviewing the product information above, I can understand the product's journey from creation to sale and its overall impact" on a seven-point Likert scale ranging from 1 (Strongly disagree) to 7 (Strongly agree). This check ensured the efficacy

of the Digital Product Passport (DPP) condition in communicating product transparency and traceability information according to EU standards, in comparison to the No DPP condition.

4.6.2. Independent Variable

Digital Product Passport presence (no vs. yes) was manipulated in the study. Participants were randomly assigned to one of two conditions: the DPP condition, where they viewed a label featuring detailed product transparency and traceability information aligned with EU standards, or the No DPP condition, where they saw a standard label from the fast fashion brand ZARA, which lacked this information.

4.6.3. Dependent Variables

Purchase intentions were measured by asking participants to rate their likelihood of buying the T-shirt with the presented label from ZARA on a seven-point Likert scale (1 = Definitely would not buy; 7 = Definitely would buy), adapted from Lee and Shin (2010).

Willingness to Pay (WTP) was measured by asking respondents how much they were willing to pay (from 0 to 100 euros) for the ZARA t-shirt with the displayed label.

4.6.4. Moderators

Perceived brand transparency was assessed using a customized selection of items adapted from Rawlins' (2008) and Lin et al.'s (2017) scales of brand transparency. Participants rated their agreement on a 7-point Likert-type scale (1 = Strongly disagree to 7 = Strongly agree) regarding ZARA's commitment to accountability, provision of understandable information, and clarity of actions. Specifically, this study focused on Rawlins' 'Overall transparency' subscale, incorporating adapted statements such as "ZARA wants to be accountable to people like me for its actions", "ZARA wants people like me to know what it is doing and why it is doing it", and "ZARA provides information that is easy for people like me to understand". Additionally, a statement adapted from Lin et al. (2017) assessed traceability within transparency: "Overall, ZARA provides the information needed to understand the environmental impact of its product production processes."

Consumer Perceived Ethicality (CPE) was assessed through the 6-item CPE scale developed by Brunk (2012) using a 7-point Likert scale (1 = Strongly disagree, 7 = Strongly agree). The six items were:

1. *The company/brand respects moral norms.*
2. *The company/brand always adheres to the law.*
3. *The company/brand is a socially responsible company/product/brand.*
4. *The company/brand avoids damaging behavior at all cost.*
5. *The company/brand is a good company/product/brand.*
6. *The company/brand will make a decision only after careful consideration of the potential positive or negative consequences for all those involved.*

5. Analysis and Results

5.1. Sample Characterization

Participants were required to complete a demographic section at the end of the survey, with detailed responses graphically available in Appendix 3. The final sample, which excludes non-finalized responses, consisted of 176 participants, with a gender distribution of 57.7% female and 42.3% male. The participants' ages varied, with 40.9% between 19 and 24 years old, 21% aged 25 to 34 years, 9.1% between 35 and 44 years, 15.3% between 45 and 54 years, 11.4% aged 55 to 65 years, and 2.3% over 65 years old. Regarding occupation, the majority of the sample was employed (70.4%), while 25.6% were university students and 4% were unemployed/retired. The sample represented 20 countries, with the majority from Portugal (58%), followed by India (11.4%) and Italy (10.8%), while other countries collectively accounted for 19.8%. Annual household income varied widely: 3.4% had an income below €10,000, 13.1% between €10,000 and €19,999, 13.6% between €20,000 and €29,999, 9.7% between €30,000 and €39,999, 11.9% between €40,000 and €49,999, 19.9% between €50,000 and €74,999, 5.1% between €75,000 and €99,999, 6.2% between €100,000 and €150,000, 6.8% above €150,000, and 10.3% preferred not to disclose their income. This comprehensive demographic characterization provides valuable insights into the study's participants, highlighting a diverse and representative sample essential for robust analysis.

5.2. Scale Reliability (and Factor Analysis)

All measurement scales used in this dissertation were adapted from existing literature. Nevertheless, to ensure measurement quality, both validity and reliability were assessed.

A factor analysis was first performed since all scales included three or more items. Although there are no theoretical reasons to believe this scale has subdimensions, this step confirms that the items within each variable are related and distinct from other factors, thereby establishing construct validity. This factor analysis employed a principal component analysis with varimax rotation, using the criterion of eigenvalues greater than 1. The results indicated that both Consumer Perceived Ethicality (CPE) and Perceived Brand Transparency, along with all components of the scales, can be grouped into a single factor. This factor explains 67.67% of the variance in CPE, with a total eigenvalue of 4.060, and 71.99% of the variance in perceived brand transparency, with a total eigenvalue of 2.879.

Following this, a reliability analysis was conducted using Cronbach's α (alpha) to evaluate the internal consistency of the scales. This method evaluates how well the items within each scale correlate with one another, indicating that they collectively measure the same underlying concept or construct, thereby confirming the scale's validity (Tavakol & Dennick, 2011). Cronbach's alpha values range from 0.1 to 1, with higher values indicating greater reliability and consistency (Tavakol & Dennick, 2011). According to George and Mallery (2003), only Cronbach's alpha values above 0.7 are acceptable, with a value above 0.8 being good, and above 0.9 being excellent. Terwee et al. (2007) partially agree, stating that values between 0.70 and 0.95 indicate a positive rating for internal consistency, but values higher than 0.95 may suggest redundancy in one or more items of the scale. Table 3 presents the Cronbach's alpha values that resulted from the variables under analysis. In this study, Consumer Perceived Ethicality demonstrated a Cronbach's alpha of 0.90, while Perceived Brand Transparency yielded a value of 0.87, indicating strong internal consistency and validating the reliability of these scales. No items were removed from the scales, as their deletion would not improve Cronbach's alphas.

Table 2 3 Reliability Test for Multi-item Scales

	Number of items	Cronbach's alpha
<i>Consumer Perceived Ethicality</i>	6	.904
<i>Perceived Brand Transparency</i>	4	.869

5.3. Results Manipulation Check

The manipulation check was based on participants' responses to the statement: <After reviewing the product information above, I can understand the product's journey from creation to sale and its overall impact.> This statement aimed to measure how well participants perceived the product transparency provided by the labels. To assess the effectiveness of the experimental manipulation, an independent samples *t-test* was conducted to compare the mean responses between the two independent groups: participants shown a DPP label and those shown a traditional ZARA label.

Table 3.3 Manipulation Check for DPP Presence (No vs With)

	Mean	SD	t-Test
No DPP Label	4.11	1.863	.05
With DPP Label	4.64	1.735	

Note: *** $p < .001$, ** $p < .01$, * $p < .05$, + $p < .1$

The results indicated a significant difference between the two groups, suggesting that participants perceived differences in the amount of information provided in the labels with and without a DPP ($M_{\text{No DPP Label}} = 4.11$; $SD = 1.86$ vs. $M_{\text{With DPP Label}} = 4.64$; $SD = 1.74$; $t(174) = -1.945$; $p = .05$). This finding implies that the manipulation worked as intended since participants reported a greater understanding of the product's journey and impact when exposed to the DPP label compared to the traditional ZARA label.

5.4. Main Results

5.4.1. The effect of the level of product traceability information

H1: *The presence of a Digital Product Passport in a fast fashion product will positively impact consumer purchasing decisions, so that:*

H1a: *The presence of a Digital Product Passport in a fast fashion product will positively impact consumer purchasing intentions.*

H1b: *The presence of a Digital Product Passport in a fast fashion product will positively impact consumer willingness to pay).*

To test the first set of hypotheses and assess the influence of the presence or absence of a DPP label on the predictive factors of consumer purchasing decisions, specifically purchasing intentions and willingness to pay, a one-way multivariate analysis of variance (MANOVA) was conducted.

The results revealed a statistically significant main effect of DPP presence on willingness to pay ($M_{\text{No DPP Label}} = 16.06$, $SD = 10.42$; $M_{\text{With DPP Label}} = 20.33$, $SD = 13.04$, $F(174) = 5.79$, $p < .05$), showing that participants were more willing to pay for products with a DPP label than for those without, fully supporting H1b.

