Master's Thesis – Master Sustainable Business and Innovation

Consumer Preference for End-of-Life Scenarios in the Fashion Industry

Melati van Boven – 0620718

Supervisor Utrecht University: Dr. S. Akerboom

Second reader Utrecht University: Dr. T. Venema

Supervisor Kuyichi Pure Goods: Zoé Daemen

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Abstract

Over the past two decades, global textile production and consumption have doubled, underscoring the environmental toll of the fashion industry's linear "take, make, waste" model. As the environmental burden of the fashion industry's linear model escalates, transitioning to a Circular Economy (CE) is imperative to reduce the consumption of virgin materials and decrease environmental degradation. This study investigates consumer preferences for end-of-life scenarios (EoL scenarios) within the fashion industry, specifically focusing on reused, remanufactured, and recycled clothing options. Through a cross-sectional survey employing the Kano model, this study categorizes consumer satisfaction attributes to quantify preferences for various EoL strategies for different types of clothing items; T-shirts, sweaters, jeans, and shorts. The Kano analysis revealed significant findings: six out of twelve attributes were classified as attractive, suggesting that these options—particularly remanufactured and recycled options—positively influence consumer satisfaction and preference. Notably, recycled options were consistently identified as either attractive or one-dimensional across all clothing items, enhancing customer satisfaction and indicating a robust preference for recycling.

Conversely, the attributes related to reused options were categorized as indifferent, indicating that their presence or absence does not significantly affect consumer satisfaction. This suggests a lack of consumer enthusiasm for reuse, which may reflect misalignments with circular economy principles that prioritize reducing material use and extending product lifecycles. The study also highlights that higher positions on the R-ladder, indicating more intensive resource-saving measures, do not necessarily correlate with increased customer satisfaction.

Further, segmentation analysis revealed that demographic factors like gender and age influence preferences for EoL scenarios. For instance, female consumers showed a stronger preference

for remanufactured and recycled options across all clothing types, suggesting that targeted marketing strategies could enhance receptivity towards these EoL scenarios. Meanwhile, younger consumers were more open to all EoL options compared to older demographics who favoured recycling, highlighting the need for strategies that bridge generational preferences.

This research suggests that while recycling is currently preferred, significant potential exists to enhance consumer receptivity to reuse and remanufacture through strategic education and marketing, aligning industry practices more closely with circular economy principles. Future research should explore the underlying motivations and barriers that influence consumer choices towards different EoL scenarios, helping to foster a more circular fashion industry.

Executive Summary

This study provides a pivotal examination of consumer preference regarding circular economy (CE) strategies in fashion. This comprehensive study addresses the urgent need for the fashion industry to shift from a linear "take-make-waste" model to a more circular model, which minimizes reliance on virgin resources and reduces waste.

Through a detailed survey employing the Kano model, the thesis assesses consumer preferences for three end-of-life scenarios (EoL scenarios): reuse, remanufacture, and recycle. The research reveals a robust preference for recycling, while reuse and remanufacture are notably less favoured. This finding highlights a critical gap between consumer attitudes and the broader engagement necessary for the effective implementation of CE practices in the industry.

Practical Implications for the Fashion Industry

The preference for recycling over other EoL options presents both challenges and opportunities for fashion companies. The study's insights into consumer preferences are invaluable for businesses aiming to align their strategies with environmental goals and consumer expectations. The following are several actionable strategies that Kuyichi Pure Goods might consider:

1. **Educational Campaigns and Consumer Awareness**

The findings suggest a need for enhanced consumer education and awareness campaigns. Fashion companies can develop initiatives to inform consumers about the benefits of reuse and remanufacture, not only for the environment but also for economic savings. By improving consumer knowledge, companies can potentially increase the attractiveness of these less favoured EoL options.

2. **Innovative Marketing Strategies**

Tailoring marketing messages to resonate with different demographic groups can enhance engagement with circular practices. Utilizing digital platforms to highlight the eco-friendly benefits of these practices can appeal to younger demographics, while emphasizing reliability and direct environmental gains may better resonate with older consumers. Storytelling that illustrates the positive impact of consumer choices on the environment could enhance engagement across all groups**.**

3. **Transparency and Consumer Trust**

Building consumer trust through transparency about the sourcing, manufacturing, and distribution processes can encourage wider acceptance of circular practices. Brands that are open about their efforts in sustainability and who educate consumers on how their purchase decisions impact the environment can foster a loyal customer base more inclined to support circular practices.

4. **Regulatory Advocacy and Industry Standards**

The thesis underscores the role of industry standards and regulatory frameworks in promoting circular practices. Fashion companies can advocate for regulations that favour circular practices and support industry-wide standards for EoL processing. An example of this would be to mandate the provision of the environmental impact data of the clothing products on the label. This would not only level the playing field but also push the entire industry towards more sustainable practices.

5. **Expanding the Circular Model Beyond Recycling**

While recycling is currently favoured among consumers, there is significant potential to expand their receptivity to other EoL options. This expansion requires a concerted effort from all

industry stakeholders to explore and invest in circular processes that are not only focused on recycling but also incorporate the full spectrum of the circular model.

In conclusion, this thesis offers critical insights into consumer preferences that can drive the adoption of circular business models in the fashion industry. It highlights the importance of aligning business strategies with these preferences to reduce environmental impacts and promote sustainable development. The practical implications derived from this study provide a roadmap for companies looking to innovate and lead in the transition toward a more sustainable fashion industry, emphasizing the need for a multifaceted approach involving education, innovation, and collaboration.

Table of Contents

1. Introduction

In the last two decades, global textile production and consumption have nearly doubled (Shirvanimoghaddam et al., 2020). This growth can be attributed to rapid population expansion, rising worldwide incomes, and elevated living standards, all of which significantly affect the climate, water resources, energy use, and the natural environment (European Commission, 2022; Shirvanimoghaddam et al., 2020). The current fashion industry follows a linear model with three main stages: take, make, and waste (Ghisellini et al., 2016). The fast fashion sector, characterized by low-cost production, high turnover, and the use of garments with a short lifespan, significantly affects the environment at various stages of the textile and fashion value chain, from manufacturing to final use (Niinimäki et al., 2020). Textile fibres can be natural (from plants and animals) or synthetic (from petroleum). Producing traditional natural fibres, like cotton, demands a lot of water and the use of pesticides (Nayak et al., 2023). Additionally, synthetic fibres are environmentally damaging as they are finite and fail to decompose after their life ends (Nayak et al., 2023). Moreover, the substantial water consumption and chemical pollution required in textile operations raise serious sustainability concerns. This massive production of textiles not only generates considerable emissions but also contributes to the waste output after consumer use (Shirvanimoghaddam et al., 2020). Worldwide, about 92 million tons of textile waste are produced annually, and this number is projected to rise to 134 million tons by 2030 (Chen et al., 2021). These human activities have consequences for the Earth, transgressing the planetary boundaries (Rockström et al., 2009).

A shift towards a circular economy (CE) in the fashion industry is necessary to reduce the vast production of virgin materials and energy consumption (Khalifa et al., 2022). The CE is designed to transform the traditional linear "take-make-waste" model into a system that promotes regeneration and restoration (Neves & Marques, 2022). A CE is defined by the continuous cycle of materials, energy, and products, with an emphasis on reducing waste and

extending the lifespan of resources (Kirchherr et al., 2017). The concept of CE embodies a system in which materials perpetually retain their value, and the environment is revitalised (Reike et al., 2018). The CE tackles critical worldwide challenges such as climate change, biodiversity depletion, waste accumulation, and environmental contamination (Rotmans & Loorbach, 2009; Schuitmaker, 2012), by disconnecting economic growth from the depletion of finite resources (Hofmann & Jaeger-Erben, 2020). The CE is driven by circular strategies or end-of-life scenarios (EoL scenarios), such as reducing, reusing, and recycling (Manickam & Duraisamy, 2019). The concept of reduction entails minimising waste throughout the entire production process. Reuse means rethinking the production process to create products that can be used again. Recycling consists of decomposing a product down to its core materials and forming a new item (Manickam & Duraisamy, 2019). By embracing the principles of the CE, a wealth of opportunities can be unlocked for innovation, job creation, and sustainable development, paving the way towards a more resilient and thriving world (Inigo & Blok, 2019). Although the concept of the CE is gaining more academic attention (Geissdoerfer et al., 2017), discussions often overlook the importance of business models and consumer involvement in facilitating the CE (Kirchherr et al., 2017).

Environmental issues and policies are increasingly driving the integration of the CE into business development (Tura et al., 2019). Due to the dissatisfaction with the traditional linear approach, methods for achieving environmentally sustainable economic growth receive support and reinforcement (Kyriakopoulos, 2021). Textiles have been recognized as a key product value chain requiring an immediate shift towards sustainable and circular production, consumption, and business practices (Niinimäki et al., 2020). This recognition is evident in the 2020 Circular Economy Action Plan and the 2021 update of the EU Industrial Strategy (Renda, 2021; Spani, 2020). This plan emphasizes the importance of attaining significant rates of independent textile waste sorting by the year 2025 (Spani, 2020). Embracing the CE within

the fashion industry has the potential to significantly diminish CO_2 emissions and resource usage (Bressanelli et al., 2022; Keßler et al., 2021). As such, the adoption of circular business models is essential (Lewandowski, 2016). Circular business models can be defined as "business model strategies suited for the move to a CE [based on the] taxonomy of slowing, closing, and narrowing resource loops" (Bocken et al., 2016, p. 317). Moving towards a circular fashion system requires a shift in mindset among all stakeholders: designers, manufacturers, suppliers, retailers, and consumers (Dissanayake & Weerasinghe, 2022). Moreover, when fashion companies prioritise these circular strategies or EoL scenarios the demand for high production will be mitigated (Chen et al., 2021).

Several barriers prevent fashion companies from embracing circular economy practices. The fashion industry's supply chain is characterized by its global reach, complexity, and fragmentation. This complexity hampers the ability to achieve transparency in circular operations (Mishra et al., 2020). Additionally, the pressure to achieve financial objectives often leads fashion designers to prioritize profitability over sustainable design choices (Dissanayake & Weerasinghe, 2022). Moreover, there is a noticeable deficiency in understanding the incentives that encourage consumers to engage with circular initiatives (Pal et al., 2019).

In addition to the legal, or moral need for fashion companies to adopt sustainable strategies, consumers are also increasingly recognizing the significance of making sustainable choices (Jia et al., 2020). Sustainable fashion has garnered attention and interest from policymakers, firms, and consumers alike (Busalim et al., 2022). As consumers demand better end-of-life management options (Michaud & Llerena, 2011), businesses are under pressure to implement new operational and managerial practices that promote sustainability (Bask et al., 2013). Consumers play a crucial role in the CE. Choices regarding when to discontinue using a product, how to dispose of it, and whether to select new or refurbished items directly influence

the cycle's efficiency. The CE depends on the willingness of consumers to not just return items they have used but also to purchase end-of-life products (EoL products) (Cao et al., 2022; Yoo et al., 2021). For an effective end-of-life strategy design, it is crucial that the objectives of producers closely align with the preferences of consumers regarding EoL scenarios during the purchasing process (Atlason et al., 2017). A producer, for example, should avoid focusing on enhancing a product's recyclability if it is evident that consumers lean towards valuing product repair and reusability instead.

Furthermore, when fashion companies want to implement circularity strategies into their business models, aligning these strategies with their customer's wants and needs can be vital for the success of their business model (Calvo-Porral & Lévy-Mangin, 2020). The lack of understanding of what consumers prefer concerning the different EoL scenarios has already been given as a barrier to adopting circular business models and could potentially hinder the shift towards the CE in the future (van Loon et al., 2022). Hence, a deeper understanding of consumer preference for different EoL scenarios in the fashion industry is needed for the further enhancement of the CE (Hazen et al., 2017). Consecutively, consumer preference is important for the development and execution of marketing activities concerning enhancing sustainability (Leonidou et al., 2013).

Previous research into consumer preferences for EoL scenarios has shown a strong preference for reusing electronic and durable goods (Atlason et al., 2017; Cao et al., 2022), though these preferences can differ across product types (Cao et al., 2022). When it comes to EoL options for household appliances and items related to culture, education, and recreation, the order of consumer preference is reuse, followed by refurbishment, remanufacturing, and finally, material recovery (Cao et al., 2022). On the other hand, for EoL transportation and communication devices, the preference hierarchy is reuse, material recovery, remanufacturing, and then refurbishment (Atlason et al., 2017).

Although previous research has examined the consumer preferences of different EoL scenarios regarding electronic, durable, and household products, studies that dive into the consumer preference for different EoL scenarios regarding clothing products, are currently lacking. Further research in this area is necessary to comprehensively understand consumer behaviour concerning EoL scenarios and clothing products. The textile and apparel industry, having a vast influence on the environment (Luján-Ornelas et al., 2020), and showing great potential for the adoption of circular strategies (Moorhouse & Moorhouse, 2017), provides a clear rationale for conducting research in this domain. This study therefore aims to address the aforementioned research gap by examining consumer preferences for different EoL scenarios in the clothing industry by addressing the following research question: *What is the consumer purchasing preference for end-of-life scenarios in the fashion industry?*

By providing a thorough understanding of the consumer preferences of different EoL scenarios for several clothing products, fashion companies could adopt circular strategies that better resonate with the desires and requirements of their customers. Mapping the consumer preferences of these EoL scenarios, could enhance the adaptation of circular business models in the fashion sector, and thereby speed up the shift towards a CE.

The subsequent parts of the thesis are organized as follows: Section 2 provides an overview of the theoretical framework, focusing on consumer preferences and EoL scenarios within the fashion industry. Section 3 elaborates on the research methodology, encompassing the design of the study, approach to sampling, methods of data collection, operationalisation, data analysis, and indicators of research quality. In Section 4, the findings of the study are disclosed. The discussion of these findings is presented in Section 5, and Section 6 concludes the study with key takeaways.

