

Research

Sustainable post-purchase behaviour of consumers of fashion textile products

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Abstract

Sustainable consumption is crucial for advancing the circular economy envisioned by the European Union in its Circular Economy Action Plan. This framework emphasizes that, alongside corporations adopting more sustainable production processes, consumers must also contribute to a sustainable future by altering their consumption patterns and lifestyles. A key aspect of consumer behaviour involves preferences for new versus second-hand products and actions taken post-purchase. To deepen understanding in this area, our research analyses consumers' sustainable post-purchase behaviours related to fashion (textile) products, focusing on the factors influencing their intentions to reuse, repair, and recycle. We conducted a representative survey of 500 residents in Budapest, Hungary, employing clustering techniques and structural equation modelling grounded in the Theory of Planned Behaviour (TPB). Our findings indicate that consumers who purchase second-hand fashion products are slightly more likely to engage in sustainable post-purchase activities. We identified and characterized four distinct clusters of fashion consumers based on their post-purchase behaviours. Moreover, we found that attitudes have a relatively minor influence on repairing and giving away old fashion items, whereas social norms and perceived behavioural control play a more significant role.

Keywords Sustainable post-purchase behaviour · Fashion industry · Motivation · Reuse · Repair · And recycling

1 Introduction

The fashion industry is among the most environmentally damaging sectors, consuming vast quantities of raw materials and generating significant harmful emissions. Over recent decades, the production and consumption of clothing have risen steadily, driven by global population growth and increasing incomes and living standards. [1]. Between 1975 and 2018, the annual per capita production of textiles worldwide grew from 5.9 kg to 13 kg [2] and the industry now generates over 92 million tons of waste and consumes 79 trillion litres of water annually [3]. The environmental impact of the textile industry is well-documented, with production processes such as mixing, carding, combing, stretching, and roving contributing to ecosystem degradation. These stages of production result in noise, air, water, and soil pollution while consuming vast amounts of natural resources [4].

As a result, companies can no longer ignore environmental concerns and must adopt innovative approaches to minimize waste, carbon emissions, and other harmful impacts on the natural environment [5]. Fashion companies have

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several strategies at their disposal, including reusing and recycling materials such as old garments, manufacturing scraps, bottles, and tires; promoting vintage and second-hand fashion; and leveraging efficient manufacturing techniques—both traditional and modern—such as advanced information technologies [6]. These strategies are increasingly being embraced within the fashion industry. For example, Levi's has implemented sustainable manufacturing processes, reducing water consumption by up to 96% [7]. Similarly, Patagonia has become a leader in sustainability by integrating material, relational, and discursive elements into its social and environmental practices. Its initiatives aim to enhance the flow of sustainable materials throughout its supply chain and the wider garment industry [8]. H&M, on the other hand, incorporates recycled materials into its products and adopts sustainable supply chain management practices, emphasizing ethical labour standards and responsible sourcing [7].

Despite these advancements, further progress is essential. Increasing the number of garments recycling facilities, expanding second-hand clothing stores, and adopting more environmentally friendly packaging solutions are critical steps to amplify the industry's sustainability efforts [9].

As fashion industries improve their production processes, supply chains, transportation, and other operations to benefit the environment [10], they also develop effective strategies to encourage sustainable consumption patterns among their customers. For example, Vătămănescu et al. [11] found that fashion companies' corporate social responsibility (CSR) strategies and reputations have a direct positive impact on consumers' inclination to purchase sustainable products.

As a result, in addition to focusing on manufacturing processes, it is crucial to consider the use phase of fashion products, which can involve a range of sustainable behaviours by consumers. This perspective is supported by Goal 12: Ensure sustainable consumption and production patterns of the United Nations Sustainable Development Goals [12], which emphasizes that reducing the impact of industrial processes is insufficient on its own; consumption also plays a critical role. Furthermore, the concept of the circular economy, advocated by the European Union and others, calls for systemic changes, including shifts in consumer behaviour [13]. Consumer behaviour related to sustainable consumption is often studied through examining new product purchases. However, the buying of second-hand products and consumers' post-purchase behaviours are equally important. According to Nittala & Moturu [14], post-purchase behaviour encompasses the use, evaluation, and disposal of products. While there is a wealth of research on fashion textile consumption, studies that specifically focus on the sustainability aspect of post-purchase behaviour in the fashion industry are scarce.

After exploring this research gap in more detail, our study focuses on gaining a deeper understanding of fashion consumers' motivations behind various sustainable post-purchase behaviours, including reusing, repairing, and recycling textile products. The primary research questions guiding this study are:

What are the characteristics of different consumer clusters based on their post-purchase behaviour of fashion products?

What factors influence consumers' sustainable post-purchase behaviour?