However, the analysis indicated a statistically non-significant main effect of DPP presence (no vs. yes) on purchasing intentions ($M_{\text{No DPP Label}} = 4.76$, $SD = 1.49$; $M_{\text{With DPP Label}} = 4.65$, $SD = 1.78$, $F(174) = .178$, $p > .05$), rejecting hypothesis H1a. Despite participants showing a higher willingness to pay for products with a DPP label, the means comparison suggests that their purchasing intention differences between fast fashion products with or without a DPP were not statistically significant.

Table 4 3 One-way MANOVA Results for DPP Presence Effect

	No DPP Label		With DPP Label		<i>F-test</i>
	Mean	SD	Mean	SD	
<i>Purchasing Intentions</i>	4.76	1.49	4.65	1.78	.178
<i>Willingness to Pay</i>	16.06	10.42	20.33	13.04	5.785*

*Note: *** $p < .001$, ** $p < .01$, * $p < .05$, + $p < .1$*

5.4.2. The moderating effect of Perceived Brand Transparency (PBT)

H2: *Perceived brand transparency will moderate the relationship between the presence (vs. absence) of a Digital Product Passport label in a fast fashion product and the predictive factors of consumer purchasing decisions, such that:*

H2a: *The relationship between a Digital Product Passport label's presence (vs. absence) in a fast fashion product and consumer purchasing intentions will be stronger (vs. weaker) when consumer-perceived brand transparency is high (vs. low).*

H2b: *The relationship between a Digital Product Passport label's presence (vs. absence) in a fast fashion product and consumer willingness to pay will be stronger (vs. weaker) when consumer-perceived brand transparency is high (vs. low).*

To assess the moderation effect of perceived brand transparency on the relationship between DPP presence and predictive factors of consumer purchasing decisions, a multiple regression analysis was conducted using Hayes9 (2013) Process Macro software for SPSS, Model 1. DPP presence was treated as a dichotomous variable (0 = no DPP, 1 = DPP), and brand transparency was treated as a continuous variable. The analysis evaluated the main effects of DPP presence and perceived brand transparency on purchasing intentions and willingness to pay.

Furthermore, it explored the interaction between DPP presence (no vs. yes) and perceived brand transparency on these dependent variables.

When analyzing the moderating role of perceived brand transparency on the relationship between DPP presence (versus absence) and predictive factors of consumer purchasing decisions, the following results were obtained:

Purchasing Intentions: Despite the non-significant main effect of the DPP label presence (no vs. yes) on purchasing intentions ($B = -.27$, $SE = .22$, $t(172) = -1.21$, $p > .05$, 95% CI = [-.71 to .17]), the results indicate a statistically significant main effect of perceived brand transparency on purchasing intentions ($B = .44$, $SE = .11$, $t(172) = 4.08$, $p < .001$, 95% CI = [.23 to .65]). This finding suggests that higher perceived brand transparency significantly increases consumers' purchasing intentions. Yet, results show a non-significant DPP Presence (no vs. yes) \times Perceived Brand Transparency interaction effect on purchasing intentions ($B = .16$, $SE = .16$, $t(172) = 1.05$, $p > .05$, 95% CI = [-.14 to .46]).

Willingness to Pay: As previously noted, there was a statistically significant main effect of the DPP label presence (no vs. yes) on willingness to pay ($B = 3.70$, $SE = 1.75$, $t(172) = 2.11$, $p < .05$, 95% CI = [.24 to 7.15]), confirming that the presence of a DPP significantly increases consumers' willingness to pay. However, results show a non-significant main effect of perceived brand transparency on WTP ($B = 1.15$, $SE = .85$, $t(172) = 1.35$, $p > .05$, 95% CI = [-.53 to 2.82]), and a non-significant DPP Presence (no vs. yes) \times Perceived Brand Transparency interaction effect on WTP ($B = 1.29$, $SE = 1.22$, $t(172) = 1.06$, $p > .05$, 95% CI = [-1.11 to 3.70]).

These findings suggest that perceived brand transparency alone does not significantly influence the effect of DPP label presence (no vs. yes) on consumers' purchasing behaviors for a fast fashion product, leading to the rejection of hypotheses H2a and H2b (Table 5).

Further analyses were conducted to evaluate the moderated-moderation effect of consumer perceived ethicality (CPE) and perceived brand transparency on the relationship between DPP presence (no vs. yes) and the dependent variables.

Table 5 3 Hayes9s Process Model 1 Output

	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>LLCI</i>	<i>ULCI</i>
Purchasing Intentions						
<i>DPP label (no vs. yes)</i>	-.27	.22	-1.21	.23	-.71	.17
<i>Perceived Brand Transparency (PBT)</i>	.44	.11	4.08***	.00	.23	.65
<i>DPP label (no vs. yes) x PBT</i>	.16	.16	1.05	.31	-.14	.46
WTP						
<i>DPP label (no vs. yes)</i>	3.70	1.75	2.11*	.04	.24	7.15
<i>Perceived Brand Transparency (PBT)</i>	1.15	.85	1.35	.18	-.53	2.82
<i>DPP label (no vs. yes) x PBT</i>	1.29	1.22	1.06	.29	-1.11	3.70

Note: *** $p < .001$, ** $p < .01$, * $p < .05$, + $p < .1$

5.4.3. The moderating effect of Consumers' Perceived Ethicality (CPE)

H3: The moderating impact of perceived brand transparency on the relationship between the presence (vs. absence) of a Digital Product Passport label in a fast fashion product and consumers' purchasing behaviors will be moderated by the level of consumer-perceived brand ethicality, so that:

H3a: The moderating impact of perceived brand transparency on the relationship between the presence (vs. absence) of a Digital Product Passport label in a fast fashion product and consumers' purchasing intention will be stronger (vs. weaker) when the level of consumer-perceived brand ethicality is high (vs. low).

H3b: The moderating impact of perceived brand transparency on the relationship between the presence (vs. absence) of a Digital Product Passport label in a fast fashion product and consumers' willingness to pay will be stronger (vs. weaker) when the level of consumer-perceived brand ethicality is high (vs. low).

A multiple regression analysis was conducted using Hayes' Process Macro software for SPSS, Model 3 to test the third set of hypotheses. This model examines the moderated-moderation

effect on the dependent variables: consumers' purchasing intentions and willingness to pay. Specifically, the model tests how the presence of a Digital Product Passport (DPP) influences the two predictive factors of consumer purchasing decisions (purchasing intentions and willingness to pay), moderated by perceived brand transparency and further moderated by consumers' perceived ethicality.

Purchasing Intentions: As verified before, results show a statistically significant and positive main effect of Perceived Brand Transparency on consumers' purchasing intentions ($B = .41$, $SE = .19$, $t(168) = 2.13$, $p < .05$, $95\% CI = [.03 \text{ to } .79]$). In line with prior findings, results also show a non-significant two-way DPP label (no, yes) x Perceived Brand Transparency interaction effect on purchasing intentions ($B = -.40$, $SE = .26$, $t(168) = -1.53$, $p > .05$, $95\% CI = [-.91 \text{ to } .11]$). Yet, a statistically significant and positive two-way DPP label (no, yes) x CPE interaction effect is verified ($B = .60$, $SE = .26$, $t(168) = 2.28$, $p < .05$, $95\% CI = [.08 \text{ to } 1.13]$). This indicates that the impact of DPP presence on purchasing intentions is positive and more pronounced for consumers with higher perceived ethicality of the brand than those with lower perceived ethicality. However, and contrary to expectations, a non-significant three-way interaction effect of DPP label (no, yes) x Perceived Brand Transparency x Consumer Perceived Ethicality on purchasing intentions was obtained: ($B = -.06$, $SE = .10$, $t(168) = -.62$, $p > .05$, $95\% CI = [-.27 \text{ to } .14]$), not supporting H3a.