2. Theoretical Background

2.1 End-of-Life Scenarios of Circular Economy

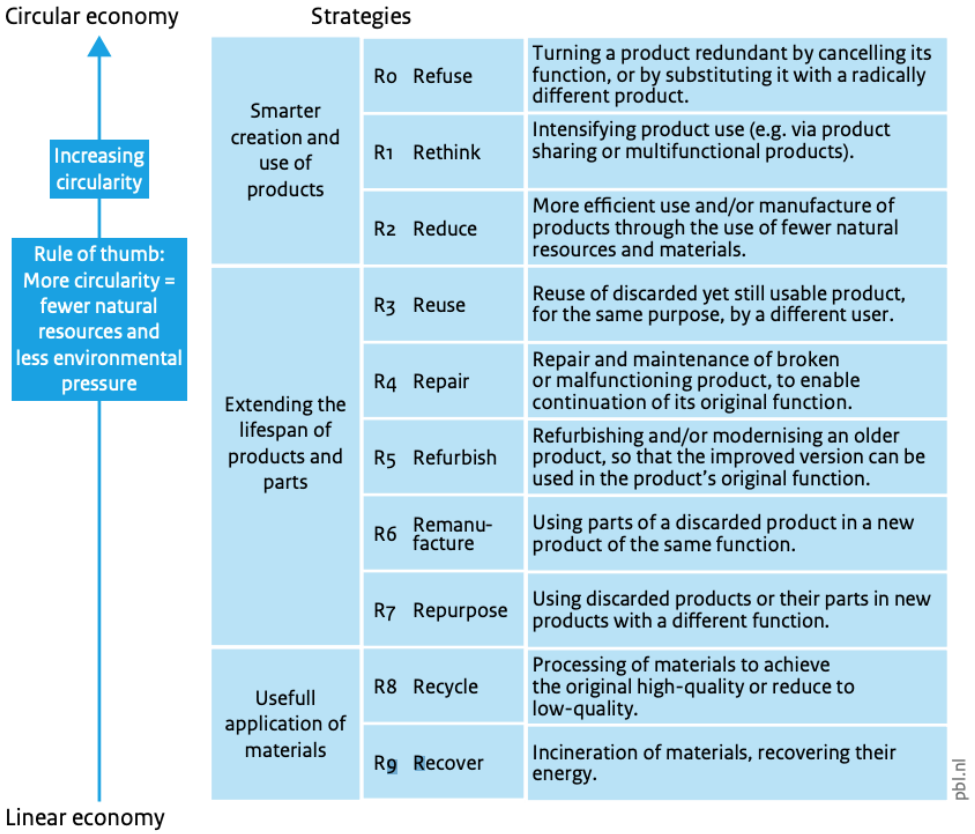
In recent years, there has been an increasing recognition of the need for a more sustainable and efficient approach to resource management (Geissdoerfer et al., 2017; Ghisellini et al., 2016). This shift in perspective has led to the emergence of the CE, a framework designed to transform the conventional linear model of "take-make-waste" into a system that is both regenerative and restorative (Neves & Marques, 2022). The CE is distinguished by an unending circulation of materials, energy, and goods, aiming to reduce waste to a minimum and extend the lifespan of resources (Kirchherr et al., 2017). The research conducted by Kirchherr et al. (2017) on CE definitions emerges as notable. Their comprehensive analysis of 114 definitions published in various sources sheds light on the current understanding of the CE concept. The study reveals several noteworthy conclusions: (1) CE is subject to individual interpretation, (2) it often involves activities centred on reduction, reuse, and recycling, (3) its connection to sustainable development is limited, (4) it predominantly emphasizes economic prosperity with limited consideration for social aspects, and (5) it often lacks explicit discourse on the role of business models and consumer engagement in enabling the CE (Kirchherr et al., 2017). A leading interpretation of the CE is provided by the Ellen MacArthur Foundation (EMF) (The Ellen MacArthur Foundation, 2013). The EMF defines a circular economy as “an industrial system that is restorative or regenerative by intention and design […]. It replaces the ‘end-of-life’ concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models” (The Ellen MacArthur Foundation, 2013, p. 7). However, this definition falls short of comprehensively addressing sustainable

development and social equity despite its emphasis on waste reduction and renewable energy. Geissdoerfer et al. (2017) describe CE "as a regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops" (Geissdoerfer et al., 2017, p. 759).

Within the field of CE research, there is a wide range of approaches and concepts. Various tools and frameworks have been introduced by both academic and non-academic researchers to facilitate the conceptualization, implementation, and evaluation of CE (Kirchherr et al., 2017). One of the most used frameworks for the implementation of circular economy strategies is a form of the R framework (Kirchherr et al., 2017). Kirchherr et al. (2017), who examined 114 CE definitions, identified multiple R frameworks. The 3R framework, proposed by Manickam & Duraisamy (2019) states that CE is governed by Reduce, Reuse, and Recycle. The 4R framework forms the foundation of the European Union (EU) Waste Framework Directive, introducing an additional 'R' to the model: Recover (European Commission, 2008). Other scholars introduce the 6R framework which expands the conventional 3R framework by adding Recover, Redesign, and Remanufacture. The 9R framework is the most detailed and comprehensive one (Figure 1) (Potting et al., 2017). It describes a hierarchy of circularity options that range from 'refuse' to 'recover'. These strategies are ranked regarding their level of circularity; strategies higher on the ladder save more resources and put less pressure on the environment and are therefore considered more circular (Kirchherr et al., 2017).

Figure 1

The 9R Framework of Circular Economy (Potting et al., 2017)



2.2 Circular Fashion

The fashion sector is notably one of the largest and most impactful industries worldwide in terms of its environmental impact (Luján-Ornelas et al., 2020). Its profound dependency on both renewable and finite resources poses a threat to the ecological system, creating significant adverse environmental and socio-ecological outcomes (Abdelmeguid et al., 2022). The industry's production and consumption patterns contribute to elevated levels of pollution, placing strain on the ecological system and prompting concerns over the long-term accessibility of these materials (Armstrong et al., 2015; Ki et al., 2021). Nonetheless, the fashion industry is actively striving to adopt circular strategies. Dissanayake & Weerasinghe (2022) have proposed four strategies that facilitate the integration of CE principles into the fashion sector.

These strategies encompass (1) enhancing resource efficiency by leveraging sustainable, regenerative, and harmless materials; (2) adopting principles of circular design that advocate for durability, adaptability, easy separation, recyclability, and biodegradability; (3) promoting product longevity through maintenance, leasing, exchanging, and renting services; and (4) facilitating circular EoL options, which includes reuse, remanufacture, and recycling. While there is a noticeable concentration, within research, on optimizing resource use, embracing circular design, and prolonging product lifespan, exploration into strategies for the end-of-life phase is notably underrepresented (Wagner & Heinzel, 2020). End-of-life circularity enables the diversion of clothing away from landfills and facilitates the extraction of material value in various forms and at different stages by closing the resource loops (Bocken et al., 2016). When the initial usage cycle of clothing concludes, it can be reused, remanufactured, or recycled.

Reuse means that clothing designed for longevity can find a second life in the secondary market, offering another cycle of usage (Dissanayake & Weerasinghe, 2022). Retailers who take on the responsibility of accepting, cleaning, repairing, and reselling used clothing can enhance customer returns and expand resale opportunities, all while building trust with their customers (Dissanayake & Weerasinghe, 2022). Moreover, garments can be given a second life through several means, such as being sold in consignment shops, handed over to relatives and friends, or through organized activities like clothing swap events (Dissanayake & Weerasinghe, 2022). Remanufacturing represents an effective strategy for prolonging the lifespan of clothing items that might otherwise be discarded (Dissanayake & Weerasinghe, 2022). This intricate process entails the disassembly of used clothing, the retrieval of valuable parts, and their subsequent redesign and reassembly to create new garments, often achieving a level of quality equal to or even surpassing that of brand-new clothing (Dissanayake & Sinha, 2015). With remanufacturing the clothing product does not have to retain its value, it can remanufactured into another piece of clothing (Sinha et al., 2016). The adoption of recycled

fibres for clothing production stands out as a crucial way towards achieving circular fashion (Majumdar et al., 2020). However, less than 1%, of discarded materials are recycled into new apparel, while 12% undergo recycling into lower-value items like cleaning insulation materials, and mattress filling. A staggering 73% of these materials are consigned to landfills or subjected to incineration (Dissanayake & Weerasinghe, 2022). This demonstrates the opportunity and potential for the reuse, remanufacturing, and recycling of clothing products. Nevertheless, there is a need to address consumers' preferences in purchasing these items (Hazen et al., 2017).

2.3 Consumer Preference

Although research on circular fashion is expanding (Colucci & Vecchi, 2021), there is a noticeable gap in studies focusing on consumer preferences for EoL scenarios (Cao et al., 2022). Companies need to consider this as it indicates the level of demand for certain products (Henninger et al., 2019). To explore consumers' purchasing preferences regarding EoL scenarios, it is essential to first gain insight into the decision-making process they employ when purchasing clothing products. Consumer preference for a product means that one product is chosen over two or more alternatives (Rhodes, 1955). In the fashion industry, it is more complex than choosing one pair of jeans over another. Fashion products are introduced to individuals who opt for items based on product characteristics aligning with their personal preferences (Benoit et al., 2017). Furthermore, fashion pieces are selected to express individuality and a quest for uniqueness and creativity. Fashion serves as a means of expressing our identity to the external world, conveying a message about our true selves and our aspirations (Myzelev, 2013). Among younger generations, there is an analytical, careful, and rigorous approach when selecting clothing, reflecting a deliberate effort to invest in fashion items that possess sustainable qualities (Pencarelli et al., 2020). Additionally, their allegiance to certain brands may depend on the brand's record of production and dedication to social and

environmental accountability. Consequently, there is an increased demand for transparency on these aspects from retailers (Gazzola et al., 2020). This shift in behaviour means that consumers are progressively impacting fashion brands and prompting advancements in production processes via their buying habits (Pereira et al., 2021). There is a growing consumer interest in circular production and consumption patterns, with the acceptance of recycled products playing a crucial role in the viability of circular business models (Calvo-Porral & Lévy-Mangin, 2020).

In the area of fashion procurement, three fundamental criteria have been empirically demonstrated to exert influence on consumer decisions and, clothing purchases (Stankevich, 2017): attributes of product quality, characteristics of the brand, and attributes related to the novelty of fashion (Eckman et al., 1990; Sprotles & Kendall, 1986). While these attributes may coexist to varying degrees within each product, one attribute typically assumes precedence, steering consumer choices (Eckman et al., 1990; Punj & Stewart, 1983; Sprotles & Kendall, 1986). These preferences aid consumers in evaluating product options and ultimately deciding to make a purchase (Punj & Stewart, 1983). Given that individuals wear apparel to satisfy diverse needs, their preferences are shaped by distinct product attributes (Eckman et al., 1990). In the light of EoL scenarios for clothing products, this can be considered a product quality attribute (Atlason et al., 2017; Cao et al., 2022).

2.3.1 Lessons Learned About Consumer Preferences for EoL Scenarios in Non-Clothing Products

Boyer et al. (2020) explored the readiness of more than 800 UK participants to spend more on mobile phones and smart vacuum cleaners identified as part of the ‘circular economy’. Results showed a preference among consumers for products marked as ‘circular’ if they comprised less than a certain proportion of recycled material. In another study, Almulhim & Abubakar (2021) used a survey to evaluate the awareness and perspectives regarding CE tactics in Saudi Arabia, uncovering an increasing enthusiasm for transitioning to CE. However, a

significant portion of respondents expressed concerns that reused or shared products could pose health risks, particularly concerning the COVID-19 pandemic. Mugge et al. (2017) summarized existing studies on consumer perceptions of refurbished phones. It has been noted that consumers show a reduced tendency to purchase refurbished items. However, improving how a product's quality, appeal, and longevity are perceived can positively affect consumers' readiness to pay a higher price (Nasiri & Shokouhyar, 2021). Additionally, Hamzaoui-Essoussi & Linton (2010) examined the impact of product categories and recycling methods on consumers' willingness-to-pay (WTP) for recycled products through a survey involving 49 participants and seven product types. It showed that product category significantly influences WTP due to varying perceived functional risks associated with different categories. Atlason et al. (2017) employed how consumers perceive product features associated with EoL and disposal methods for household electrical and electronic products by conducting a quantitative Kano survey involving 146 participants. The findings revealed that among these options, reuse was the most preferred EoL product recycling approach. Together, these research findings indicate that preferences for EoL products among consumers are shaped by the type of product and the EoL option used. Thus, by integrating consumer preferences into EoL scenarios, it is possible to gain a detailed understanding of which preferences correspond to specific EoL scenarios across various product types. To design an effective EoL strategy, it is important that the objectives of producers closely align with the preferences of consumers regarding EoL scenarios during the purchasing process (Atlason et al., 2017). By grasping consumer acceptance and preferences for circular products, companies can devise more effective strategies to fulfil market demands (Calvo-Porral & Lévy-Mangin, 2020). It is not beneficial for a producer to focus solely on designing a product with recycled materials if in some cases consumers may prioritise buying products that are repaired or reused (Atlason et al., 2017). In general, consumers tend to hold favourable attitudes toward circular products, including items

made from recycled or upcycled materials (Wagner & Heinzel, 2020). When it comes to customer acceptance of recycled products, product safety and the positive product image are given as the main drivers for the purchase intention of circular products (Calvo-Porral & Lévy-Mangin, 2020). Providing information about the environmental impact of products is also an important determinant for purchasing preferences of circular goods (Pretner et al., 2021). Given the wide array of clothing products available, it is reasonable to anticipate variations in consumer preferences regarding EoL scenarios (Atlason et al., 2017).

Furthermore, variations in this context may arise among different consumer segments, categorized by factors such as demographics or their attitudes towards environmental issues (Atlason et al., 2017). Comprehending consumer preferences and concerning distinct EoL scenarios within specific product categories becomes imperative for the development of products (Atlason et al., 2017). Consequently, fashion companies should prioritise the identification of the most favourable EoL scenarios and integrate them into the adoption of circular business models.

2.3.2 Understanding Consumer Preferences Through Customer Satisfaction

Measuring consumer preferences can generally be done with two approaches: through ‘revealed preferences’, in which actual choices or purchases are examined, and through ‘stated preferences’, in which respondents are asked about hypothetical choices (de Corte et al., 2021). Both approaches suffer from biases; the literature on stated preferences has found that individuals tend to overstate their valuation of a particular good, service or outcome, also known as ‘hypothetical bias’ (Johansson-Stenman & Svedsäter, 2012), and may therefore not predict actual behaviour (Fifer et al., 2014). The revealed preference approach, although coping with the hypothetical bias, can only be applied when data on consumer purchases is available (de Corte et al., 2021). When looking into the consumer preferences for hypothetical products

(data on circular EoL clothing products is not available yet) the revealed preference approach is not possible.