To address these questions, we present the findings of a survey conducted among fashion consumers in Budapest, the capital city of Hungary. The structure of the article is as follows: first, we review different types of sustainable post-purchase behaviours and the literature on consumer motivations for engaging in them. Next, we focus on the fashion industry, providing an overview of the literature related to post-purchase behaviour in this sector. We then present our hypotheses and research methods, followed by a discussion of the empirical survey results. Finally, we conclude with a summary of our findings and suggest directions for future research.

2 Literature review and hypotheses development

From small, local businesses, the fashion sector has evolved into a multi-billion-dollar global industry that caters to the diverse needs of over 8 billion people worldwide. Fashion (clothing) is one of the fastest-growing industries, where competitiveness hinges on constant innovation in both engineering solutions and business models. One such model, fast fashion, has emerged to deliver affordable clothing to the masses, but at a significant societal cost. It has been widely criticized for its unsustainable practices—both environmentally and socially—due to the production of low-quality, non-durable products sold at exceptionally low prices [15, 16]. Fast fashion is characterized by its focus on producing short-lived products, often made from inexpensive materials, and manufactured under poor working conditions, with workers receiving low wages [15]. By shortening production times and streamlining supply chain processes, fast fashion increases the profitability of businesses involved [17].

While fast fashion threatens to overshadow traditional fashion, several alternatives, such as slow and sustainable fashion, have emerged to counter its negative societal impacts. According to Štefko and Steffek [18], traditional fashion informs consumers about the finished product and its origins, while slow fashion emphasizes the heritage of the product and the methods used in its creation. Slow fashion goes beyond following trends, viewing clothing as a form of self-expression. It can also be seen as a subset of traditional fashion, which prioritizes long-lasting processes and often uses recycled or organic materials.

Fast fashion ultimately results in large amounts of waste and harmful emissions. In addition to slow and traditional fashion, purchasing second-hand products [19] and extending the life cycle of garments through reuse, repair, and recycling are crucial strategies to mitigate these environmental issues [20]. Herjanto et al. [20] note that the trend of buying second-hand fashion products is growing annually, and global demand for second-hand clothing is expected to double in the coming years. Nevertheless, our understanding of consumer behaviour and the factors influencing these sustainable practices remains limited in this important area.

2.1 Motivations to reuse, repair, and recycle products

According to Mohr et al. [21], responsible consumer behaviour involves acquiring, using, and disposing of products in ways that minimize or eliminate negative effects while maximizing their long-term positive impact on society. Research on reusing, repairing, and recycling products to extend their lifespan has gained increasing attention due to its potential to reduce waste, conserve resources, and promote sustainability. Reuse and repair are highly effective strategies for extending a product's lifespan and minimizing the need for new materials. These practices offer significant environmental and economic benefits by reducing the need to extract, process, and transport raw materials [22] and align with the principles of the circular economy.

Among the factors motivating product reuse, Nalewajek & Macik [23] identify the desire for self-expression, individuality, and creativity as primary drivers, with environmental concerns often serving as secondary motivators in consumer decision-making. Saving money is another significant factor. For example, Joung & Park-Poaps [24] found that economic considerations strongly influenced reuse behaviour, as consumers are motivated by the potential for cost savings.

Simpson et al. [25] discovered that two psychological tendencies—frugality and attachment—increase the likelihood of retaining products. They also noted that emotional satisfaction and infrequent product use can reduce ownership and lead to the disposal of items that could otherwise be reused. Schifferstein & Zwartkruis-Pelgrim [26] explain that product attachment refers to a consumer's emotional bond with a product, such as a car. When consumers form stronger attachments to products, they are more likely to care for and reuse them. Additionally, other motivational factors, such as psychological bonds with products, can further encourage reuse behaviour [27], offering consumers both benefits and enjoyment while reinforcing their self-identity [28]. Reusing items can also strengthen social bonds, fostering feelings of love and connection among family and friends. For example, the joy of seeing children wear clothing that carries cherished memories from relatives or one's own childhood highlights how used goods can deepen human relationships [29].

According to Musova et al. [30], environmentally conscious consumers are more likely to engage with and support circular solutions. McLaren et al. [31] emphasize that product repair is a key strategy for promoting waste reduction and enhancing resource efficiency in many countries. Trust, care, and attachment are crucial factors that drive repair behaviours. Additionally, repairing and updating products adds value, fosters social creativity, strengthens community ties, and encourages resistance to consumerism. A survey by Borthakur & Govind [32] found that low-income groups are particularly inclined towards repair, with 93.7% of respondents expressing a desire to extend the lifespan of their products. This motivation arises from a need to maximize the utility and longevity of possessions, ultimately saving money. According to K. Laitala et al. [33], repairing items instead of replacing them is often more cost-effective, especially for individuals or households managing tight budgets or seeking to reduce overall expenses. However, low prices and poor quality of new products represent significant barriers to repairing old items.