Willingness to Pay (WTP): Results show a non-significant two-way DPP label (no, yes) x Perceived Brand Transparency interaction effect ($B = 1.58$, $SE = 2.10$, $t(168) = .75$, $p > .05$, $95\% CI = [-2.56 \text{ to } 5.73]$) and a non-significant two-way DPP label (no, yes) x CPE interaction effect ($B = .68$, $SE = 1.59$, $t(168) = .81$, $p > .05$, $95\% CI = [-4.82 \text{ to } 3.69]$) on WTP. However, and more importantly, results reveal a statistically significant and positive three-way DPP label (no, yes) x Perceived Brand Transparency x CPE interaction effect on WTP ($B = 1.80$, $SE = 0.83$, $t(168) = 2.17$, $p < .05$, $95\% CI = [0.16, 3.44]$). This indicates that the combined influence of DPP presence, perceived brand transparency, and CPE significantly impacts WTP.

To further analyze the three-way interaction effect, a slope analysis was conducted to assess differences at one standard deviation below (-1SD) and above (+1SD) the mean (Aiken and West, 1991; Fitzsimons, 2008). Results indicate that the presence vs. absence of a DPP label significantly affects willingness to pay, depending on the levels of perceived brand transparency and consumer-perceived ethicality. Specifically, significant differences in WTP were observed at high levels of perceived brand transparency (+1SD) and high levels of CPE ($B = 6.05$, $SE =$

2.70, $t(168) = 2.24$, $p < .05$, 95% CI = [.71 to 11.38]). This finding suggests that products labeled with a DPP are likely to generate a higher willingness to pay when consumers perceive both high levels of brand transparency and ethicality, supporting H3b. Interestingly, results also show that when perceived brand transparency and ethicality are low, the presence of a DPP label is not a differentiating factor from a product that does not come with a DPP label, as it does not significantly affect differences in their willingness to pay.

Figure 2 3 Willingness to Pay Three-way Interaction

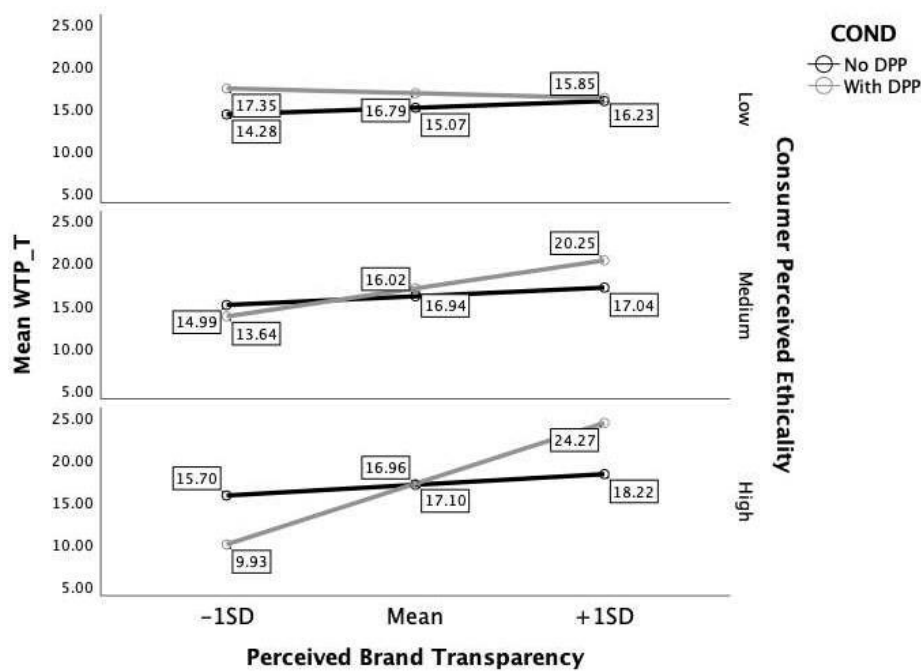


Table 6 - Haye's Process Model 3 Outputs

	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>LLCI</i>	<i>ULCI</i>
Purchasing Intentions						
<i>DPP label (no vs. yes)</i>	-.13	.27	-.48	.63	-.65	.40
<i>Perceived Brand Transparency (PBT)</i>	.41	.19	2.13*	.03	.03	.79
<i>DPP label (no vs. yes) x PBT</i>	-.40	.26	-1.53	.13	-.91	.11
<i>Consumers9 Perceived Ethicality (CPE)</i>	.15	.20	.78	.43	-.24	.54
<i>DPP label (no vs. yes) x CPE</i>	.60	.26	2.28*	.02	.08	1.13
<i>PBT x CPE</i>	.09	.07	1.46	.15	-.03	.23
<i>DPP label (no vs. yes) x PBT x CPE</i>	-.06	.10	-.62	.53	-.27	.14

WTP						
<i>DPP label (no vs. yes)</i>	.93	2.16	.43	.67	-3.34	5.20
<i>Perceived Brand Transparency (PBT)</i>	.71	1.56	.46	.65	-2.37	3.79
<i>DPP label (no vs. yes) x PBT</i>	1.58	2.10	.75	.45	-2.56	5.73
<i>Consumers' Perceived Ethicality (CPE)</i>	.68	1.59	.43	.67	-2.46	3.81
<i>DPP label (no vs. yes) x CPE</i>	-.56	2.15	-.26	.79	-4.82	3.69
<i>PBT x CPE</i>	-.12	.55	.22	.83	-.56	1.20
<i>DPP label (no vs. yes) x PBT x CPE</i>	1.80	.83	2.17*	.03	.16	3.44

*Note: ***p < .001, **p < .01, *p < .05, +p f 1*

PBT: Perceived Brand Transparency; CPE: Consumers' Perceived Ethicality; WTP: Willingness-to-pay

Overall, these findings show a complex interaction between the presence of Digital Product Passports (DPPs), consumer-perceived brand transparency, and ethicality in shaping consumer behavior. While DPPs directly increase consumers' willingness to pay (WTP), this effect is also shaped by how transparent and ethical the brand is perceived to be.

Interestingly, while DPPs and the combined perception of brand transparency and ethicality positively affect WTP, these factors do not significantly impact consumers' purchasing intentions. This suggests that although consumers may be more willing to pay a premium when they view the brand as ethical and transparent, these perceptions do not necessarily increase their intention to purchase.

6. Conclusions and Implications

The present dissertation intended to understand the impact of Digital Product Passports (DPPs) on two predictive factors of consumer purchasing decision behavior in the fast fashion industry: purchase intentions and willingness to pay (WTP). Additionally, the study investigated the moderated-moderation effect of consumer perceptions of brand transparency and consumer-perceived ethicality in such relationships, offering a comprehensive analysis of how these factors collectively shape consumer purchasing decisions when a DPP is present versus absent.

The findings indicate that while a DPP positively affects consumers' willingness to pay (WTP), it does not significantly influence their purchase intentions (*RQ1*). Several factors may explain these results. Firstly, as a relatively new concept, DPPs may not be fully understood or perceived as essential, fair, or trustworthy by consumers, leading to a disconnect between awareness and purchase intentions. Secondly, it shows a gap between a consumer's stated value for a product and their actual buying behavior. Although consumers may appreciate and be willing to pay more for the transparency offered by DPPs, they might not actively plan to purchase such products due to caution toward new information. Accordingly, research indicates that consumers generally prioritize considerations such as price, product quality, and style preferences over transparency disclosures (Hansen & Sia, 2015). Finally, while increased willingness to pay shows positive consumer attitudes toward fashion products that have an associated DPP to track and trace information, purchasing intention can be missing due to practical or psychological factors. Over time, the improved access to detailed product information, which traditional labels may lack but will be available through a DPP, could enhance purchase intentions. This signals the potential future role of DPPs in fashion brands, suggesting a need for targeted marketing and product strategies to convert consumer interest into actual sales.