An alternative perspective on understanding consumer preferences involves examining customer purchasing behaviour in the context of customer satisfaction (CS). Measuring CS is imperative due to its substantial influence on a company's long-term performance and the choices made by consumers (Ngo, 2015). A seminal study conducted by Ittner and Larcker in 1998 underscored CS as a key predictor of customer purchasing behaviour (Ittner & Larcker, 1998). Various methods for assessing customer satisfaction often revolve around product features and the degree of consumer satisfaction with these features (Ngo, 2015). Two primary approaches exist for gauging CS; The first approach begins with theoretical underpinnings to identify attributes believed to impact CS significantly. It posits that these predefined attributes are the most effective in predicting CS. A major focus of this approach lies in validating and ensuring the model's reliability through data collected. The primary output is typically a snapshot of the current CS level (Ngo, 2015). In the second approach, the emphasis is on identifying and empirically testing the connection between suggested attributes and CS. Like the attribute-driven approach, it draws upon theoretical foundations to propose attributes that influence CS. Subsequently, it endeavours to determine whether these attributes exhibit a statistically significant relationship with CS. The primary outcome of this approach is the selection of attributes deemed most suitable for measuring CS. Even though it usually does not measure the existing level of CS, it is instrumental in developing effective means to assess customer satisfaction (Ngo, 2015). Several authors have used customer satisfaction as a proxy for measuring consumer preferences; Cao et al. (2022) looked into the customer satisfaction of different EoL scenarios (Cao et al., 2022), to determine consumer preference, while Salahuddin and Lee (2020), identified key quality features for wearable technology by measuring consumer satisfaction (Salahuddin & Lee, 2020). In both studies, it is assumed that when the customer is

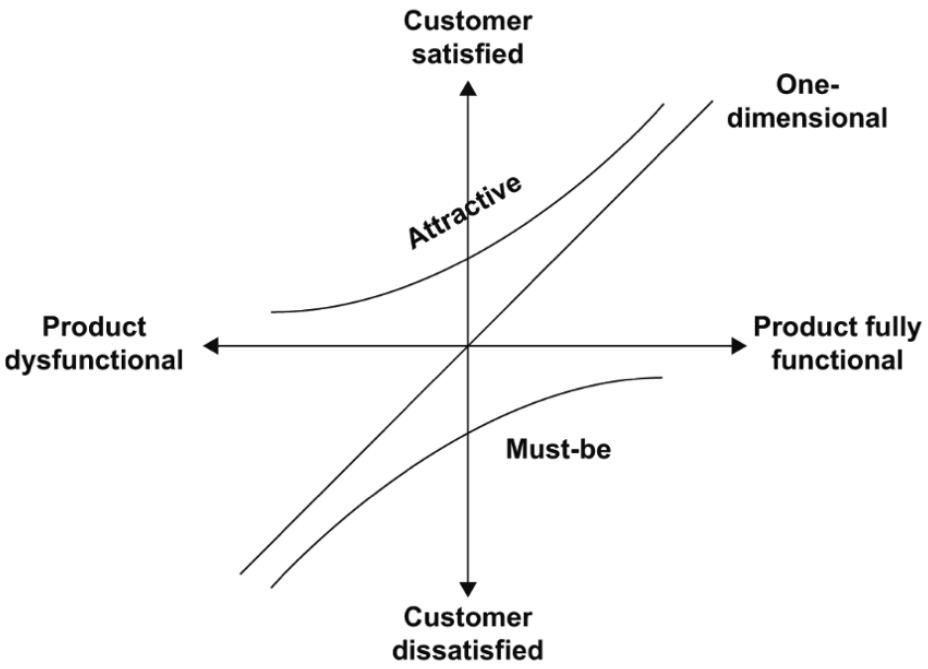
more satisfied with a given feature, that feature is also preferred over another feature, and therefore a good proxy for measuring consumer preferences (Cao et al., 2022; Salahuddin & Lee, 2020).

2.3.2.1 Kano Model. Several research studies have affirmed that quality factors play a pivotal role in determining CS (Chen et al., 2019; Cronin & Taylor, 1992). One method to assess the importance of product features from the user's point of view is the Kano model. This model, initially proposed by Noriaki Kano in 1984 (Kano et al., 1984) has proved to be an effective method for prioritizing feature implementation by understanding user needs. It allows developers to determine the relative significance of various product features in determining customer satisfaction, thus deciding which features are necessary, desirable, or require improvement (Atlason et al., 2017). The model involves using questionnaires to explore how consumers respond to products, systems, or service functions or features. The Kano model acknowledges that product features have varying effects on customer satisfaction, with some showing non-linear relationships with satisfaction. These features are divided into three main categories; must-be features, one-dimensional features, and attractive features (Kano et al., 1984). Must-be features are basic, and their absence can result in user dissatisfaction. However, fulfilling these features does not lead to increased customer satisfaction either (Atlason et al., 2017). One-dimensional attributes refer to characteristics that exhibit a direct linear correlation with customer satisfaction. As these attributes are more fully realized, customer satisfaction increases accordingly (Atlason et al., 2017). Attractive features are the most crucial and desirable features (Sauerwein et al., 1996). Consumers do not expect these features, and the exclusion does not mean a decrease in customer satisfaction. However, incorporating these features into the product can significantly enhance customer satisfaction (Atlason et al., 2017). Attractive and one-dimensional quality attributes contribute positively to customer satisfaction,

while the absence of one-dimensional and must-be quality factors leads to customer dissatisfaction (Kano et al., 1984). The relationship between these features is depicted in Figure 2. Apart from the three main categories of customer satisfaction, three additional categories are proposed: indifferent, reverse, and questionable. If customer satisfaction falls into the indifferent category, it implies that the consumers are indifferent to that requirement, and its fulfilment or lack of fulfilment will not impact customer satisfaction with the product (Wang & Ji, 2010). The reverse and questionable categories suggest the consumers' dislike towards the requirement and a contradiction in their answers to the questions, respectively. Using this information can help product developers prioritise the features that will enhance customer satisfaction the most (Wang & Ji, 2010).

Figure 2

The Correlation Between the Functionality of Product Features and Consumer Satisfaction (Wang & Ji, 2010)



The original Kano model analyses the functional and physical features of a product, related to user needs. However, prior research has also shown that the Kano model is a suitable tool for examining the user perception of environmental aspects, instead of just functional and physical features (Atlason et al., 2017). The underlying principle here is that EoL scenarios are integrated into the design process, potentially influencing the physical composition of products. Furthermore, as consumers have grown more conscious of EoL options, it is reasonable to anticipate that they have a better grasp of various EoL scenarios and their implications (Atlason et al., 2017). Some studies have examined the Kano model concerning recycled or refurbished products, e.g., electronic products (Atlason et al., 2017). No research has been done specifically on user perceptions of EoL scenarios for clothing products. The Kano model is therefore deemed as an appropriate tool for determining consumer preference.

2.4 Conceptual Framework

Individuals' awareness of sustainability and their environmental consciousness can significantly impact their behaviour. Environmental concern, defined as the level of worry individuals have regarding environmental risks (Lee et al., 2014), can motivate behaviours like buying recycled goods. Similarly, behaviours towards sustainable consumption are motivated by not just personal needs but also an acknowledgement of societal and environmental duties (Vermeir & Verbeke, 2006). Individuals are more apt to engage in actions they perceive as beneficial to solving environmental challenges (Park & Lin, 2020). Environmental knowledge plays a crucial role in shaping attitudes and behavioural patterns related to environmental concerns (Tan, 2011), leading to the anticipation that those deeply concerned about the environment might show a preference for circular products due to their reduced impact on the environment (Calvo-Porral & Lévy-Mangin, 2020). Additionally, the literature indicates that individuals with a profound understanding of environmental matters are more inclined towards

purchasing circular products (Hazen et al., 2017; Wang et al., 2013). Informed consumers tend to opt for circular products recognizing their environmental advantages (Wang et al., 2016).

This research about the consumer purchasing preference for different EoL scenarios focused on the EoL scenarios; reuse, remanufacture, and recycle. These align with the end-of-life circularity strategies for clothing products outlined by (Dissanayake & Weerasinghe, 2022). The customer satisfaction of EoL products corresponding to clothing products was used as a medium for studying consumer preferences (Atlason et al., 2017; Cao et al., 2022). Attractive and one-dimensional quality attributes contribute positively to customer satisfaction, while the absence of one-dimensional and must-be quality factors leads to customer dissatisfaction (Kano et al., 1984). With this approach, the current study put forth the following hypotheses:

H1: The EoL scenario 'reuse' positively affects customer satisfaction regarding clothing products.

H2: The EoL scenario 'remanufacture' positively affects customer satisfaction regarding clothing products.

H3: The EoL scenario 'recycle' positively affects customer satisfaction regarding clothing products.

When the EoL scenarios 'reuse', 'remanufacture', and/or 'recycle' are considered attractive or one-dimensional, they positively affect customer satisfaction. As a result, hypotheses *H1*, *H2*, and/or *H3* can be supported.

When fashion companies seek to incorporate circularity strategies into their business models, aligning these strategies with their customers' desires and needs becomes crucial for their model's success (Calvo-Porral & Lévy-Mangin, 2020). The lack of comprehension regarding consumer preferences for various EoL scenarios has already posed a barrier to the adoption of circular business models and could potentially impede the transition to a CE in the

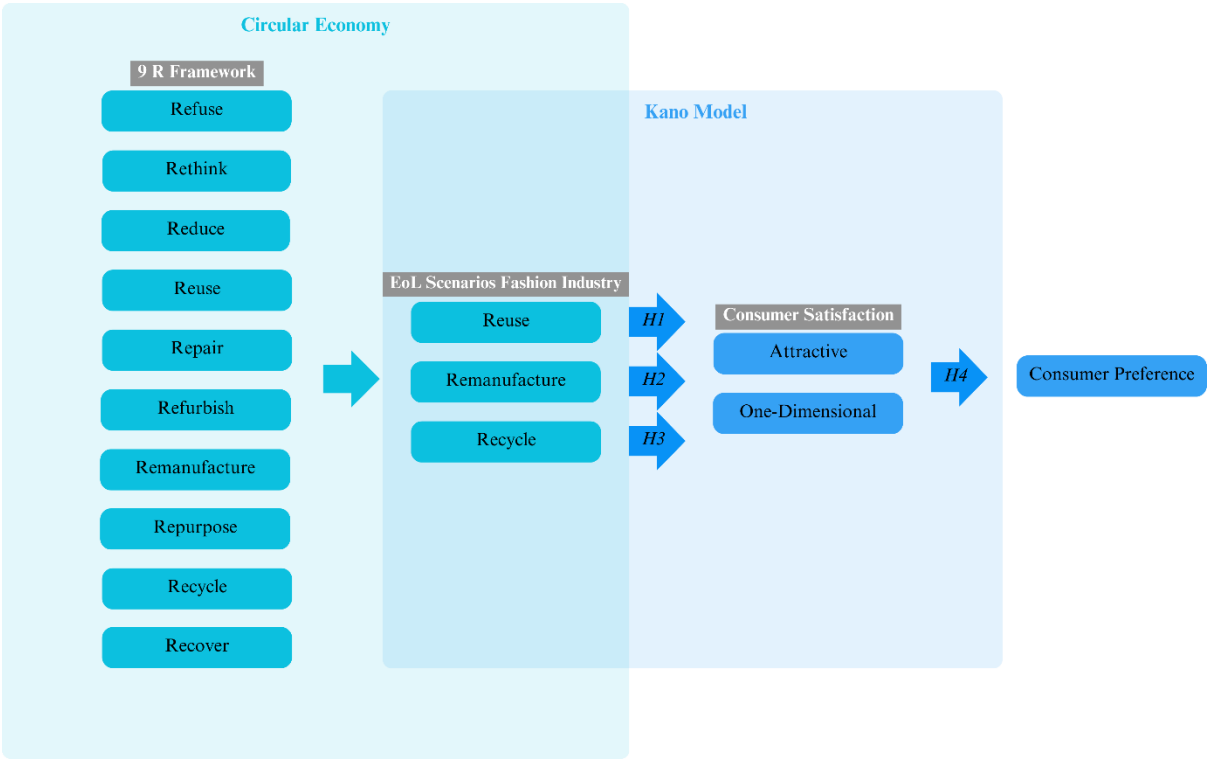
future (van Loon et al., 2022). Thus, gaining a deeper insight into consumer preferences for different EoL scenarios within the fashion industry is imperative for advancing CE (Hazen et al., 2017).

Past research has indicated that for items like household appliances and products related to culture, education, and recreation, reuse is considered the top EoL option (Cao et al., 2022). Similarly, for transportation and communication devices, reuse has been identified as the most preferred EoL scenario (Atlason et al., 2017). Therefore, the following hypothesis and conceptual framework (Figure 3) was proposed:

H4: The EoL scenario 'reuse' leads to the highest customer satisfaction regarding clothing products.

Figure 3

The Conceptual Framework



3. Methods

3.1 Research Design

A descriptive cross-sectional quantitative approach was used as the research design in this research. A cross-sectional design involves gathering data from numerous cases, all at a singular moment in time (Bryman, 2016). The objective is to gather a body of quantitative data related to two or more variables, often numerous variables, and then analyse the data to identify patterns of association (Bryman, 2016). In this study, a body of quantitative data was gathered to find relationships between consumer preference and different EoL scenarios. A descriptive purpose was employed as this study aims to research a population (Singh, 2007), where the population is customers of a sustainable clothing brand; Kuyichi Pure Goods. Through the process of data collection concerning a chosen object, descriptive research facilitates a more profound comprehension of a specific matter and provides valuable insights for future studies (Singh, 2007). A descriptive cross-sectional approach only examines if variables are related, and cannot denote causal relationships, because the characteristics of an experimental design are absent (Bryman, 2016). The proposed study established a comprehensive analysis to understand consumer preferences, in relation to EoL scenarios in the fashion industry, rather than a causal relationship. That is why a descriptive cross-sectional approach was chosen as the research method.

This research adopted a stepwise process consisting of three steps: 1) selecting a representative sample of clothing products to obtain consumers' preferences, 2) conducting a cross-sectional user survey to collect data on consumer preferences for different EoL scenarios for clothing products and 3) analysing the data at both aggregated- and individual segment level using the Kano model. The primary objective of this research was to analyse the aggregated findings. However, to provide insights at the individual segment level, a stepwise Kano

approach was employed in an exploratory way. To arrive at these segments, questions regarding demographics, purchasing behaviour for environmentally sustainable products, and willingness-to-pay (WTP) more for circular products were added to the survey. This approach was based on the Kano model described in (Atlason et al., 2017, 2018; Wang & Ji, 2010) and allowed for observatory results.

3.2 Sampling Strategy

The sampling procedure applied to this research was non-probability sampling, using a convenience sampling strategy. Convenience sampling is a method where samples are drawn in a way that is easiest available and accessible to the researcher. This might stem from geographical proximity, accessibility during a specific timeframe, or willingness to engage in the research (Bryman, 2016). For this research, the samples were recruited with an online survey through the channels of a sustainable clothing brand; Kuyichi Pure Goods. More specifically, through a social media post and a Dutch, English, and German newsletter. By participating participants had the chance to win 100 euros of shopping credit. The research was based on convenience rather than equal probability, which can be prone to sampling bias and response bias. This sampling strategy was chosen nonetheless, as the aim of the study is to understand the consumer preference for buying clothing products with different EoL scenarios after which more targeted circular strategies can be implemented. Utilising a convenience sample for this research is also justifiable because an opportunity arises to collect data from a sample that is too valuable to pass up (Bryman, 2016). The data generated from this approach may not support definitive conclusions due to limitations in generalizability, but it could serve as a starting point for subsequent research or facilitate connection with existing literature in this field (Bryman, 2016). To reduce bias a sample size calculation was performed. Given that this research employed convenience sampling and had an infinite overall population, the

necessary sample size was estimated using a specific formula. The formula (1) for determining the required sample size is outlined as follows (Cao et al., 2022):

$$n = (\frac{Z^2\, p(1-p)}{E^2}) \quad (1)$$

Where n is the sample size, Z is the Z-score, p is the estimated proportion of the population, and E is the margin of error. In the formula, Z is taken as 1.96 (α = 0.05), and E as 0.05 (5%). The estimated population size was calculated according to the number of subscribers to the newsletters with the corresponding open rates. The Dutch newsletter was sent out to 15,336 people, the English one to 14,202 people, and the German version to 1,226 people. The average open rate was 43.8% which leads to a sample size of: $n = (\frac{1.96^2 * 0.438(1-0.438)}{0.05^2})$ = 386.

By using convenience sampling through the channels of a sustainable clothing company, it was assumed to target specific consumers who already have sustainable buying intentions. Mapping the consumer preferences of this specific group can therefore guide the circularity strategies of already sustainable companies. This descriptive study aimed to comprehensively understand the consumer preferences of 'sustainable' consumers, which could be used as low-hanging fruit for immediately improving the circularity efforts of sustainable companies. Because convenience sampling is inherently biased, future studies are advised to test the generalizability of the results by utilising other sampling methods that better fit the general population.

3.3 Data Collection

3.3.1 Product Selection

To increase the robustness of the study, four clothing products were considered and examined, namely jeans, shorts, T-shirts, and sweaters. These products were selected because they are most common in the fashion industry and represent a significant share of all purchased

clothing products. Each item was analysed separately, to find interrelationships and contrasts between different clothing products when it comes to consumer preferences. The participants were asked to base their answers on a product hypothetically having one of these features (EoL scenarios).

3.3.2 User Survey

The data for this research was collected through a cross-sectional user survey. The survey consisted of Kano questions which assessed the satisfaction of consumers with the presence or absence of specific features in a particular clothing product, with the features being the EoL scenarios. Before participating, all consumers were provided with a clear explanation of the study's nature before giving consent. To alleviate the cognitive burden, participants were asked to evaluate four clothing products, two per category. This implies that a total of 24 questions were posed, encompassing questions about four different products in both their functional and dysfunctional forms. In addition, the respondent's purchasing behaviour for environmentally sustainable products was self-assessed using the 5-point Likert scale by Kumar et al. (2017) consisting of four items.

Furthermore, the study assessed the WTP a premium for circular jeans. The WTP was evaluated because there might be a discrepancy between attitudes and behaviour; consumers may hold positive attitudes towards environmentally favourable EoL scenarios, but this does not necessarily translate to making any active effort or paying any possible premium price. To determine the WTP for circular jeans, the scale by Cranfield & Magnusson (2003) was used (Appendix 1).

This, in combination with demographic questions, positioned at the start of the survey, brought the total number of questions in the Kano survey to 35. Appendix 1 shows an example of the Kano survey.

3.4 Operationalisation

In this study, the Kano model was used to determine the customer satisfaction of different EoL scenarios of clothing products. The EoL scenarios were treated as quality features of a clothing product, in which clothing products are reused, remanufactured, or recycled before being sold again. In line with the standard procedure for Kano survey findings, EoL scenarios were categorised, based on the responses from the study population, drawing from existing research (Atlason et al., 2017; Wang & Ji, 2010; Xu et al., 2009). This classification was carried out at a product-specific level.

This study comprises independent variables represented by the EoL scenarios: *reuse, remanufacture,* and *recycle*. The analysis focused on assessing the relationship between these independent variables and the dependent variable, *consumer satisfaction,* as outlined in *H1*, *H2,* and *H3*. In *H4*, *consumer satisfaction* was treated as an independent variable in the context of *consumer preference*. Consumer preferences were analysed through the lens of customer satisfaction with EoL clothing products. The assumption was that when customers are more satisfied with one EoL scenario, compared to another, they also prefer that EoL scenario over the other.

3.5 Kano Modelling

3.5.1 Kano Survey

To address the initial three hypotheses, it was imperative to comprehend the association between various EoL scenarios and consumer satisfaction. The premise of this study was that all clothing products were functioning like they should, therefore assuming functional similarity for all EoL scenarios. In the Kano model, 5 dimensions are used to determine customer satisfaction: attractive, one-dimensional, must-be, indifferent, and reverse quality. To determine this, customer satisfaction (CS) and customer dissatisfaction (DS) were measured

through survey questions, based on a Likert scale. Questions were formulated in the functional form, to determine satisfaction, and in the dysfunctional form, to determine dissatisfaction (Table 1). The Kano questions were formulated with responses as 1) I like it that way, 2) I expect it that way, 3) I am neutral, 4) I can tolerate it that way, and 5) I dislike it that way (Xu et al., 2009). Utilizing the aggregate of customer answers to both functional and dysfunctional queries, the requirement was categorized into one of six Kano classifications through consultation with the Kano evaluation table (Figure 4) (Berger, 1993). The predominant response pattern within the sample set typically dictates the assignment of the final Kano category for any given requirement (Kano et al., 1984). When the consumer responses to the different EoL scenarios are classified into attractive, or one-dimensional attributes *H1*, *H2*, and *H3* can be supported.

Table 1

Question Wording in the Kano Survey for Different EoL Scenarios in Both Functional and Dysfunctional Forms

Product feature	Functional	Dysfunctional
EoL 1 (Reuse)	How would you feel about purchasing a [product] that has been previously worn by someone else?	How would you feel about purchasing a [product] that has not been previously worn by someone else?
EoL 2 (Remanufacture)	How would you feel about purchasing a [product] that is made from parts of another clothing product?	How would you feel about purchasing a [product] that is not made from parts of another clothing product?
EoL 3 (Recycle)	How would you feel about purchasing a [product] that is made from recycled materials?	How would you feel about purchasing a [product] that is not made from recycled materials?

Figure 4

Kano Evaluation Table (Kano et al., 1984)

CRs		DYSFUNCTIONAL				
		1. like	2. must-be	3. neutral	4. live with	5. dislike
FUNCTIONAL	1. like	Q	A	A	A	O
	2. must-be	R	I	I	I	M
	3. neutral	R	I	I	I	M
	4. live with	R	I	I	I	M
	5. dislike	R	R	R	R	Q
A = Attractive		M = Must-be		R = Reverse		
O = One-dimensional		I = Indifferent		Q = Questionable		

3.5.2 Calculation of CS and DS Values

The CS and DS values were calculated and put in relationship functions, which made it easier to compare customer satisfaction for different EoL scenarios. The formulas presented by (Wang & Ji, 2010) were used to calculate the CS and DS values. The satisfaction values denoted the level of consumer satisfaction when a feature was fully integrated (CS), whereas the dissatisfaction values indicated the scenario where the feature was completely excluded (DS). The attributes were then described based on their categorization (Wang & Ji, 2010). The CS value for customer needs (CS_i) was calculated by dividing the total responses for a given feature (EoL scenario) that are associated with satisfaction factors (attractive and one-dimensional) by the aggregate of responses classified as attractive (f_A), one-dimensional (f_O), must-be (f_M), and indifferent responses (f_I) (Wang & Ji, 2010):

$$CS_i = \frac{f_A + f_O}{f_A + f_O + f_M + f_I} \quad (2)$$

To calculate the DS value for customer needs, the sum of all responses for one feature (EoL scenario) that are linked to dissatisfaction factors (one-dimensional and must-be) was divided by the overall count of responses across attractive, one-dimensional, must-be, and indifferent categories (Wang & Ji, 2010):

$$DS_i = -\frac{f_O + f_M}{f_A + f_O + f_M + f_I} \quad (3)$$

3.5.3 Determination of CS and DS Points

To perform quantitative analysis, these values should be integrated into one data point with the quantified level of fulfilment of customer needs. Hence, the following assumptions were made: If a product could provide a specific customer need, it was considered to have a fulfilment level of 1, indicating complete satisfaction. Conversely, if a product failed to meet a customer's need, the fulfilment level for that customer's need was designated as 0, signifying total non-fulfilment (Wang & Ji, 2010). With these assumptions, the DS and CS points were defined. The CS point for customer need represented as (1, CS_i), signified the level of customer satisfaction when the customer needs had a fulfilment level of 1. The DS point for customer needs, represented as (0, - DS_i), reflects the level of customer dissatisfaction experienced when customer needs go unmet, corresponding to a fulfilment level of 0 (Wang & Ji, 2010). Using these points, the relationship curves were quantified more precisely (Wang & Ji, 2010).

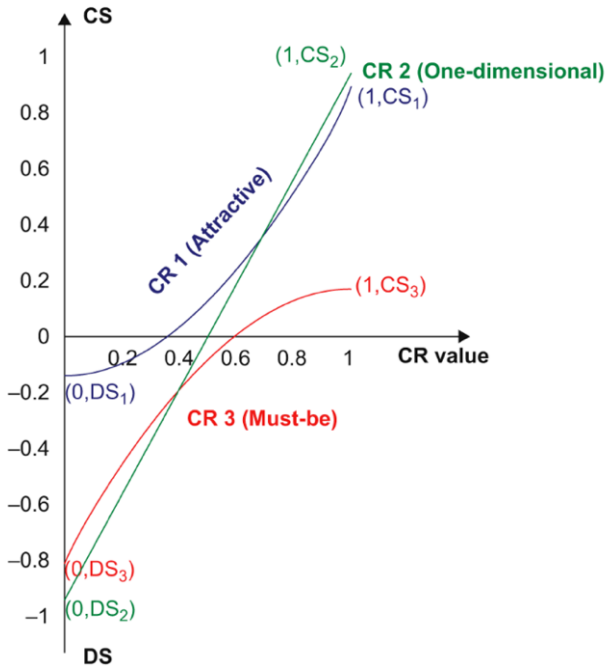
3.5.4 The Relationship Curves

Typically, the category, that referred to the most frequently occurring observations in the sample responses, was regarded as the definitive Kano category for that feature or EoL scenario (Kano et al., 1984). This way the corresponding curve could be calculated. The curves depicting the relationship between customer satisfaction and the fulfilment of customer needs are illustrated in Figure 5, with the x-axis showing the level of customer need fulfilment from 0 to 1, and the y-axis indicating customer satisfaction or dissatisfaction levels ranging from -1

to 1. The following equations were adopted from Wang & Ji (2010). The relationship curve was expressed as $S = f(x, a, b)$ where S is the degree of customer satisfaction, x denotes the fulfilment level of customer needs from 0 to 1, and a and b are coefficients adjusted according to the different Kano categories for customer needs (Wang & Ji, 2010).

Figure 5

Curves Illustrating the Correlation Between Customer Satisfaction and Customer Requirement Fulfilment (Wang & Ji, 2010)



When the EoL scenario showed one-dimensional attributes, it followed a linear curve expressed as $S = a_1 x + b_1$, where a_1 represents the gradient of the line, and b_1 is the intercept with the y-axis. When inserting the CS and DS points, namely (1, CS_i) and (0, DS_i) into the formula, it yields $a_1 = CS_i + DS_i$ and $b_1 = DS_i$. This gives the following equation:

$$S_i = (CS_i - DS_i)x_i + DS_i \qquad (4)$$

When the final Kano category for a certain EoL scenario was determined to be attractive, it followed an exponential curve expressed as $S = a_2 e^x + b_2$. By inserting the DS and CS values into the equation, the values for a_2 and b_2 were derived as follows: $a_2 = \frac{CS_i - DS_i}{e-1}$ and $b_2 = \frac{-(CS_i - eDS_i)}{e-1}$. Thus, the function for attractive attributes can be expressed as:

$$S_i = \frac{CS_i - DS_i}{e-1} e^{x_i} - \frac{CS_i - eDS_i}{e-1} \quad (5)$$

If a EoL scenario showed must-be attributes, it followed another exponential curve: $S = a_3(-e^{-x}) + b_3$. Again, substituting the DS and CS values into the equation gives $a_3 = \frac{e(CS_i - DS_i)}{e-1}$, and $b_3 = \frac{eCS_i - DS_i}{e-1}$. The function is then expressed as:

$$S_i = \frac{e(CS_i - DS_i)}{e-1} e^{-x_i} - \frac{eCS_i - eDS_i}{e-1} \quad (6)$$

3.5.5 Kano Analysis

After the determination of the DS and CS values, and the relationship curves, aggregated raw results were obtained. The DS and CS values for each EoL scenario were analysed on a product-specific basis, along with the corresponding equation delineating the relationship between the implementation of each feature and consumer satisfaction. A CS value signifies consumer satisfaction, rated on a scale from -1 to 1, when the feature is fully integrated, while the DS value indicates customer satisfaction, also on a scale from -1 to 1, when the feature is entirely excluded. Interpreting these results can be approached from two perspectives. The first approach involves examining the function when x = 1. A higher position on the y-axis within the function suggests that consumers find the feature more appealing when fully implemented. Alternatively, the functions can be analysed by studying the integrals, where a larger integral suggests that the feature holds greater potential for consumer satisfaction when considering partial feature implementation. The obtained regressions demonstrate the development of consumer satisfaction as a specific EoL scenario is

implemented more extensively (Atlason et al., 2017). If the results show that at x=1, the EoL scenario ‘reuse’ has a higher position on the y-axis for the average of different product categories, *H4* can be supported.

To extend the traditional Kano model and perform additional exploratory research, an analysis at the level of specific consumer segments was done. The segmentation was done based on standard demographic statistics (gender, age, education, income), and WTP. The integral values from the equations were obtained, and the highest scores for segments and product features were computed.

3.6 Research Quality Indicators

To ensure research quality, it is important to focus on reliability, replicability, and validity, following the principles of Bryman (2016). To ascertain internal consistency, Cronbach’s alpha (α) was used, facilitating the assurance of uniform results (Bryman, 2016). The computation of Cronbach’s α adheres to the following mathematical expression, designated as Formula 7:

$$\alpha = \frac{k\bar{c}}{\bar{v} + (k-1)\bar{c}} \tag{7}$$

Here, *k* denotes the count of items within the survey, $\bar{c}$ is the average covariance among these items, and $\bar{v}$ represents the mean-variance observed (Bryman, 2016). For the internal consistency to be deemed acceptable, a Cronbach’s α coefficient of at least 0.7 is recommended.

With the detailed research approaches, replication is facilitated. However, as a convenience sample was generated, limitations in generalizability might occur. In addition, the principal aim of this research was to analyse aggregated data. However, for a more detailed examination at the individual segment level, the data was gathered for exploratory purposes.

Lastly, established, reliable scales for measurement validity were used. Moreover, a pre-experiment addressed clarity and response issues.

The research adhered to ethical guidelines for studies with human subjects. It guaranteed informed consent, safeguarded privacy, and maintained participants' withdrawal rights. Consent for data utilization was obtained from participants, adhering to practices compliant with the General Data Protection Regulation (GDPR) for data transparency.

3.6.1 Pearson's Chi-Square Test

Pearson's chi-square test contrasts the actual frequency distribution of each category against the anticipated frequency distribution under the null hypothesis (Franke et al., 2012). It also determines the alignment of sample data with the claimed uniform distribution. Indicating consumers with different demographics exhibit no singular preference for a Kano category across clothing products and corresponding EoL scenarios. In this study, the null hypothesis posits that Kano category values occur equally frequently across all clothing products and corresponding EoL scenarios. Pearson's chi-square test compares the observed frequency distribution for each category with the expected frequency distribution based on the null hypothesis (Fisher et al., 2011). The Pearson's chi-square test statistic is computed using Formula 8.

$$\chi^2 = \sum(\frac{(O_i - E_i)^2}{E^2} \quad (8)$$

Where O_i represents the observed frequency, and E_i the expected frequency (Fisher et al., 2011)

3.6.2 Fisher's Exact Test

The study employed Fisher's exact test as part of the analysis of consumers' response patterns within the chi-square test of independence framework. Contingency tables were structured to compare Kano category responses across demographic factors including age, gender, education, and annual gross income. The chi-square test statistic's sampling

distribution approximates a chi-square distribution, rendering it more accurate with larger sample sizes. However, in smaller samples, where expected frequencies in each cell must exceed five, this approximation may not suffice (Connelly, 2016). Fisher introduced a method to compute the exact probability of the chi-square statistic, particularly effective for small sample sizes, known as Fisher's exact test (Fisher et al., 2011). Given the smaller sample size per demographic group, Fisher's exact test was deemed appropriate for analysing differences among demographic groups in this study. The p-value of Fisher's exact test was calculated according to Formula 9.

$$p = \frac{(R1!\,R2!\,\ldots Rm!)(C1!\,C2!\,\ldots Cn!)}{N!\prod aij!} \tag{9}$$

The categorical variables X and Y had m and n levels, respectively, forming an m×n matrix (e.g., for 2 x 2 contingency tables with two variables each with two options). The elements *aij* indicate the count of observations for $x = i$ and $y = j$. The total of the rows were denoted by Ri, the total of the columns by Cj, and the grand total by $N = \sum R_i = \sum C_j$ (Howell, 2011; Materla, 2018).