Regarding the second research question (*RQ2*) on whether perceived brand transparency moderates the relationship between the presence (versus absence) of a DPP and consumers' purchase intention and WTP, our findings show no statistically significant interaction effect on purchasing behaviors. Although existing literature suggests that consumers generally value product transparency (Kim et al., 2020; Kang & Hustvedt, 2014), and while a DPP does enhance product transparency and traceability, our results indicate that consumers' perceptions of a brand's overall transparency do not significantly amplify the impact of a DPP on their purchase intentions and WTP for products in the fast fashion sector. This may be because consumers do

not yet associate the presence of a DPP with broader brand transparency or because DPPs are relatively new and not well-understood by the general population. Consequently, consumers might not perceive DPPs as significantly enhancing a brand's transparency or influencing their purchasing behaviors in a meaningful way.

Lastly, a statistically significant and positive three-way interaction was observed between the presence of a DPP, perceived brand transparency, and consumer-perceived brand ethicality on WTP (*RQ3*). This finding highlights how the impact of perceived brand transparency is amplified by consumer perceptions of the brand's ethical considerations on their willingness to pay a premium for products when a DPP is present. This aligns with existing research, which consistently shows that consumers are willing to pay more for socially responsible or environmentally sustainable products, especially when the brand is viewed as transparent and committed to ethical practices (Boulstridge & Carrigan, 2000).

Additionally, the findings reveal that when consumers perceive a fast fashion brand as both highly transparent and ethical, the presence of a DPP further increases their willingness to pay a premium for the product. This outcome indicates that consumers value brand transparency, ethical practices, and detailed product information provided by a DPP, which enhances their perception of the product's worth and justifies paying a higher price. This effect reflects consumers' growing awareness and demand for brands to adopt transparent and authentic practices in their social and environmental conduct (Kim et al., 2020). Furthermore, consumers are increasingly expecting brands to comply with new regulations, such as the Eco-design for Sustainable Products Regulation (ESPR), and to fulfill due diligence requirements (European Commission, 2022a).

In contrast, a non-statistically significant three-way interaction was observed between the presence of a DPP, perceived brand transparency, and consumer-perceived ethicality on purchase intentions. This finding diverges from studies that suggest transparency in production practices generally enhances purchase intentions, particularly when combined with ethical considerations (Kim et al., 2020). Several factors may explain this result. This result may be explained by pre-existing doubts about a brand's transparency and ethicality, which are common in the fast fashion industry and thus may reduce additional transparency via DPPs insufficient to change purchase intentions. Thus, despite their potential, more than perceived brand transparency and consumer-perceived ethicality might be needed to amplify purchase intentions when a DPP is present.

As DPPs are planned to become mandatory in the apparel sector by 2030, this research represents a crucial first step in understanding how this measure may impact consumers' product information and willingness to pay. The findings demonstrate the intricate relationship between the presence of DPPs, perceived brand transparency, and consumer-perceived ethicality within the context of signaling theory (Spence, 1973). Nevertheless, its transformative potential, particularly in fast fashion, is evident. DPPs can act as indicators of a brand's dedication to product transparency, potentially positively influencing consumer purchasing behavior.

6.1. Theoretical Implications

Although the concept of Digital Product Passports (DPPs) is gaining attention and is expected to be fully implemented in the apparel industry by 2030, it remains relatively new, with limited studies on its implications. This research fills this gap by examining the interaction between perceived brand transparency and consumer-perceived ethicality, in shaping purchasing decisions in the presence versus absence of a DPP in a fast fashion product. Building on previous research about the benefits and challenges of DPPs (Mol, 2015; Doorey, 2011), this study significantly contributes to the emerging literature on DPPs by exploring their impact on consumer purchase intentions and willingness to pay within the fast fashion sector. It highlights how the implementation of DPPs leverages digital technologies to provide accurate information about product composition, sourcing, and environmental impact, thereby reinforcing the credibility of the information presented (Adisorn et al., 2021; Götz et al., 2022; Walden et al., 2021). This aligns with recent literature emphasizing the potential of digital solutions to improve supply chain transparency, traceability, and sustainability (Ebinger & Omondi, 2020; Lee & Zhang, 2023).

Second, drawing on signaling theory's premise that signals can communicate concealed attributes impacting decisions (Erdem & Swait, 1998; Spence, 1973), this study investigates DPPs as signals of a brand's dedication to product traceability and transparency. Specifically, it delves into how DPPs influence consumer purchase intentions and willingness to pay within the fast fashion sector. The findings underscore DPPs' emergence as contemporary signaling mechanisms that align with consumer preferences for enhanced product transparency (Garcia-Torres et al., 2022). This research contributes theoretically by advancing our understanding of signaling dynamics in digital contexts, particularly elucidating how these signals shape consumer purchasing decisions in industries like fast fashion. This not only enriches signaling

theory but also identifies avenues for further refinement in understanding the nuanced interplay between product vs brand transparency signals and consumer decision-making processes.

This nuanced understanding extends the existing literature on perceived brand transparency (Bhaduri & Ha-Brookshire, 2011; Kim et al., 2020; Yang & Battocchio, 2021) and consumer perceived ethicality (Brunk, 2010; Creyer, 1997) within the fast fashion context, specifically examining how these factors can act together in shaping PI and WTP.

Lastly, this study makes a significant contribution to the existing literature by uncovering the dynamic interplay between perceived brand transparency and consumer-perceived ethicality, bridging a significant gap that has traditionally examined these variables separately. Through this integrated approach, this dissertation pioneers an exploration of how these factors jointly influence consumer purchase intentions (PI) and willingness to pay (WTP) in the presence of a DPP, specifically within the fast fashion context. Drawing on signaling theory, the research underscores that perceived brand transparency and ethicality are critical factors amplifying the impact of DPPs on WTP. In essence, this study lays the groundwork for a deeper and more nuanced understanding of how consumer purchasing decisions are evolving in today's digital age, particularly within the fast fashion sector.

6.2. Managerial Implications

This study provides valuable managerial insights into the transformative potential of Digital Product Passports (DPPs) within the fast fashion industry, specifically focusing on their impact on consumer purchase intentions (PI) and willingness to pay (WTP). Specifically, DPPs are robust tools for communicating detailed information on product origins, production processes, and their environmental and social footprints. By strategically deploying DPPs to create transparent and traceable systems for product information, brands can effectively utilize them as signaling tools for their commitment to product traceability and transparency. By understanding how DPPs interact with perceived brand transparency and consumer-perceived brand ethicality to shape consumer purchasing decisions, managers can tailor marketing strategies that resonate with conscientious consumers and capitalize on sustainability-driven market trends.

Simultaneously, there is a growing consumer demand for heightened product transparency and ethical responsibility from brands (Lin et al., 2017). DPPs fulfill these expectations and empower brands to achieve a competitive advantage in the fast fashion market. As evidenced

by this study, the presence of a DPP significantly influences consumer willingness to pay, particularly when a fast fashion brand is perceived as transparent and ethical. Therefore, technological advancements not only enhance the accessibility of information but also position brands as pioneers in transparent product disclosure, impacting their willingness to pay.

In conclusion, this study underscores the strategic integration of DPPs within the fast fashion industry, emphasizing their transformative potential in enhancing consumer engagement and operational practices. Our findings highlight that DPPs can serve as powerful tools to increase consumer willingness to spend on products and promote environmental sustainability. Importantly, the impact of DPPs on consumer behavior is moderated by perceived brand transparency and further moderated by consumer-perceived brand ethicality. Therefore, to fully maximize its potential benefits, organizations should also work on the perceived brand transparency and ethicality since the DPP works on a product level but these two variables can be crucial to shape PI and WTP. These insights empower managers to innovate responsibly, align business strategies with evolving consumer preferences, and drive meaningful changes in the industry, paving the way for a transparent future in fast fashion.

7. Limitations and Future Research

The limitations of this study suggest directions for future research. While this study provides valuable insights into the impact of digital product passports on consumer purchasing behaviors in the fast fashion industry, it opens up numerous avenues for further exploration and refinement. This is particularly relevant due to the novelty of this topic and its potential to transform the fast fashion industry through enhanced product transparency, traceability, and consumer consciousness globally.