The Fisher's Exact Test is typically applied to 2 × 2 contingency tables, wherein each variable comprises two options, particularly suited for small sample sizes. However, in this study, a larger contingency table was utilized, necessitating an extension of the method's applicability. The Fisher-Freeman-Halton Exact Test accommodates larger contingency tables and larger samples (Field, 2013). Because the sample size was too large for exact *p*-value computations and too unbalanced for the chi-square test the Monte Carlo simulation was employed. This offered an unbiased estimate of the exact *p*-value, bypassing the constraints of the chi-square method (Mehta & Patel, 1996).

3.6.3 Wilcoxon Signed-Rank Test

In the study examining consumer preferences for EoL scenarios for clothing products, including ‘reuse’, ‘remanufacture’, and ‘’recycle across four types of clothing products: sweaters, T-shirts, jeans, and shorts, the Wilcoxon Signed-Rank Test was utilized to analyse the significance of differences in participant responses for each EoL scenario within each clothing category. This non-parametric test was chosen due to its suitability for paired data where the normality assumption might not hold, particularly as it compares median differences between related samples (Kitchen, 2009). The test’s applicability was confirmed by checking the distribution of differences for skewness, ensuring the assumption of symmetry required by the Wilcoxon test was met.

4. Results

To address the research question *"What is the consumer purchasing preference for end-of-life scenarios in the fashion industry?"* several preparatory steps were undertaken prior to interpreting the findings. Initially, the internal reliability of the study was evaluated, followed by the presentation of respondent profiles. Subsequently, the test of independence was examined and an analysis of consumers' responses based on demographics was conducted. Furthermore, a Wilcoxon Signed-Rank test was conducted to test the significance of the differences regarding participant responses for each EoL scenario within each clothing category.

Following the demographic analysis, general outcomes were presented along with hypothesis testing results. Additionally, the integration of relationship curves was executed, providing an overview of the most preferable clothing products corresponding to EoL scenarios. Lastly, an examination of WTP for different EoL scenarios was conducted.

4.1 Internal Reliability

To assess reliability, this study applied the test of singleness relevant to internal consistency reliability, i.e., Cronbach's alpha. The alpha value obtained was 0.93, which significantly surpasses the suggested threshold of 0.70 set by (Nunnally, 1978). Utilizing Cronbach's alpha for assessing reliability is critical in research as it gauges the coherence of a test or survey, demonstrating the extent to which a collection of items functions collectively. An alpha value of 0.93 indicates a high level of consistency among the items in the survey, suggesting that they reliably measure the underlying concept or construct being investigated. This is important because a high degree of reliability increases confidence in the results and conclusions drawn from the data. It signifies that the survey items work well together and are likely to produce similar results under consistent conditions.

4.2 Respondent Profiles

In aggregate, the Kano survey garnered 646 completions over a span of three weeks. Following the exclusion of bot responses, duplicate entries, and incomplete submissions, a total of 488 Kano surveys were deemed valid and included for analysis. Additionally, demographic factors such as gender, age, education, and annual gross income were computed for further segmentation as outlined in Table 2.

Table 2

Overview of Participant Information

Background Variable	N	Percentages (%)
Gender		
Female	336	68.85
Male	147	30.12
Other	1	0.21
Prefer not to say	4	0.82
Age		
15-24	26	5.33
25-34	146	29.92
35-54	231	47.34
55-64	68	13.93
65+	17	3.48
Education		
No schooling completed or High School	25	5.12
Secondary vocational education (MBO) or University of Applied Sciences (HBO)	169	34.63
Bachelor's degree	68	13.93
Master's degree or PhD or higher	226	46.31
Annual gross income (€)		
Less than 10,000	34	6.97
10,000-30,000	110	22.54
30,000-50,000	156	31.97
50,000-100,000	112	22.95
Above 100,000	29	5.94
Prefer not to say	47	9.63

4.3 Pearson's Chi-square Test for the Kano Model

A chi-square goodness-of-fit test was performed to ascertain whether a notable discrepancy exists between the observed distribution of consumer preferences for EoL scenarios for clothing products and a predicted distribution (Franke et al., 2012). This expected distribution was based on theoretical predictions that suggest consumers have equal preferences for three distinct EoL scenarios: reuse, remanufacture, and recycle. The rationale behind performing this test was to assess whether actual consumer behaviour aligns with sustainable practices as evenly as hypothesized or if certain preferences are more pronounced than others. The chi-square goodness-of-fit test was utilized because the research focused on categorical attributes within a singular population, ensuring that each category had an expected frequency count of five or more. This condition makes the test well-suited for evaluating the data's adherence to a hypothesized distribution. To assess the statistical significance of the observed distributions, critical chi-square values (X^2) were derived based on the degrees of freedom, which in this case were five, aligned with a significance threshold of 0.05.

It can be observed that for all EoL scenarios, the calculated chi-square values exceeded the critical chi-square values (with p-values falling below the 0.05 significance threshold) (Table 3). An expected value of 81.3 was established for the Kano categories across 12 EoL scenarios. This expected value for each Kano category was arrived at by dividing the total survey responses by the number of categories. With 488 responses and 6 distinct Kano categories in this analysis, the initial hypothesis positing that the observed data would align with a uniform expected distribution was dismissed for each of the 12 EoL scenarios.

Table 3

Evaluation of the Kano Survey Responses with the Chi-Square Goodness-of-Fit Test

Attribute	Category totals						X^2	p-value
	Q	M	O	A	I	R		
Sweater Reuse	12	1	4	98	247	126	577.369	<0.01
Sweater Remanufacture	5	9	53	241	164	16	595.787	<0.01
Sweater Recycle	6	15	116	243	75	9	550.724	<0.01
T-shirt Reuse	9	5	6	60	224	184	591.189	<0.01
T-shirt Remanufacture	11	13	59	188	195	22	466.393	<0.01
T-shirt Recycle	6	10	114	251	97	10	564.975	<0.01
Jeans Reuse	18	7	11	78	244	130	532.664	<0.01
Jeans Remanufacture	10	7	62	196	192	21	492.090	<0.01
Jeans Recycle	7	13	116	248	96	8	550.418	<0.01
Shorts Reuse	14	7	14	79	261	113	588.705	<0.01
Shorts Remanufacture	14	16	58	187	197	16	469.172	<0.01
Shorts Recycle	10	13	112	235	109	9	495.607	<0.01

4.4 Fisher's Exact Test for Evaluating Demographic Factors

For each clothing item across different EoL scenarios, *p*-values were determined that span from 0 to 1, taking into account demographic factors, as shown in Table 4. The null hypothesis posited the absence of noticeable variations in response patterns among different demographic groups, indicating a uniform impact of demographic factors on consumer reactions. A *p*-value nearing 1 suggests that consumer responses are consistent, regardless of demographic differences (Materla, 2018). Conversely, a p-value close to 0 underlines variations in responses based on the Kano model's attribute classification, indicating significant response differences among various demographic segments. A threshold of 0.05 for significance was established to examine differences based on demographics.

4.4.1 Analysis by Age

The survey participants were stratified into five age groups, each with its corresponding number of respondents (Table 2). Analysis revealed that recycled sweaters, reused T-shirts, recycled T-shirts, reused jeans, remanufactured jeans, recycled jeans, reused shorts, remanufactured shorts, and recycled shorts all exhibited *p*-values below the significance threshold of 0.05. This indicates that consumers across various age groups demonstrated disparate responses to these attributes. Nevertheless, there was uniformity in responses across different age cohorts concerning reused sweaters, remanufactured sweaters, and remanufactured T-shirts (Table 4).

4.4.2 Analysis by Gender

Similarly, respondents were categorized by gender. The Fisher's exact test yielded evident insights: reused sweaters, remanufactured T-shirts, reused jeans, remanufactured jeans, recycled jeans, remanufactured shorts, and recycled shorts exhibited significant differences in response patterns. Conversely, remanufactured sweaters, recycled sweaters, reused T-shirts, recycled T-shirts, and reused shorts demonstrated congruent responses (Table 4).

4.4.3 Analysis by Education

Significant variations in response patterns were recognized across distinct categories, encompassing recycled sweaters, remanufactured T-shirts, recycled T-shirts, remanufactured jeans, recycled jeans, remanufactured shorts, and recycled shorts. Conversely, reused sweaters, remanufactured sweaters, reused T-shirts, reused jeans, and reused shorts showed similar response patterns (Table 4).

4.4.4 Analysis by Annual Gross Income

Diverse response patterns were evident among respondents' income levels concerning attributes such as recycled sweaters, reused T-shirts, reused jeans, remanufactured jeans, and

remanufactured shorts. However, respondents demonstrated uniform responses for reused sweaters, remanufactured sweaters, remanufactured T-shirts, recycled T-shirts, reused shorts, and recycled shorts (Table 4).

Table 4

Analysis of Demographic-Based Responses to Clothing Products and Their End-of-Life (EoL) Scenarios with Fisher's Exact Test

	Age	Gender	Education	Income
EoL scenario and clothing product	*p*-value	*p*-value	*p*-value	*p*-value
Sweater Reuse	0.181	0.008*	0.964	0.144
Sweater Remanufacture	0.110	0.073	0.331	0.288
Sweater Recycle	0.003*	0.434	0.022*	0.021*
T-shirt Reuse	0.003*	0.149	0.750	0.010*
T-shirt Remanufacture	0.458	0.006*	0.028*	0.095
T-shirt Recycle	0.024*	0.168	0.003*	0.216
Jeans Reuse	0.051*	0.011*	0.293	0.031*
Jeans Remanufacture	0.005*	0.029*	0.040*	0.035*
Jeans Recycle	0.007*	0.023*	0.003*	0.303
Shorts Reuse	<0.001*	0.101	0.566	0.221
Shorts Remanufacture	0.002*	0.008*	0.036*	0.010*
Shorts Recycle	0.003*	0.020*	0.009*	0.133

Note. * $p < .05$

4.5 Wilcoxon Signed-Rank Test

After performing the Wilcoxon Signed-Rank test, the results revealed significant differences in consumer preferences across the EoL scenarios for each clothing type (Table 5). Across all clothing types, we observed a statistically significant difference in consumer preferences among the EoL scenarios. Specifically, every comparison within clothing categories yielded *p*-values lower than 0.05. This uniform result across sweaters, T-shirts, jeans, and shorts underscores a pronounced preference disparity for EoL options, indicating that consumer preferences are significantly influenced by the type of clothing when considering reuse, remanufacture, and recycle as potential EoL scenarios. This analysis underscores the variability in consumer EoL preferences across different types of clothing products. The significant differences identified by the Wilcoxon Signed-Rank Test highlight the importance of considering the type of clothing product when devising strategies for circular end-of-life management in the fashion industry.

Table 5

Results of the Wilcoxon Signed-Rank Test

EoL scenario comparison	P-value	Z value
Sweater Reuse – Sweater Remanufacture	<0.01	-9.496
Sweater Reuse – Sweater Recycle	<0.01	-5.406
Sweater Remanufacture – Sweater Recycle	<0.01	-3.741
T-shirt Reuse – T-shirt Remanufacture	<0.01	-15.419
T-shirt Reuse – T-shirt Recycle	<0.01	-17.123
T-shirt Remanufacture – T-shirt Recycle	<0.01	-10.218
Jeans Reuse – Jeans Remanufacture	<0.01	-13.113
Jeans Reuse – Jeans Recycle	<0.01	-15.671
Jeans Remanufacture – Jeans Recycle	<0.01	-9.234
Shorts Reuse – Shorts Remanufacture	<0.01	-13.175
Shorts Reuse – Shorts Recycle	<0.01	-15.375
Shorts Remanufacture – Shorts Recycle	<0.01	-9.305

4.6 Kano Analysis

4.6.1 General Outcomes

Participants' preferences for specific EoL scenarios were gathered from their inputs to a survey framed along two dimensions—functional and dysfunctional—following the directives depicted in Figure 4. The survey encompassed three EoL scenarios: reuse, remanufacture, or recycle, and it covered four clothing articles: sweaters, T-shirts, jeans, and shorts. The counts of participant responses related to the attributes of each garment were systematically recorded. The Kano category that received the highest number of counts for each attribute was identified as the one perceived most favourably, as signified in Table 6, following the approach of Kano et al. (1984). This table also displays the Customer Satisfaction (CS) and Dissatisfaction (DS) values for each attribute, along with the corresponding equation depicting the relationship between feature implementation and customer satisfaction. It's worth noting that the shape of the equation varies based on the type of Kano category (Figure 5). A CS value delineates customer satisfaction (on a scale from -1 to 1) when the feature is fully enacted, while the DS value illustrates customer satisfaction (also on a scale from -1 to 1) when the feature is completely excluded (Atlason et al., 2017). Furthermore, the DS and CS points were computed, along with the determination of gradient (a) and intercept (b) for all attributes classified as attractive, leading to the generation of relationship curves (Table 7). Figure 6 showcases these functions plotted for each attractive attribute on an aggregated level. The figure demonstrates the development of satisfaction among consumers the more a certain EoL feature is implemented. At $x = 1$, the maximum feasible implementation is attained, with customer satisfaction depicted on the y-axis.

The hypotheses were tested according to the determined Kano category for each attribute.

Table 6

Results of the Kano Survey and Classification into Kano Category

Attributes	A	O	M	I	R	Q	Total	Kano category	CS	DS
Reuse, Sweater	98	4	1	247	126	12	488	I	0.29	-0.19
Remanufacture, Sweater	241	53	9	164	16	5	488	A	0.63	-0.13
Recycle, Sweater	243	116	15	75	9	6	488	A	0.80	-0.29
Reuse, T-shirt	60	6	5	224	184	9	488	I	0.22	-0.04
Remanufacture, T-shirt	188	59	13	195	22	11	488	I	0.54	-0.16
Recycle, T-shirt	251	114	10	97	10	6	488	A	0.77	-0.26
Reuse, Jeans	78	11	7	244	130	18	488	I	0.26	-0.05
Remanufacture, Jeans	196	62	7	192	21	10	488	A	0.55	-0.15
Recycle, Jeans	248	116	13	96	8	7	488	A	0.77	-0.27
Reuse, Shorts	79	14	7	261	113	14	488	I	0.26	-0.06
Remanufacture, Shorts	187	58	16	197	16	14	488	I	0.54	-0.16
Recycle, Shorts	235	112	13	109	9	10	488	A	0.74	-0.27

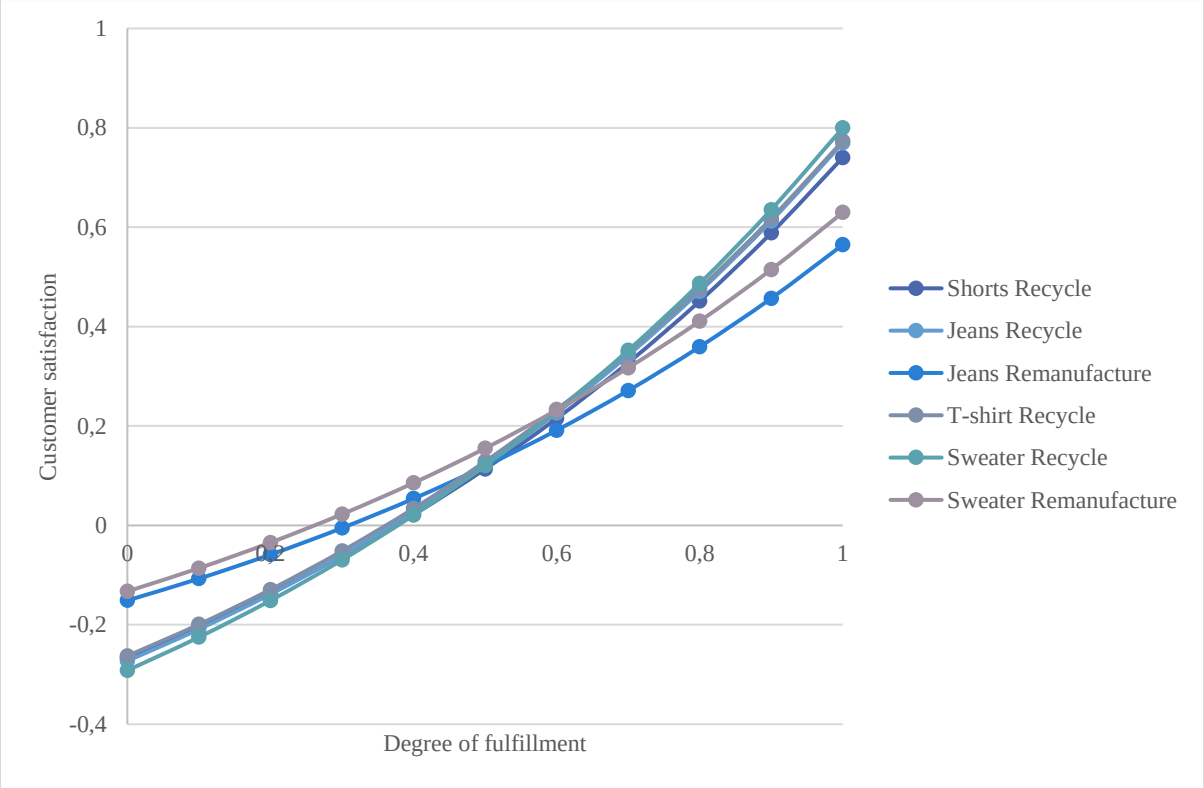
Table 7

Results of Attributes with Attractive Kano Category

Customer requirements	CS Point	DS Point	a	b	f(x)	$S = af(x) + b$
Attractive						
Recycle, Shorts	(1, 0.74)	(0, -0.27)	0.59	-0.85	e^x	$S = 0.59e^x - 0.85$
Recycle, Jeans	(1, 0.77)	(0, -0.88)	0.61	-0.88	e^x	$S = 0.61e^x - 0.88$
Remanufacture, Jeans	(1, 0.57)	(0, -0.15)	0.42	-0.57	e^x	$S = 0.42e^x - 0.57$
Recycle, T-shirt	(1, 0.77)	(0, -0.26)	0.60	-0.87	e^x	$S = 0.60e^x - 0.87$
Recycle, Sweater	(1, 0.80)	(0, -0.29)	0.64	-0.93	e^x	$S = 0.64e^x - 0.93$
Remanufacture, Sweater	(1, 0.63)	(0, -0.13)	0.44	-0.58	e^x	$S = 0.44e^x - 0.58$

Figure 6

Plotted Results with Attractive Kano Category



4.6.2 H1: The EoL Scenario 'Reuse' Positively Affects Customer Satisfaction Regarding Clothing Products

Hypothesis *H1* posited that the EoL scenario categorized as 'reuse' would demonstrate alignment with either the attractive or one-dimensional Kano categories across all four clothing products. However, the findings have led to the rejection of *H1*. The examination revealed that the EoL scenario 'reuse' failed to align with either the attractive or one-dimensional Kano categories across all four clothing products studied. As illustrated in Table 6, the analysis indicates that for the second-hand sweater, the highest count was observed within the indifferent Kano category, totalling 247 out of 488 instances. Similarly, the second-hand T-shirt exhibited 224 counts within the indifferent Kano category. Moreover, the indifferent Kano category garnered 244 counts for second-hand jeans and 261 counts for second-hand shorts.

These observations collectively imply that the fulfilment or non-fulfilment of these attributes would not substantially impact customer satisfaction with the product, and therefore *H1* was rejected.

4.6.3 H2: The EoL Scenario 'Remanufacture' Positively Affects Customer Satisfaction Regarding Clothing Products

Similarly, *H2* positing that 'remanufacture' would exert a positive impact on customer satisfaction was rejected for T-shirts and shorts; however, it was accepted for sweaters and jeans. As depicted in Table 6, a remanufactured sweater registered the highest count in the attractive Kano category, totalling 241. Similarly, remanufactured jeans garnered the highest count of 196 in the attractive Kano category. Conversely, a remanufactured T-shirt exhibited the highest count (195) in the indifferent category, while remanufactured shorts also showed the highest count (197) in the indifferent category. The findings indicate a distinct variance in customer satisfaction with remanufactured products, based on the type of clothing product.

4.6.4 H3: The EoL Scenario 'Recycle' Positively Affects Customer Satisfaction Regarding Clothing Products

In contrast, *H3* was accepted across all four clothing products, as the EoL scenario 'recycle' was consistently classified as either attractive or one-dimensional. Notably, all recycled clothing products attained their highest count within the attractive Kano category (Table 6). Specifically, the recycled sweater garnered 243 out of 488 counts within the attractive Kano category, the recycled T-shirt amassed 251 counts, the recycled jeans obtained 248 counts, and the recycled shorts accumulated 235 counts. These results demonstrate that recycling is generally the favoured EoL scenario among different clothing items.

4.7 Integration

4.7.1 Segregated Results

Due to the inherent limitations of the traditional Kano model in providing detailed insights beyond aggregated outcomes, the stepwise methodology proposed by Atlason et al. (2017) was employed. This approach facilitated the identification of segregated results by integrating relationship curves to discern the most preferable attributes.

The results offer two principal modes of interpretation. Initially, examination of the function at x = 1 elucidates higher values on the y-axis, indicating heightened attractiveness of the feature to consumers upon full realization. Alternatively, analysis of integrals provides insights, with larger integral values suggesting greater potential for customer satisfaction when considering partial feature implementation, as suggested by Atlason et al. (2017). The latter approach was adopted as it affords a more comprehensive understanding of the dataset.

The segregated findings from the Kano model regarding EoL scenarios are presented in Table 8. This table shows the integration values for all product features between x= 0 and x =1. Higher integral values denote heightened customer satisfaction for the respective clothing product in conjunction with its EoL scenario. Only features that were categorized as attractive or one-dimensional, were considered for further analysis, given that indifferent characteristics suggest consumers are unconcerned about that particular requirement, meaning its presence or absence will not affect customer satisfaction. The ‘I's’ in Table 8 signify indifference of the demographic group towards the EoL scenarios.

Table 8

Approximation of Integrals for the Relationship Curves Across the Demographic Groups

	Maximize Reuse Potential				Maximize Remanufacture Potential				Maximize Recycle Potential			
	Sweater	T-shirt	Jeans	Shorts	Sweater	T-shirt	Jeans	Shorts	Sweater	T-shirt	Jeans	Shorts
General												
	I	I	I	I	0.177	I	0.154	I	0.173	0.161	0.168	0.165
Gender												
Female	I	I	I	I	0.208	0.151	0.156	0.144	0.160	0.166	0.156	0.148
Male	I	I	I	I	I	I	I	I	0.178	0.185	0.184	0.173
Age												
15-24	0.219	I	0.219	I	0.231	0.194	0.218	0.211	0.106	0.114	0.157	0.157
25-34	I	I	I	I	0.213	0.161	0.184	0.177	0.199	0.201	0.209	0.201
35-54	I	I	I	I	0.180	I	0.143	I	0.154	0.166	0.158	0.144
55-64	I	I	I	I	0.161	I	I	I	0.176	0.145	0.103	0.108
65+	I	I	I	I	I	0.174	I	I	-0.367	0.128	-0.266	-0.179
Education												
None/ High sch.	I	I	I	I	0.142	I	I	I	0.228	0217	0.217	0.217
MBO/ HBO	I	I	I	I	0.182	0.118	0.149	0.116	0.164	0.163	0.161	0.152
BSc	I	I	I	I	0.228	I	I	0.189	0.215	0.206	0.216	0.207
MSc/ PhD+	I	I	I	I	0.181	I	I	I	0.143	0.161	0.142	0.133
Income												
< 10000	I	I	I	I	0.239	I	I	0.210	0.121	0.216	0.221	0.246
10,000-30,000	I	I	I	I	0.205	0.168	0.201	0.165	0.169	0.168	0.206	0.190
30,000-50,000	I	I	I	I	0.185	I	I	I	0.201	0.178	0.141	0.143
50,000-100,000	I	I	I	I	0.165	I	I	I	0.142	0.141	0.151	0.129
>100,000	I	I	I	I	0.211	I	0.211	I	0.121	0.186	0.164	0.136
Prefer not to say	I	I	I	I	0.146	I	0.135	0.124	0.133	0.174	0.123	0.115

4.7.2 H4: The EoL Scenario 'Reuse' Leads to the Highest Customer Satisfaction Regarding Clothing Products

As seen in Table 8, the general results show that the recycle EoL scenarios were categorized as attractive for all products, the remanufacture scenarios were categorized as attractive for jeans and sweaters, but as indifferent for T-shirts and shorts, and the reuse EoL scenarios were deemed indifferent for all clothing products. When looking at the integral values of the attractive features the remanufactured sweater was most attractive (0.177) followed closely by recycled sweater (0.173), recycled jeans (0.168), recycled shorts (0.168) recycled T-shirt (0.161) and lastly remanufactured jeans (0.154). In terms of the general results, Table 8 suggests that the feature recycle is deemed attractive for all products, but that the 'recycled sweater' is slightly preferred. The attribute of reuse being categorized as indifferent across all products implies that customer satisfaction remains unchanged regardless of the product's reuse (second-hand). For the feature remanufacture there is a difference between clothing products in terms of attractiveness. Participants seem to prefer remanufactured sweaters over remanufactured jeans but are indifferent when it comes to remanufactured T-shirts and shorts.

This led to the rejection of *H4*, as a higher position on the R-ladder did not inherently correlate with elevated customer satisfaction. Notably, 'recycle' emerged as the most satisfactory option across all four clothing products, while being lower on the R-ladder.

4.7.3 Consumer Segmentation

4.7.3.1 Gender. When considering the Kano analysis at the level of specific user segments for gender, the options: 'Other' and 'prefer not to say' were omitted due to a negligible size of the data (1 and 4 respondents respectively). As depicted in Table 8, the segmented results for gender show a clear difference between men and women however, when it comes to customer satisfaction, men seem to be indifferent to remanufacture across all

products, whereas women find the feature remanufacture attractive for all products. When it comes to reuse both men and women are indifferent to all products. Men find the recycle feature attractive for all products whereas women only find recycle attractive for the sweater (0.160) and shorts (0.148). Looking at the integral values men seem to prefer recycled T-shirts (0.185) and recycled jeans (0.184) over recycled sweaters (0.178) and recycled shorts (0.173), whereas women are indifferent to recycled T-shirts and recycled jeans. For women, a strong preference for remanufactured sweaters (0.208) is observed followed by recycled sweaters (0.160), remanufactured jeans (0.156), remanufactured T-shirts (0.151), recycled shorts (0.148), and lastly remanufactured shorts (0.144).

4.7.3.2 Age. The customer satisfaction for different EoL scenarios varies among age groups (Table 8). Among young people aged 15-24, all three features: reuse, remanufacture, and recycling are attractive, with the most preferred item being the remanufactured sweater (0.231), followed closely by reused sweaters and jeans (both 0.219), and remanufactured jeans (0.218). In contrast, individuals aged 25-34 are indifferent to clothing products with the reuse EoL scenario but display a preference for all remanufactured and recycled clothing items, with the remanufactured sweater being the most preferred (0.213). Similarly, individuals aged 35-54 are also indifferent to the reuse EoL scenario but find most remanufactured clothing items attractive, with the remanufactured sweater being the most appealing (0.180). Those in the age group 55-64 share an indifference for reuse but favour remanufactured sweaters and all recycled clothing products, with the recycled sweater ranking highest (0.176). Finally, individuals aged 65 and above are also indifferent to reuse and find remanufactured and recycled T-shirts attractive, with remanufactured T-shirts showing the highest preference (0.174).

4.7.3.3 Education. Across all education levels, there is a unanimous lack of preference for clothing items with the reuse EoL scenario, while all recycled clothing options are deemed attractive according to the Kano categories (Table 8). Notably, individuals with no schooling and those with a high school degree exhibit a preference for recycled sweaters above all other options. For individuals with MBO and HBO qualifications, there is a strong preference for remanufactured or recycled clothing, with remanufactured sweaters being the most favoured choice (0.182). Similarly, individuals holding bachelor's degrees show a preference for remanufactured sweaters, with a particularly high score of 0.228. This preference extends to individuals with master's degrees or PhDs, who also favour remanufactured sweaters, albeit with a slightly lower score of 0.181.

4.7.3.4 Income. As seen in Table 8, individuals with an income below $10,000 demonstrate a preference for recycled shorts, with a notably high score of 0.246, closely followed by a preference for remanufactured sweaters (0.239). In the income bracket of €10,000 to €30,000, there is a preference for recycled jeans (0.206), remanufactured sweaters (0.205), and remanufactured jeans (0.201). Those earning between €30,000 and €50,000 exhibit a preference for recycled sweaters, scoring 0.201. Individuals with incomes ranging from €50,000 to €100,000 favour remanufactured sweaters with a score of 0.165. In the highest income bracket of €100,000 and above, there is a preference for both remanufactured sweaters and jeans, with identical scores of 0.211. Interestingly, individuals who prefer not to disclose their income show a preference for recycled T-shirts, scoring 0.174.

4.7.3.5 Summary. Across various demographic segments, certain patterns emerge (Table 8). Firstly, the analysis reveals a consistent preference for recycled clothing items across all product categories, indicating their attractiveness to consumers. Remanufactured sweaters consistently emerge as the most preferred option across education levels and income brackets,

suggesting a broad appeal regardless of educational attainment or financial status. However, there are notable variations among demographic groups. For instance, younger individuals aged 15-24 show a strong preference for all EoL scenarios, particularly favouring remanufactured sweaters. Conversely, older age groups, such as those aged 65 and above, demonstrate a more discerning preference, with a focus on remanufactured and recycled T-shirts. Gender differences also play a role, with women exhibiting a stronger preference for remanufactured sweaters compared to men, who are largely indifferent across all products. Interestingly, income levels also influence preferences, with lower-income individuals showing a preference for recycled shorts, while higher-income groups favour remanufactured sweaters and jeans. In general, the EoL scenario of recycling emerged as the most satisfactory choice among all four clothing products. Consequently, Hypothesis 4 was rejected.