Firstly, the sample size and demographic diversity can be seen as limitations since they may not fully capture the global fast fashion consumer base. Future research could benefit from including a more comprehensive and representative sample to enhance the external validity of the results and provide more generalizable findings.

Additionally, the stimulus used for the Digital Product Passport (DPP) in this dissertation, though inspired on existing online prototypes, was developed by the study's author. This means it may not perfectly replicate future real-world DPPs. The variations in design, information, and functionality between the prototypes used in this research and those in practical use could influence consumer responses and behaviors differently than observed in this study. This limitation highlights an opportunity for future research to test more refined prototypes and ultimately examine the impact of implementing actual DPPs on customers' perceptions and experiences.

Future research could explore the implications of DPPs from various perspectives, including sustainability, economic impact, and competitiveness. It would be valuable to examine the information needs and requirements demanded by each stakeholder in the DPP ecosystem, as this study touched on this topic but did not delve deeply into it. Research should also focus on understanding the potential impact and usefulness of artificial intelligence in this new tool and its implementation. Investigating how technological advancements can enhance the effectiveness and adoption of digital product passports could provide deeper insights into their potential benefits and challenges. At the same time, given that not all information elements may be applied simultaneously due to factors such as cost, time, and technological constraints, exploring which information elements should be prioritized during the initial phases of

implementation could be useful. This could help identify the elements that provide the greatest value to consumers and brands, ensuring more effective and efficient deployment of DPPs.

Given the moderating variables in this study—perceived brand transparency and perceived consumer ethicality—and the finding that these variables had less impact on consumer behavior than anticipated, further research is recommended. Specifically, future studies should investigate the factors that could influence these perceptions, such as cultural background, personal values, and prior brand experiences, to understand their role in shaping consumer behavior across different contexts. Additionally, segmenting consumers based on their awareness, knowledge, and motivations could provide a more detailed analysis of how DPPs influence purchasing decisions.

Finally, practical research on consumer responses to digital product passports is necessary. Testing the validity of this tool in real-world scenarios and enhancing consumers' understanding of its implications in a business context could provide actionable insights. Practical research could be executed through various DPP pilots in companies of different sizes, helping to refine the tool and better understand its impact on consumer behavior. Conducting longitudinal studies to observe changes in consumer behavior over time as DPPs become more widely adopted could also help assess behavioral changes and provide insights into how real-world DPPs influence consumer behavior and brand perception.

Appendix

Appendix 1: Stimuli

A. Digital Product Passport presence on a label of a product from a fast fashion brand.

The situation presented to the survey participants was:

The labels displayed below are in the format of a Digital Product Passport, a new initiative from the European Union (EU).

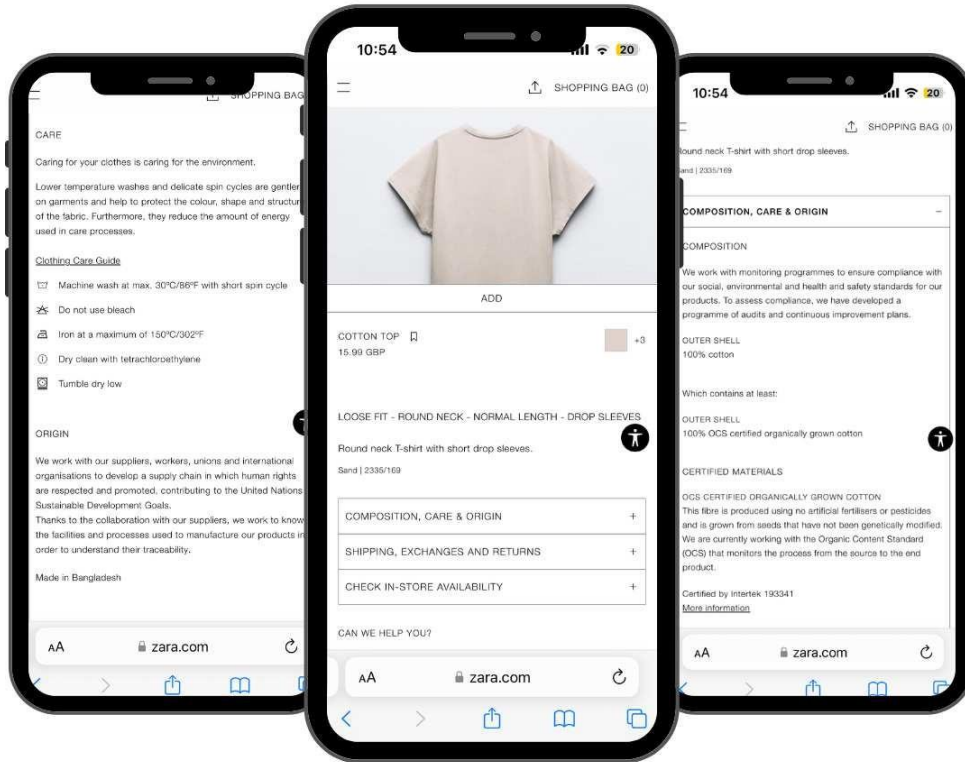
These labels provide detailed information about the product, including the specific materials used, the manufacturing processes involved, the country of origin, and the product's sustainability credentials, such as environmental impact and compliance with eco-friendly standards, among others.



B. No presence of a Digital Product Passport on the label of a product from a fast fashion brand.

The situation presented to the survey participants was:

The labels displayed below are directly extracted from ZARA's website and have not been altered in any way.



Appendix 2: Main Study Survey

Dear Participant,

Welcome and thank you for your participation in this survey.

This study is part of a master's thesis dissertation at Católica Lisbon SBE, and it aims to explore consumers' perceptions and behaviors within the fast fashion industry.

To ensure the accuracy of this research, please answer all questions honestly. There are no right or wrong answers, and all your responses and data are confidential and anonymous.

This survey should take no more than 5 minutes to complete.

Thank you,

Leonor Silva

Imagine you are considering purchasing a T-shirt from the fast fashion brand, ZARA.

On the next page, you'll encounter an image displaying three labels associated with this T-shirt. Following that, each label will be presented individually for closer examination.

Before answering the following questions, please carefully review the labels. Consider how the information presented on the labels influences your opinions.

Stimuli Displayed

Q1. After reviewing the product information above, I can understand the product's journey from creation to sale and its overall impact&

- Strongly disagree (1)
- Disagree (2)
- Somewhat disagree (3)
- Neither agree nor disagree (4)
- Somewhat agree (5)
- Agree (6)
- Strongly agree (7)

Q2. After looking at the previous t-shirt labels, how do you perceive the brand to be?

On a scale from 1 (Strongly disagree) to 7 (Strongly agree), please rate your level of agreement with the following statements:

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
1. ZARA respects moral norms.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. ZARA always adheres to the law.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. ZARA is a socially responsible company/product/brand.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. ZARA avoids damaging behavior at all cost.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. ZARA is a good company/product/brand.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. ZARA will make a decision only after careful consideration of the potential positive or negative consequences for all those involved.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q3. After looking at the previous t-shirt labels, how do you perceive the brand to be?

On a scale from 1 (Strongly disagree) to 7 (Strongly agree), please rate your level of agreement with the following statements:

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
1. ZARA wants to be accountable to people like me for its actions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. ZARA wants people like me to know what it is doing and why it is doing it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. ZARA provides information that is easy for people like me to understand.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Overall, ZARA provides the information needed to understand the environmental impact of its product production processes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q4. On a scale from 1 (Definitely would not buy) to 7 (Definitely would buy), please rate your likelihood of purchasing this item, considering its label, from this fast fashion brand, ZARA.:

	Definitely would not buy (1)	(2)	(3)	Neither/ Nor (4)	(5)	(6)	Definitely would buy (7)
Would you buy the T-shirt with this label from ZARA?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q5. Approximately how much would you be willing to pay, in EUR, for a T-shirt with the label presented before?