4.8 Willingness-to-Pay

In this study, measuring the willingness-to-pay (WTP) serves as an indicator of consumer preferences and behaviours, particularly concerning sustainability practices within the fashion industry. Assessing WTP provides insights into the perceived value and market potential of products manufactured through various EoL scenarios, such as reuse, remanufacture, and recycling. The WTP was assessed to identify potential gaps between attitudes and actions; while individuals may express favourable views towards EoL options, such attitudes might not always lead to proactive measures or the WTP a premium for such products.

Given the extensive scope of this research, we focused the WTP analysis solely on jeans. Limiting the examination to jeans enabled us to maintain the survey's feasibility and prevent respondent fatigue. A comprehensive analysis of WTP for all clothing products

(including T-shirts, shorts, and sweaters) would have necessitated a longer survey, potentially leading to reduced participant engagement and data quality.

In the analysis, two hypotheses were formulated regarding the WTP for jeans under different EoL scenarios. The null hypothesis (H_0) posited that the WTP for jeans subjected to reuse, remanufacture, and recycling processes would be equal. Conversely, the alternative hypothesis (H_1) proposed that the WTP for jeans under these scenarios would not be equal:

$$H_0: WTP(Reuse) = WTP(Remanufacture) = WTP(Recycle)$$

$$H_1: WTP(Reuse) \neq WTP(Remanufacture) \neq WTP(Recycle)$$

Subsequently, a one-sided analysis of variance (ANOVA) test was conducted to examine the significance of differences in WTP among jeans categorized as second-hand, remanufactured, or composed of recycled fibres. The resulting p-value of <.001, falling below the 0.05 significance level, led to the rejection of the null hypothesis (H_0). This finding suggests a noteworthy distinction in WTP among jeans subjected to reuse, remanufacture, and recycling processes.

4.8.1 Descriptive Statistics for WTP

In this section, a detailed examination of the descriptive statistics concerning the EoL scenarios for jeans: reuse, remanufacture, and recycle is presented (Table 9). This analysis is pivotal for understanding the distribution and central tendencies of participant responses, thereby offering insights into consumer preferences regarding sustainable practices for jeans.

For the reuse of jeans, the analysis included 488 observations, with responses ranging from 50 to 137 euros, indicating variability in participants' WTP for reused jeans. The mean value of 66.51 euros reflects a moderate preference towards spending less on reuse options.

The standard deviation of 15.174 and variance of 230.254 illustrate a moderate spread of responses around the mean, suggesting diverse opinions among participants.

In contrast, the remanufacture scenario also analysed 488 responses but showed a wider range of opinions (from 50 to 150), with a mean of 93.58. Signifying a relatively stronger WTP for remanufactured jeans compared to reused ones. The variability in responses is further underscored by a standard deviation of 17.527 and a variance of 307.181, indicating a significant spread of opinions on remanufacturing.

Similarly, recycling jeans presented a range of 100 (from 50 to 150) among the same number of participants, with the highest mean of 102.45, suggesting the greatest WTP for recycling. The relatively close standard deviation of 15.499 and variance of 240.219 to those of reuse indicate a somewhat consistent valuation of recycling above reuse, despite its higher average WTP.

The comparative analysis of these statistics reveals a clear preference hierarchy among participants. Notably, recycling jeans is perceived as the most valuable option, reflected in the highest WTP, followed by remanufacturing and finally reuse.

These results clearly indicate a parallel in customer satisfaction with recycled products. Generally, consumers display a preference for recycled clothing products compared to reused and remanufactured clothing and seem prepared to pay a premium for the recycled option as well.

Table 9

Descriptive statistics for the willingness-to-pay for different circular clothing products

	Mean value (€)	Min (€)	Max (€)	SD	Variance
Reuse, Jeans	66.51	50	137	15.174	230.254
Remanufacture, Jeans	93.58	50	150	17.527	307.181
Recycle, Jeans	102.45	50	150	15.499	240.219

5. Discussion

5.1 General Analysis

This study explored consumer preferences for various EoL scenarios in the clothing industry, employing the Kano model for analysis. The study aimed to ascertain consumer preferences among EoL scenarios—namely, reuse, remanufacture, and recycle—for different types of clothing items (T-shirts, sweaters, jeans, and shorts). While research on circular fashion is expanding (Colucci & Vecchi, 2021), studies on consumer preferences towards EoL scenarios for clothing remain insufficient (Cao et al., 2022).

The Kano model analysis identified that attributes were categorized either as attractive or indifferent (Table 6). Specifically, out of twelve attributes, six were classified within the attractive category of the Kano model: remanufactured sweaters, recycled sweaters, recycled T-shirts, remanufactured jeans, recycled jeans, and recycled shorts. Attributes deemed ‘attractive’, positively influence customer satisfaction, and assessing customer satisfaction with EoL clothing products facilitated an investigation into consumer preferences (Atlason et al., 2017; Cao et al., 2022), making these six attributes more preferable to consumers. Results from hypothesis testing indicated that the ‘reuse’ option did not conform to the Kano model's attractive or one-dimensional categories for any of the clothing items examined. In contrast, the ‘remanufacture’ option significantly enhanced customer satisfaction for sweaters and jeans but had no such effect for T-shirts and shorts. The ‘recycle’ option, however, was consistently identified as either attractive or one-dimensional, thereby positively influencing customer satisfaction. Conversely, the remaining six attributes were placed in the indifferent category: reused sweater, reused T-shirt, remanufactured T-shirt, reused jeans, reused shorts, and remanufactured shorts. This indicates that consumers are neutral regarding these attributes,

meaning their presence or absence does not significantly affect product satisfaction. Consequently, these six attributes do not enhance consumer preference.

Moreover, occupying a higher tier on the R-ladder was not necessarily linked to increased customer satisfaction. The results revealed that the integral values of the six attractive attributes revealed that the remanufactured sweater held the highest appeal (0.177), closely followed by the recycled sweater (0.173), recycled jeans (0.168), recycled shorts (0.168), recycled T-shirt (0.161), and finally, remanufactured jeans (0.154). This indicates that recycling as a feature is attractive across all products, with the 'recycled sweater' being marginally more preferred.

Noteworthy is the finding that ‘recycle’ was deemed an attractive option across all clothing items analysed, despite its lower positioning on the R-ladder. This is in line with the study of Cao et al. (2022) which reveals that consumers prefer recycled products over second-hand products (Cao et al., 2022). Other studies highlight that perceived safety and quality of the product are the main reasons for the preference for recycled products (Magnier et al., 2019; Sun et al., 2018). Consumers’ preference for recycling over other circular strategies, such as reuse, can be attributed to the perceived environmental benefits and the simplicity associated with recycling processes (Arias & Trujillo, 2020). Recycling aligns with the growing environmental consciousness among consumers, who view it as a straightforward way to contribute to sustainability without compromising on product quality or experiencing the potential inconveniences associated with reuse or remanufacture (Kautish et al., 2019). This trend suggests that similar to the linear “take-make-waste” model which does not emphasize reuse (Esposito et al., 2018), consumers likewise de-emphasize it. This reflects a misalignment of consumer preferences with the principles of the circular economy, presenting a noteworthy insight and implication for stakeholders focused on circularity.

However, for the fashion industry to truly advance towards sustainability, there is a pressing need to embrace a broader range of circular options (Brydges, 2021). Strategies like reuse and remanufacture not only reduce waste and environmental impact more effectively by extending the life cycle of products but also challenge the industry to innovate in design, production, and consumption practices, thereby fostering a more holistic approach to sustainability (Geissdoerfer et al., 2017; Kirchherr et al., 2017). Moving towards these circular options is essential for minimizing the fashion industry's carbon footprint and achieving long-term environmental goals.

Another noteworthy finding is the apparent preference of the remanufactured sweater and jeans options over other remanufactured products like shorts and T-shirts. For the reuse and recycle EoL scenarios respondents seemed coherent across clothing products but seemed selective when it comes to remanufactured products. These differences between products might be explained by the research of Wang & Hazen (2016) that suggests that the durability and perceived longevity of products like sweaters and jeans might enhance their attractiveness when remanufactured (Wang & Hazen, 2016). Consumers might link these products with superior quality and enhanced sustainability characteristics, which resonate with their environmental principles and lower the perceived risks involved in purchasing them (Wang et al., 2020). Additionally, the aesthetic and functional qualities of jeans and sweaters might improve with age (Rahman, 2012), making them more desirable in a remanufactured state compared to T-shirts and shorts, which are often viewed as more casual and disposable, which might lead to a preference for newness in lighter wear items. Furthermore, the research conducted by (Xu et al., 2022) offers crucial observations on the attitudes of Chinese consumers towards second-hand clothing. The findings suggest that the COVID-19 pandemic has significantly raised awareness about health and hygiene, impacting choices related to second-hand clothing. This increased concern for hygiene might explain the overall preference for

recycling and specifically, why consumers show a preference for remanufactured jeans and sweaters compared to remanufactured T-shirts.

Given the evident preference for recycling and remanufacturing (sweater and jeans) as an EoL scenario in the clothing industry, further research is required to delve into the underlying motivations and barriers influencing consumer choices. Gaining a more profound understanding could inform the creation of strategies that more effectively encourage sustainable actions, such as reuse and remanufacture, alongside recycling.

5.2 Segmentation Analysis

In the general results, attributes were categorized as either attractive or indifferent. However, a more detailed Kano analysis across specific consumer segments showed variations in the weighting of the different options. Females demonstrated a preference for the EoL scenarios ‘remanufacture’ and ‘recycle’ for all types of clothing. In contrast, males exclusively showed a preference for recycling across all clothing items. Together, these insights suggest that products aimed at female consumers are more inclined to be directed towards positive EoL scenarios.

These findings are in line with previous research that shows that consumer preferences in sustainable fashion vary significantly between men and women, with each gender exhibiting distinct attitudes and behaviours towards sustainable clothing (Lai et al., 2017; Luchs & Mooradian, 2012). A study exploring consumers’ perceptions towards sustainable fashion in the UK found clear differences between male and female perceptions. Females appeared more inclined to follow sustainable fashion as a short-term trend, whereas males seemed more resistant to change, highlighting a need for improved communication strategies to align with demographic impacts on purchasing decisions (Lai et al., 2017). Moreover, it has been noted in the fashion sector that female consumers purchase more clothing items than males and show

a greater interest in fashion trends (Hageman et al., 2024). A study focused on exploring female consumers' attitudes and purchasing behaviour driven by sustainable business strategies of fast fashion companies revealed that female consumers are sustainably conscious and their purchasing behaviour is influenced, albeit unconsciously, by the sustainable initiatives of these companies (Hageman et al., 2024). The indifferent attitude of men towards fashion and sustainable fashion, in general, is reflected in the results of this study that reveal that men only perceive the recycling EoL scenario as 'attractive'.

However, both genders were indifferent towards the 'reuse' EoL scenario, signalling a deviation from earlier findings. The finding that both men and women exhibit indifference towards second-hand clothing contrasts with existing literature, such as the study by Guiot and Roux (2010), which suggests women are more inclined towards second-hand shopping, appreciating the uniqueness and value for money it offers (Guiot & Roux, 2010). Previous research also highlights the growing appeal of sustainable fashion practices among broader demographics, indicating a possible convergence in attitudes towards second-hand clothing among men and women as sustainability becomes a universal concern (McNeill & Moore, 2015). The observed indifference towards the reuse of clothing highlights a critical gap in our understanding of consumer behaviour in sustainable fashion, underscoring the need for further research into the underlying reasons for this apathy. Investigating these factors could reveal insights into potential psychological barriers, cultural influences, or misconceptions about product quality and sustainability benefits, providing valuable direction for developing strategies to enhance consumer engagement with reuse practices.

The distinct preferences between younger and older age groups regarding EoL scenarios in clothing, where younger consumers find all EoL options—reuse, remanufacture, and recycle—attractive, compared to older consumers who predominantly favour recycling,

underscore the generational shifts in sustainability values. This divergence aligns with the observations by Straughan & Roberts (1999), who posited that younger individuals tend to exhibit a broader acceptance of environmentally friendly practices, reflecting a more ingrained eco-consciousness possibly nurtured by increased environmental education and digital access to information (Straughan & Roberts, 1999). In contrast, the preference for recycling among older age groups may be attributed to a more traditional understanding of environmental action, focusing on waste reduction through recycling, as detailed by Gatersleben et al. (2002). This generational difference highlights the importance of nuanced approaches in promoting sustainable fashion, suggesting that younger consumers' openness to various sustainable practices could be leveraged through innovative campaigns that highlight the environmental and social benefits of reuse and remanufacture. Simultaneously, the apparent preference for recycling among older consumers indicates a need for continued education on the comprehensive benefits of broader circular economy principles, potentially shifting perceptions towards a more inclusive acceptance of sustainable consumption behaviours across all age demographics.

A more detailed examination reveals that higher education levels correlate with a greater inclination towards circular practices higher on the R-ladder. Respondents with a high school education significantly prefer the recycle EoL scenario across all product categories and seem indifferent towards reuse and remanufacturing, whereas respondents with higher education seem to also find the remanufacturing EoL scenario attractive, especially when it comes to sweaters. These results echo the findings of Grankvist et al. (2004), who suggested that individuals with higher education are more likely to engage in pro-environmental behaviour due to a better understanding of environmental issues (Grankvist et al., 2004).

Similarly, the impact of income on preferences towards recycled clothing highlights the economic considerations in sustainable consumption, as discussed by Laitala et al. (2015), who

found that income levels influence the perceived affordability and thus the attractiveness of sustainable fashion options (Laitala et al., 2015). However, when looking at the segmented results for income we see that the lower income groups find the ‘remanufacture’ EoL scenario attractive for more clothing products, compared to the higher income groups that only seem to prefer the remanufactured sweater. The segmented results for income show similarities to the segmented results for age, which could indicate that people in the lower income brackets, also tend to be younger, and therefore according to Straughan & Roberts (1999), exhibit a broader acceptance of environmentally friendly practices (Straughan & Roberts, 1999). These insights emphasize the necessity for fashion brands to consider educational and economic backgrounds when crafting messages and strategies to promote reuse, recycling, and remanufacturing. Tailoring communication and offerings to resonate with specific demographic segments can enhance the effectiveness of sustainability initiatives, encouraging a wider range of consumers to participate in more circular fashion consumption practices.

5.3 Willingness-to-Pay

The findings of this study, highlighting a distinctive consumer willingness-to-pay (WTP) for jeans under various EoL scenarios, resonate with prior research in the field of sustainable fashion. The results align with Michaud & Llerena (2011), who discovered that consumers frequently demonstrate a willingness to pay a premium for eco-friendly products, including those made from recycled materials (Michaud & Llerena, 2011). This is supported by the higher WTP for recycling jeans in our study, suggesting that consumers perceive recycled jeans as more valuable and are thus willing to pay a premium for them. This could be attributed to a growing awareness and concern for environmental issues, which enhances the perceived value of recycling (Wang et al., 2023).