0 10 20 30 40 50 60 70 80 90 100

EUR ↵	
-------	--

Now, please answer some demographics about yourself.

Q6. What is the gender you identify as?

- Female
- Male
- Prefer not to say.

Q7. What is your age?

- Under 18 years
- 18 3 24 years
- 25 3 34 years
- 35 3 44 years
- 45 3 54 years
- 55 3 64 years
- 65 years or older

Q8. What is your current occupation?

- High School Student
- University Student
- Employed
- Unemployed or Retired

Q9. Where are you from?

½ Please select below... (1) ... Other (196)

Q10. What is your current annual income in Euros?

- Less than -10,000
- 10,000 3 -19,999
- 20,000 3 -29,999
- 30,000 3 -39,999
- 40,000 3 -49,999
- 50,000 3 -74,999

- -75,000 3 -99,999
- -100,000 3 -150,000
- Over -150,000
- I prefer not to disclose.

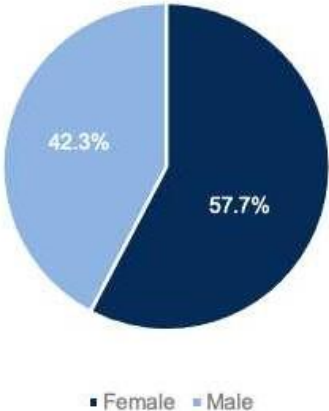
Thank you for completing this survey!

Your response has been recorded.

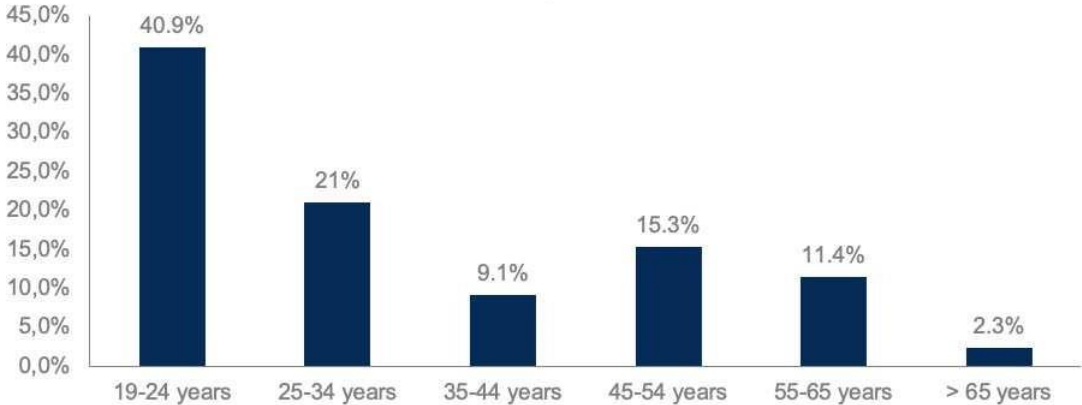
Please do not discuss the nature of the study with any other participants, as it may bias future results.

Appendix 3: Survey Demographics

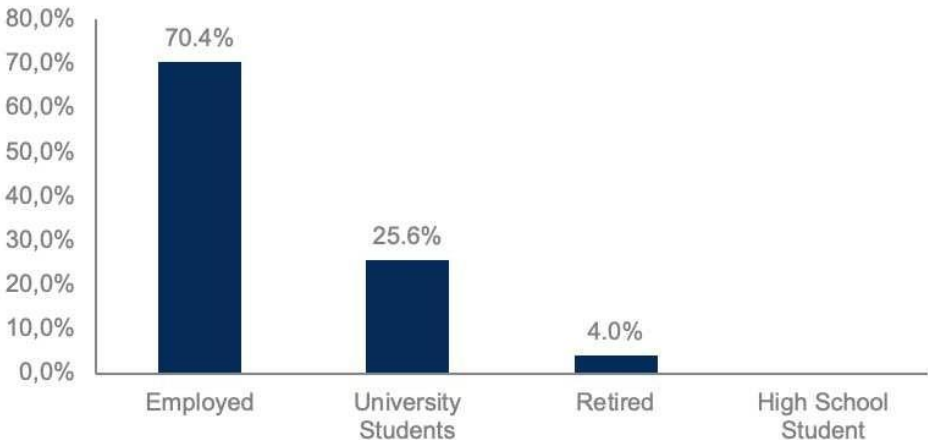
Gender



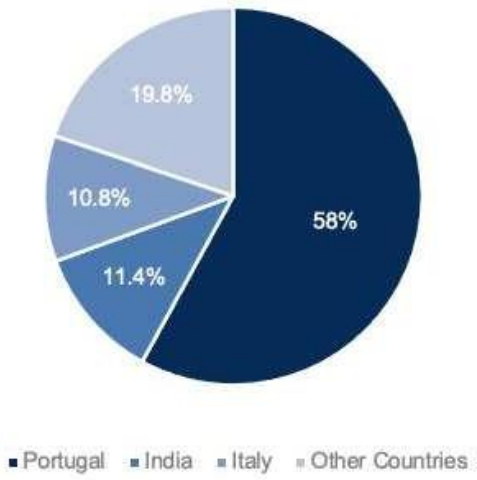
Age



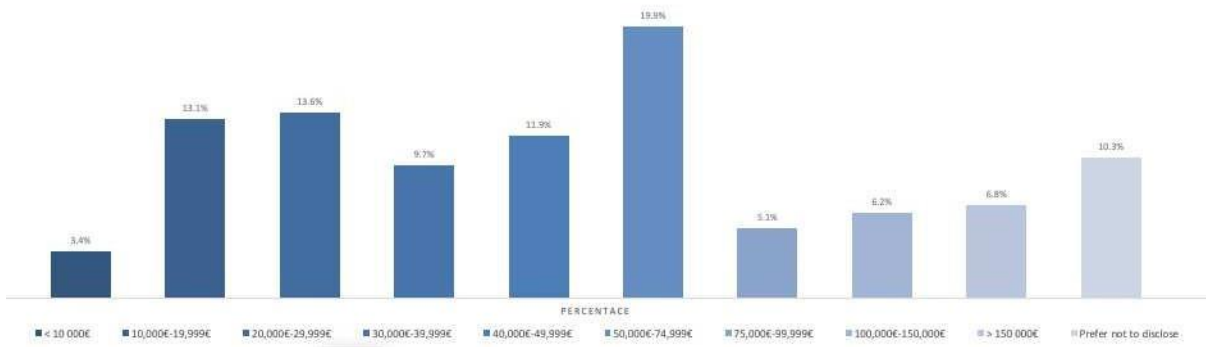
Occupation



Countries



Annual Household Income



References

- Adisorn, T., Tholen, L., & Götz, T. (2021). Towards a digital product passport fit for contributing to a circular economy. *Energies*, 14(8), 2289.
- Aiken, L. S., West, S. G., & Reno, R. R. (1991). *Multiple regression: Testing and interpreting interactions*. Sage.
- Albu, O. B., & Wehmeier, S. (2014). Organizational transparency and sense-making: The case of Northern Rock. *Journal of Public Relations Research*, 26(2), 117-133.
- Alves, L., Ferreira Cruz, E., Lopes, S. I., Faria, P. M., & Rosado da Cruz, A. M. (2022). Towards circular economy in the textiles and clothing value chain through blockchain technology and IoT: A review. *Waste Management & Research*, 40(1), 3-23.
- Bendzuck, K., Berg, H., Bernier, C., Böll, M., Dao, A., Gayko, J., Gupta, M., Hänel, F., Jousse, A., Merckx, J., Olsson, S., Osterwalder, M., Ruiz Lopez, A., Schneider, A., Wagner, E., Wautelet, T., Wenning, R. (2024). Cross-sector and sector-specific DPP roadmaps. *CIRPASS Consortium, 2024*
- Bergh, D. D., Connelly, B. L., Ketchen Jr, D. J., & Shannon, L. M. (2014). Signaling theory and equilibrium in strategic management research: An assessment and a research agenda. *Journal of Management Studies*, 51(8), 1334-1360.
- Bhaduri, G., & Ha-Brookshire, J. E. (2011). Do transparent business practices pay? Exploration of transparency and consumer purchase intention. *Clothing and Textiles Research Journal*, 29(2), 135-149.
- Bhardwaj, V., & Fairhurst, A. (2010). Fast fashion: response to changes in the fashion industry. *The International Review of Retail, Distribution and Consumer Research*, 20(1), 165-173.
- Bick, R., Halsey, E., & Ekenga, C. C. (2018). The global environmental injustice of fast fashion. *Environmental Health*, 17, 1-4.
- Boulstridge, E., & Carrigan, M. (2000). Do consumers really care about corporate responsibility? Highlighting the attitude-behaviour gap. *Journal of Communication Management*, 4(4), 355-368.

- Brandão, A., Gadekar, M., & Cardoso, F. (2018). The impact of a firm's transparent manufacturing practices on women fashion shoppers. *Journal of Global Fashion Marketing*, 9(4), 322-342.
- Breidert, C., Hahsler, M., & Reutterer, T. (2006). A review of methods for measuring willingness-to-pay. *Innovative Marketing*, 2(4).
- Brunk, K. H. (2010a). Exploring origins of ethical company/brand perceptions—a consumer perspective of corporate ethics. *Journal of Business Research*, 63(3), 255-262.
- Brunk, K. H. (2010b). Exploring origins of ethical company/brand perceptions—reply to Shea and Cohn's commentaries. *Journal of Business Research*, 63(12), 1364-1367.
- Brunk, K. H. (2012). Un/ethical company and brand perceptions: Conceptualising and operationalising consumer meanings. *Journal of Business Ethics*, 111(4), 551-565.
- Brunk, K. H., & Blumelhuber, C. (2011). One strike and you're out: Qualitative insights into the formation of consumers' ethical company or brand perceptions. *Journal of Business Research*, 64(2), 134-141.
- Bubicz, M. E., Barbosa-Póvoa, A. P. F. D., & Carvalho, A. (2021). Social sustainability management in the apparel supply chains. *Journal of Cleaner Production*, 280, 124-141.
- Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: moving toward new theory. *International Journal of Physical Distribution & Logistics Management*, 38(5), 360-387.
- Connelly, B. L., Certo, S. T., Ireland, R. D., & Reutzel, C. R. (2011). Signaling theory: A review and assessment. *Journal of Management*, 37(1), 39-67.
- Creyer, E. H. (1997). The influence of firm behavior on purchase intention: do consumers really care about business ethics? *Journal of Consumer Marketing*, 14(6), 421-432.
- Dopico, D. C., Mendes, R., Silva, H. A., Verrez-Bagnis, V., Pérez-Martín, R., & Sotelo, C. G. (2016). Evaluation, signalling and willingness to pay for traceability. A cross-national comparison. *Spanish Journal of Marketing-ESIC*, 20(2), 93-103.
- Dornyei, Z. (2007). *Research methods in applied linguistics*. Oxford University Press.

- Doorey, D. J. (2011). The transparent supply chain: From resistance to implementation at Nike and Levi-Strauss. *Journal of Business Ethics*, 103, 587-603.
- Dyer, B., & Ha0Brookshire, J. E. (2008). Apparel import intermediaries' secrets to success: Redefining success in a hyper0dynamic environment. *Journal of Fashion Marketing and Management: An International Journal*, 12(1), 51-67.
- Ebinger, F., & Omondi, B. (2020). Leveraging digital approaches for transparency in sustainable supply chains: A conceptual paper. *Sustainability*, 12(15), 6129.
- Egels-Zandén, N., & Hansson, N. (2016). Supply chain transparency as a consumer or corporate tool: The case of Nudie Jeans Co. *Journal of Consumer Policy*, 39, 377-395.
- Erdem, T., & Swait, J. (1998). Brand equity as a signalling phenomenon. *Journal of Consumer Research*, 7(2), 131-157.
- Etikan, I., & Babtope, O. (2019). A basic approach in sampling methodology and sample size calculation. *Med Life Clin*, 1(2), 1006.
- European Commission. (2022a). EU strategy for sustainable and circular textiles.
- European Commission. (2022b). COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT, Accompanying the document, Proposal for a Regulation of the European Parliament and of the Council establishing a framework for setting ecodesign requirements for sustainable products and repealing Directive 2009/125/EC. SWD(2022) 82 final PART 4/4.
- European Commission (2022c). Digital product passports: enhancing transparency & consumer information.
- European Commission. (2024). *Digital product passport in the textile sector* (Draft version). EPRS | European Parliamentary Research Service, Scientific Foresight Unit (STOA), PE 757.813. Panel for the Future of Science and Technology.
- European Parliament (2024). The impact of textile production and waste on the environment (infographic). Brussels: European Parliament.
- Evans, J. R., & Mathur, A. (2005). The value of online surveys. *Internet Research*, 15(2), 195-219.

- Fitzsimons, G. J. (2008). Death to dichotomizing. *Journal of Consumer Research*, 35(1), 5-8.
- Foscht, T., Lin, Y., & Eisingerich, A. B. (2018). Blinds up or down? The influence of transparency, future orientation, and CSR on sustainable and responsible behavior. *European Journal of Marketing*, 52(3/4), 476-498.
- Fung, B. (2014). The demand and need for transparency and disclosure in corporate governance. *Universal Journal of Management*, 2(2), 72-80.
- Garcia-Torres, S., Rey-Garcia, M., Sáenz, J., & Seuring, S. (2022). Traceability and transparency for sustainable fashion-apparel supply chains. *Journal of Fashion Marketing and Management: An International Journal*, 26(2), 344-364.
- Gazzola, P., Pavione, E., Pezzetti, R., & Grechi, D. (2020). Trends in the fashion industry. The perception of sustainability and circular economy: A gender/generation quantitative approach. *Sustainability*, 12(7), 2809.
- George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference*. 11.0 update (4th ed.). Allyn & Bacon.
- GS1. (2023). The new EU sustainability textile strategy.
- Götz, T., Berg, H., Jansen, M., Adisorn, T., Cembrero, D., Markkanen, S., & Chowdhury, T. (2022). Digital product passport: The ticket to achieving a climate neutral and circular european economy?
- Hansen, R., & Sia, S. K. (2015). Hummel's digital transformation toward omnichannel retailing: key lessons learned. *MIS Quarterly Executive*, 14(2).
- Heim, H. (2022). Digital fashion revolutions: supply chain transparency, digitalization and the non-disclosure paradox. *Fashion Practice*, 14(3), 329-351.
- Herédia-Colaço, V., & Coelho do Vale, R. (2018). Seize the day or save the world? The importance of ethical claims and product nature congruity. *Journal of Business Ethics*, 152, 783-801.

- Jansen, M., Meisen, T., Plociennik, C., Berg, H., Pomp, A., & Windholz, W. (2023). Stop guessing in the dark: Identified requirements for digital product passport systems. *Systems*, 11(3), 123.
- Jin, C. H., & Lee, J. Y. (2019). The halo effect of CSR activity: Types of CSR activity and negative information effects. *Sustainability*, 11(7), 2067.
- Joy, A., & Peña, C. (2017). Sustainability and the fashion industry: Conceptualizing nature and traceability. *Sustainability in fashion: A cradle to upcycle approach*, 31-54.
- Joy, A., Sherry Jr, J. F., Venkatesh, A., Wang, J., & Chan, R. (2012). Fast fashion, sustainability, and the ethical appeal of luxury brands. *Fashion Theory*, 16(3), 273-295.
- Kang, J., & Hustvedt, G. (2014). Building trust between consumers and corporations: The role of consumer perceptions of transparency and social responsibility. *Journal of Business Ethics*, 125, 253-265.
- Kim, A. J., & Ko, E. (2012). Do social media marketing activities enhance customer equity? An empirical study of luxury fashion brand. *Journal of Business Research*, 65(10), 1480-1486.
- Kim, H., & Lee, T. H. (2018). Strategic CSR communication: A moderating role of transparency in trust building. *International Journal of Strategic Communication*, 12(2), 107-124.
- Kim, N. L., Kim, G., & Rothenberg, L. (2020). Is honesty the best policy? Examining the role of price and production transparency in fashion marketing. *Sustainability*, 12(17), 6800.
- Kim, T., Barasz, K., & John, L. K. (2019). Why am I seeing this ad? The effect of ad transparency on ad effectiveness. *Journal of Consumer Research*, 45(5), 906-932.
- Lee, K. L., & Zhang, T. (2023). Revolutionizing supply chains: unveiling the power of blockchain technology for enhanced transparency and performance. *International Journal of Technology, Innovation and Management (IJTIM)*, 3(1), 19-27.
- Leiner, D. (2014). Convenience samples from online respondent pools: A case study of the SoSci Panel. *Studies in Communication| Media (SCM)*, 5(4), 367-396.
- Likert, R. (1932). A technique for the measurement of attitudes. *Archives of psychology*.