Additionally, the preference for remanufactured jeans over reused ones, as indicated by the higher mean WTP for remanufactured jeans, echoes findings by Abbey et al. (2015). Their research suggested that remanufactured products could bridge the gap between new and used goods, offering a perception of added value through the remanufacturing process (Abbey et al., 2015). This is consistent with the findings of this study, where remanufactured jeans were valued more than reused jeans but less than recycled jeans.

The preference hierarchy observed in this study, with recycling jeans perceived as the most valuable, followed by remanufacturing and finally reuse, points to an intriguing insight into consumer perceptions of sustainability. It appears that the more transformative the EoL process, the higher the perceived value and WTP. This could be because recycling and remanufacturing are viewed as more extensive efforts to mitigate environmental impact compared to simple reuse, thereby commanding a higher price in the eyes of consumers.

While the findings of the WTP generally align with consumer preferences for EoL scenarios, indicating a WTP more for recycled jeans, they also underscore the necessity for further research into how WTP varies across different clothing products. Notably, the apparent consumer preference for remanufactured sweaters, consistent across various demographic factors, suggests that this preference may extend to a higher WTP for such products. Investigating the WTP for remanufactured sweaters could reveal nuanced consumer values and preferences, offering valuable insights into the fashion industry's sustainability practices. Such research could help in understanding whether the findings for jeans are indicative of a broader trend across clothing items or only specific to jeans.

5.4 Limitations

This thesis, while offering significant insights into consumer preferences for EoL scenarios within the fashion industry, encounters several limitations that must be acknowledged. The study's reliance on convenience sampling from Kuyichi Pure Goods customers may skew the results towards a demographic already predisposed to sustainable practices, potentially limiting the wider applicability of these insights. This narrow focus is further compounded by the selection of specific clothing items for analysis, which may not reflect the full spectrum of consumer behaviour across different types of clothing products.

Moreover, the thesis presupposes a direct correlation between consumer satisfaction with certain EoL scenarios and their preference for those options, potentially oversimplifying the multifaceted nature of consumer decision-making. Factors such as price, brand loyalty, and personal values, which might significantly influence consumer choices, were not fully accounted for in this assumption. The quantitative nature of the research, primarily through the use of the Kano model and WTP analysis, provides a structured understanding of consumer preferences. However, it may overlook the nuanced motivations and attitudes driving these preferences. Qualitative studies could complement this research by delving deeper into the reasons behind consumer choices regarding EoL scenarios.

Additionally, there are some limitations inherent to the Kano model and user survey that were utilized during this study. The binary nature of the model's classification system oversimplifies the complex spectrum of consumer emotions and reactions, potentially overlooking the nuances of customer feedback. The EoL scenario with the predominant number of endorsements for each garment was designated as the attribute perceived as most favourable by the group. This binary approach does not leave much room for interpretation meaning that for some EoL scenarios the difference in count between for example 'attractive' and

‘indifferent’ was minimal, but was designated to the highest group, nonetheless. The reliance on customer surveys for data collection also introduces the risk of bias, as responses may be influenced by the respondents' current mood or interpretation of the questions.

Lastly, the dynamic landscape of sustainability preferences, driven by changing societal norms, technological advancements, and growing environmental consciousness, means that the findings of this study, although pertinent at the time of research, may require periodic reassessment to remain relevant.

5.5 Recommendations for Further Research

In light of the findings and limitations identified in this study, several avenues for future research emerge. These recommendations are aimed at extending the understanding of consumer preferences for EoL scenarios in the fashion industry. Addressing these areas could significantly contribute to the development of sustainable practices and the successful implementation of circular fashion strategies.

5.5.1 Expand Sample Diversity

To ensure the findings are more generalizable to the broader population, future research should employ a stratified sampling technique. This approach would facilitate a more detailed examination of consumer preferences across a wider demographic spectrum, instead of only consumers of Kuyichi Pure Goods.

5.5.2 More Research into the Qualitative Aspects of Choosing Different EoL Scenarios

While quantitative data provides invaluable insights into consumer preferences and behaviours, qualitative research into the motivations and rationales behind choosing one EoL scenario over another could enrich our understanding of consumer decision-making processes. Investigating the qualitative aspects through interviews, focus groups, or case studies could

uncover the underlying values, attitudes, and emotional drivers that influence these choices. This research could reveal personal, societal, and contextual factors that sway consumer preferences towards reuse, remanufacture, or recycling options, offering deeper insights into how to effectively encourage sustainable consumer behaviours in the fashion industry.

5.5.3 Explore Additional Clothing Items

While this study provided valuable insights into consumer preferences for jeans, sweaters, T-shirts, and shorts, extending the scope to include other types of clothing items would enrich the understanding of EoL scenarios across different product categories. Future research could explore outerwear, formal wear, and accessories, among others, to provide a comprehensive view of consumer preferences for circular fashion.

5.5.4 Explore Willingness-to-Pay for Other Clothing Products

In addition to expanding the variety of clothing items studied future research should delve into consumers' WTP for other types of clothing within the context of EoL scenarios. This exploration should not only cover a broader range of apparel items but also investigate how the perceived value of these items, in terms of quality, brand, and sustainability features, influences WTP. Understanding these dynamics could offer insights into pricing strategies that could enhance the attractiveness of circular fashion options across different clothing categories.

5.5.5 Investigate the Impact of Information on Consumer Choices

There is a need to explore how the provision of detailed information regarding the environmental impact and the processes involved in reuse, remanufacture, and recycling influences consumer preferences. This could include examining the effects of transparency on consumers' WTP for EoL products and their overall perceptions of product value.

5.5.6 Assess the Effectiveness of Marketing Strategies

Evaluating different marketing strategies in promoting EoL products, especially those that have been remanufactured or are made from recycled materials, is crucial. Research in this area could identify effective communication techniques and promotional tactics that enhance consumer interest and acceptance of these products.

5.5.7 Conduct Longitudinal Studies

To capture the evolution of consumer preferences over time, conducting longitudinal studies is recommended. Such research could provide insights into how trends, awareness of sustainability issues, and changing societal values impact consumer behaviour towards EoL scenarios.

By addressing these recommendations, future research can significantly contribute to the advancement of sustainable practices in the fashion industry, promoting a shift towards more circular and environmentally friendly consumer behaviours.

5.6 Practical Implications

The findings from this research underscore the importance of understanding the complex implications of sustainability practices on both the business and policy fronts. This analysis is grounded in the empirical findings that demographic segments exhibit distinct preferences towards EoL scenarios, which in turn offers a strategic roadmap for tailoring sustainability initiatives. For example, women generally show a preference for EoL scenarios that are higher up the R-ladder hierarchy. Furthermore, the study indicates that younger consumers are more open to embracing a variety of EoL strategies—reuse, remanufacture, and recycle—unlike older groups, who tend to lean towards recycling. Deeper analysis also points to a positive correlation between higher education levels and a preference for circular practices further up the R-ladder. These distinctions highlight the critical need for businesses to

implement a targeted approach in their sustainability measures, ensuring alignment with the values and expectations of their specific customers. Adopting such a focused strategy not only boosts customer satisfaction but also amplifies the environmental benefits of these initiatives, driven by increased consumer engagement in preferred EoL activities.

Given the broad acceptance of recycling across various demographic groups, positioning recycling as the cornerstone of EoL strategies emerges as a pragmatic initial step. However, this focus on recycling should not overshadow the potential of reuse and remanufacturing options, which, although currently less preferred or understood, offer substantial environmental benefits. To elevate the role of reuse and remanufacturing in EoL scenarios, stakeholders should explore innovative methods to make these options more attractive and accessible. This includes developing incentives, but also guiding consumer preferences towards more sustainable choices by providing clear, accessible environmental impact information for products. By mandating the disclosure of the environmental footprint of products, policymakers can empower consumers to make more informed choices that align with the principles of the R-ladder. Such policy recommendations not only support environmental objectives but also promote a culture of accountability and sustainability within the industry.

Marketing strategies emphasizing the environmental advantages of sustainable EoL practices, especially when customized for different age groups, can significantly boost engagement. Utilizing digital platforms to highlight eco-friendly benefits appeals to younger demographics, while focusing on reliability and direct environmental gains resonates with older consumers. Integrating storytelling to illustrate the positive impact of consumer choices enhances engagement across all demographics.

6. Conclusion

This thesis provided valuable insights into consumer preferences for various EoL scenarios within the clothing industry, by critically examining the purchasing preferences for reused, remanufactured, and recycled clothing items. Through a stepwise process, including the selection of a representative sample, a comprehensive user survey, and a nuanced analysis employing the Kano model, this study has highlighted the attractiveness and indifference of certain EoL scenarios across different clothing types and demographic segments.

Remarkably, the study underscores that attributes classified within the attractive category—remanufactured sweaters, remanufactured jeans, recycled sweaters, recycled T-shirts, recycled jeans, and recycled shorts—demonstrate a positive impact on customer satisfaction, thereby illustrating a marked preference for these sustainable practices. This contrasts with the ‘reuse’ option, which did not align with the Kano model's categories of attractiveness or one-dimensionality across the examined items, suggesting an indifferent consumer perception towards reuse.

Further, the analysis delves into demographic variations, uncovering that female consumers show a stronger preference for ‘remanufacture’ and ‘recycle’ scenarios across all clothing types, whereas male consumers predominantly favour recycling. This gender-based divergence extends to generational differences, with younger consumers exhibiting openness to all EoL options, in contrast to older consumers who lean towards recycling. Additionally, the study links higher education levels to a preference for circular practices higher on the R-ladder, especially favouring remanufacturing for sweaters.

The study also explored consumer WTP for different EoL scenarios, particularly highlighting a preference for recycled jeans. This inclination towards recycled jeans over

reused or remanufactured options illuminates potential pathways for fashion companies to tailor their circular strategies effectively.

By delving into consumer preferences, this research paves the way for fashion companies to adopt more nuanced and effective circular strategies, ultimately contributing to the acceleration of the transition towards a circular economy in the fashion sector.

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Appendices

Appendix 1. Kano Survey

Dear participant,

Thank you for participating in this study. Your involvement greatly aids our research on consumer purchasing preferences for circular clothing products.

The survey takes approximately 5-10 minutes. Your answers are anonymous, and we follow the rules of the General Data Protection Regulation (GDPR) when we collect, use, and store them. You can stop participating at any time and erase your responses after completing the survey.

This research is conducted in conjunction with Kuyichi Pure Goods, a sustainable clothing brand. By filling in this survey, you get the chance to win 100 euros shopping credit at www.kuyichi.com. More information will be provided at the end of the survey.

If you have any questions or comments about this study, you may contact the researcher at Melati van Boven, m.l.vanboven@students.uu.nl.

By clicking the button below, you indicate your willingness to voluntarily take part in this study.

Thank you for your participation!

Demographics

1. What is your age?
2. What is your gender? Female/ Male/ Other / Prefer not to say
3. What is the highest degree or level of school you have completed? *If currently enrolled, highest degree received.*? No schooling completed / High school / Secondary vocational education (MBO) / University of Applied Sciences (HBO) / Bachelor's degree / Master's degree / PhD or higher

4. What is your annual income? Less than 10 000 euros / 10 000 to 20 000 euros / 20 000 to 30 000 euros / 30 000 to 40 000 euros / 40 000 to 50 000 euros / 50 000 to 100 000 euros / 100 000 to 200 000 euros / 200 000 euros or more / Prefer not to say

The following questions help us to understand your preference for different clothing products. Imagine considering buying the following clothing products that are either reused (second-hand), remanufactured (e.g., when jeans are cut up into pieces to form a new product such as a denim jacket), or recycled (e.g., jeans containing recycled fibres such as recycled cotton or recycled polyester).

With answers 1) I like it that way, 2) I expect it that way, 3) I am neutral, 4) I can tolerate it that way, and 5) I dislike it that way.

5. How would you feel about purchasing a *sweater* that has been previously worn by someone else?
6. How would you feel about purchasing a *sweater* that has **not** been previously worn by someone else?
7. How would you feel about purchasing a *sweater* that is made from parts of another clothing product?
8. How would you feel about purchasing a *sweater* that is **not** made from parts of another clothing product?
9. How would you feel about purchasing a *sweater* that is made from recycled materials?
10. How would you feel about purchasing a *sweater* that is **not** made from recycled materials?
11. How would you feel about purchasing a *T-shirt* that has been previously worn by someone else?

12. How would you feel about purchasing a *T-shirt* that has **not** been previously worn by someone else?
13. How would you feel about purchasing a *T-shirt* that is made from parts of another clothing product?
14. How would you feel about purchasing a *T-shirt* that is **not** made from parts of another clothing product?
15. How would you feel about purchasing a *T-shirt* that is made from recycled materials?
16. How would you feel about purchasing a *T-shirt* that is **not** made from recycled materials?
17. How would you feel about purchasing *jeans* that have been previously worn by someone else?
18. How would you feel about purchasing *jeans* that have **not** been previously worn by someone else?
19. How would you feel about purchasing *jeans* that are made from parts of another clothing product?
20. How would you feel about purchasing *jeans* that are **not** made from parts of another clothing product?
21. How would you feel about purchasing *jeans* that are made from recycled materials?
22. How would you feel about purchasing *jeans* that are **not** made from recycled materials?
23. How would you feel about purchasing *shorts* that have been previously worn by someone else?
24. How would you feel about purchasing *shorts* that have **not** been previously worn by someone else?
25. How would you feel about purchasing *shorts* that are made from parts of another clothing product?

26. How would you feel about purchasing *shorts* that are **not** made from parts of another clothing product?
27. How would you feel about purchasing *shorts* that are made from recycled materials?
28. How would you feel about purchasing *shorts* that are **not** made from recycled materials?

The following questions will help us understand your purchasing behaviour when it comes to environmentally sustainable products.

With answers on a 5-point Likert-scale 1 = strongly disagree, 5 = strongly agree.

29. I choose the environmentally sustainable alternative for products if one with a similar price is available.
30. I bring my own shopping bag to a store to reduce the use of plastic bags.
31. If I understand the potential damage to the environment that some products can cause, I do not purchase those products.
32. I don't buy a product if the company which sells it is environmentally irresponsible.

The following questions will give us insight into your willingness to pay for circular products. Imagine considering buying the following clothing products that are either reused (second-hand), remanufactured (e.g., when jeans are cut up into pieces to form a new product such as a denim jacket), or recycled (e.g., jeans containing recycled fibres such as recycled cotton or recycled polyester).

With slider from €50 to €100. Default set at €100.

33. Suppose you are considering buying jeans that cost 100 euros. Assuming no difference in performance and functionalities compared to new jeans, what is the price you would pay for jeans that have been previously worn by someone else?

34. Suppose you are considering buying jeans that cost 100 euros. Assuming no difference in performance and functionalities compared to new jeans, what is the price you would pay for jeans that are remanufactured?
35. Suppose you are considering buying jeans that cost 100 euros. Assuming no difference in performance and functionalities compared to new jeans, what is the price you would pay for jeans that are made from recycled materials?

We thank you for your time spent taking this survey. Your response has been recorded. If you are interested in participating in the raffle for a chance to win the 100 euros shopping credit at www.kuyichi.com, please click on this link.