- Lin, J., Lobo, A., & Leckie, C. (2017). The role of benefits and transparency in shaping consumers' green perceived value, self-brand connection and brand loyalty. *Journal of Retailing and Consumer Services*, 35, 133-141.
- Lu, L. C., Chang, W. P., & Chang, H. H. (2014). Consumer attitudes toward blogger's sponsored recommendations and purchase intention: The effect of sponsorship type, product type, and brand awareness. *Computers in Human Behavior*, 34, 258-266.
- Mackey, A., & Gass, S. M. (2015). *Second language research: Methodology and design*. Routledge.
- Maxwell, S. E., Delaney, H. D., & Kelley, K. (2017). *Designing experiments and analyzing data: A model comparison perspective*. Routledge.
- McNeill, L., & Moore, R. (2015). Sustainable fashion consumption and the fast fashion conundrum: fashionable consumers and attitudes to sustainability in clothing choice. *International Journal of Consumer Studies*, 39(3), 212-222.
- Mol, A. P. (2015). Transparency and value chain sustainability. *Journal of Cleaner Production*, 107, 154-161.
- Newberry, C. R., Klemz, B. R., & Boshoff, C. (2003). Managerial implications of predicting purchase behavior from purchase intentions: a retail patronage case study. *Journal of Services Marketing*, 17(6), 609-620.
- Niinimäki, K., Peters, G., Dahlbo, H., Perry, P., Rissanen, T., & Gwilt, A. (2020). The environmental price of fast fashion. *Nature Reviews Earth & Environment*, 1(4), 189-200.
- Ospital, P., Masson, D. H., Beler, C., & Legardeur, J. (2022, November). A digital product passport to support product transparency and circularity. In *Global Fashion Conference 2022* (pp. 11-p).
- Ozdamar Ertekin, Z., & Atik, D. (2015). Sustainable markets: Motivating factors, barriers, and remedies for mobilization of slow fashion. *Journal of Macromarketing*, 35(1), 53-69.
- Papú Carrone, N. (2020). Traceability and transparency: A way forward for SDG 12 in the textile and clothing industry. *The UN Sustainable Development Goals for the Textile and Fashion Industry*, 1-19.

- Plociennik, C., Pourjafarian, M., Nazeri, A., Windholz, W., Knetsch, S., Rickert, J., ... & Weidenkaff, A. (2022). Towards a digital lifecycle passport for the circular economy. *Procedia CIRP*, 105, 122-127.
- Ramya, N. A. S. A. M., & Ali, S. M. (2016). Factors affecting consumer buying behavior. *International Journal of Applied Research*, 2(10), 76-80.
- Rawlins, B. (2008). Give the emperor a mirror: Toward developing a stakeholder measurement of organizational transparency. *Journal of Public Relations Research*, 21(1), 71-99.
- Reck, R., Castagna, A. C., Shuqair, S., & Pinto, D. C. (2022). The transparency paradox: When transparency cues help or backfire for brands? *Journal of Cleaner Production*, 372, 133381
- Rejeb, A., Keogh, J. G., & Treiblmaier, H. (2019). Leveraging the Internet of Things and blockchain technology in supply chain management. *Future Internet*, 11(7), 161.
- Rzeczycki, A. (2023). Sustainability in the fashion industry. *Journal of Multidisciplinary Research*, 15(1), 33-39.
- Sansome, K., Wilkie, D., & Conduit, J. (2024). Beyond information availability: Specifying the dimensions of consumer perceived brand transparency. *Journal of Business Research*, 170, 114358.
- Schnackenberg, A. K., & Tomlinson, E. C. (2016). Organizational transparency: A new perspective on managing trust in organization-stakeholder relationships. *Journal of Management*, 42(7), 1784-1810.
- Sedgwick, P. (2013). Convenience sampling. *BMJ*, 347.
- Shen, B. (2014). Sustainable fashion supply chain: Lessons from H&M. *Sustainability*, 6(9), 6236-6249.
- Singh, J. J., Iglesias, O., & Batista-Foguet, J. M. (2012). Does having an ethical brand matter? The influence of consumer perceived ethicality on trust, affect and loyalty. *Journal of business ethics*, 111, 541-549.
- Sodhi, M. S., & Tang, C. S. (2019). Research opportunities in supply chain transparency. *Production and Operations Management*, 28(12), 2946-2959.

Spence, M. (1978). Job market signaling. In *Uncertainty in economics* (pp. 281-306). Academic Press.

Statista. (2024a). Revenue of the apparel market worldwide from 2018 to 2028. *Statista*. <https://www.statista.com/forecasts/821415/value-of-the-global-apparel-market>

Statista. (2024b). Fast fashion market value forecast worldwide from 2021 to 2027. *Statista*. <https://www.statista.com/statistics/1008241/fast-fashion-market-value-forecast-worldwide/>

Taiminen, K., Luoma-Aho, V., & Tolvanen, K. (2015). The transparent communicative organization and new hybrid forms of content. *Public Relations Review*, 41(5), 734-743.

Taj, S. A. (2016). Application of signaling theory in management research: Addressing major gaps in theory. *European Management Journal*, 34(4), 338-348.

Tapscott, D., & Ticoll, D. (2003). *The naked corporation: How the age of transparency will revolutionize business*. Simon and Schuster.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53.

Terwee, C. B., Bot, S. D., de Boer, M. R., van der Windt, D. A., Knol, D. L., Dekker, J., ... & de Vet, H. C. (2007). Quality criteria were proposed for measurement properties of health status questionnaires. *Journal of Clinical Epidemiology*, 60(1), 34-42.

Turker, D., & Altuntas, C. (2014). Sustainable supply chain management in the fast fashion industry: An analysis of corporate reports. *European Management Journal*, 32(5), 837-849.

United Nations. (2019, March 25). UN Launches Drive to Highlight Environmental Cost of Staying Fashionable. UN News; United Nations. Retrieved June 25, 2024, from <https://news.un.org/en/story/2019/03/1035161>

United Nations Global Compact Office (2014), A Guide to Traceability. A Practical Approach to Advance Sustainability in Global Supply Chains. United Nations, New York, NY.

Walden, J., Steinbrecher, A., & Marinkovic, M. (2021). Digital product passports as enabler of the circular economy. *Chemie Ingenieur Technik*, 93(11), 1717-1727.

Wells, J. D., Valacich, J. S., & Hess, T. J. (2011). What signal are you sending? How website quality influences perceptions of product quality and purchase intentions. *MIS Quarterly*, 373-396.

Yang, J., & Battocchio, A. F. (2021). Effects of transparent brand communication on perceived brand authenticity and consumer responses. *Journal of Product & Brand Management*, 30(8), 1176-1193.

Yoo, C. Y., & Jeong, H. J. (2014). Brand transparency in social media: Effects of message sidedness and persuasion knowledge. *The Journal of Advertising and Promotion Research*, 3(2), 5-44.