Repairing products offers benefits both for the environment and consumers. Scott & Weaver [34] argue that extending a product's lifespan through repair is an often-overlooked opportunity to improve both consumer well-being and environmental quality. Motivations for repair decisions, therefore, merit further exploration. In their development of a repair propensity scale, they identified three key factors influencing the willingness to repair: market factors (such as repair inconvenience and trust in repair efficiency), product factors (including replacement cost, initial item cost, and attachment), and consumer factors (such as environmental concern, frugality, product retention, innovativeness, and education). According to McNeill et al. [35], individuals who prioritize fashion tend to dispose of clothing items more quickly and with less consideration for their environmental impact. Paradoxically, these same consumers are often

motivated to repair items that align with their sense of style. This suggests a complex relationship, where fashion-conscious individuals may demonstrate contrasting behaviours toward consumption and repair, with style preferences and aesthetic values playing a significant role.

Terzioğlu [22] developed a model of repair motivation and barriers to identify the underlying factors influencing consumer behaviour. He identified three key aspects of repair: technical, value, and emotional. Technical aspects encompass the required skills, knowledge, time, and effort, as well as the availability of materials and the need to address design issues. Value aspects include the functional, aesthetic, and symbolic value of the item, as well as financial considerations. Emotional aspects involve feelings of attachment, perceived pleasure and interest in the repair process, and environmental concerns.

Another key sustainable post-purchase practice is recycling behaviour. Miafodzyeva et al. [36] found that a significant portion of the population lacks strong awareness about the separate collection of household waste for recycling purposes. According to Berglund [37], legal norms and personal attitudes are crucial in motivating individuals to engage in recycling, whereas social approval and financial incentives are less influential. He concluded that policies, regulations, and individual beliefs are essential drivers in encouraging recycling practices among the population. Research by González-Torre & Adenso-Díaz [38] shows that individuals who regularly dispose of general waste are more likely to recycle certain products at home.

Additionally, as the distance to recycling facilities decreases, the number of waste categories that citizens separate and collect at home increases. Both economic and moral motivations influence recycling rates in households. Convenience is a particularly important factor, as the presence of collection points close to residences in multi-family housing complexes leads to higher recycling rates [39]. Other motivations for recycling include individual commitment, intrinsic satisfaction [40], self-efficacy [41], conservation practices and knowledge [42], government regulations [43], and environmental awareness [44]. Table 1 summarizes the key studies on the motivations behind post-purchase behaviour for non-textile products.

In summary, recent research has highlighted various motivations behind consumers' engagement in reuse, repair, and recycling activities for different types of products. Reuse behaviour is primarily driven by cost-saving intentions and psychological satisfaction [45]. Repair practices are influenced by factors such as product quality, cost considerations [33], and environmental benefits [34]. Positive recycling behaviours are shaped by ecological awareness [46], personal satisfaction [47], economic incentives [48], and the availability of convenient disposal facilities [49]. Based on these findings, it can be concluded that psychological factors are more strongly associated with reuse than with repair and recycling, where other factors, such as cost and convenience, play a larger role. Nevertheless, financial considerations remain an important motivator across all three activities.

2.2 Motivations of sustainable post-purchase behaviour in the fashion industry

The fashion textile industry plays a crucial role in the economic and social development of many countries. According to Keane & Te Velde [50], the textile and clothing industries are of significant economic and social importance both in the short and long term. In the short term, they contribute to revenue generation, employment (particularly for women), and foreign exchange earnings, while in the long term, they offer nations the opportunity for sustained economic growth.

As a result, researchers have increasingly focused on promoting more sustainable lifestyles by examining the sustainability aspects of fashion textile consumption. Over the past 15 years, there has been a notable rise in research output regarding the post-consumer behaviour of fashion products [51]. Consumer purchasing behaviour typically unfolds in five stages: need identification, information search, evaluation of alternatives, purchase, and post-purchase behaviour. As noted by Mugge et al. [52], post-purchase behaviour is a critical phase where consumers assess their satisfaction with the purchase and determine their attachment to the product.

Reusing, repairing, and recycling textile products can manifest in various ways. Reuse may involve repurposing items for the same or different uses, passing garments to family or friends, donating to charity, or selling them as second-hand items. Repairs can be performed by the original owner or through professional repair services, and recycling occurs through multiple avenues. Upcycling plays a vital role in sustainability by transforming materials that would otherwise be discarded into new products, thereby extending the lifespan of fashion items [53]. These behaviours are influenced by a range of factors, some of which have been explored to varying extents in the existing literature (see Table 2).

Joung & Park-Poaps [24] identify economic factors as key motivators for reuse and resale behaviour, while convenience drives discarding behaviour. Family subjective norms also influence environmentally motivated resale and donation

Table 1 Summary of key publications regarding the motivation to reuse, repair, and recycle (non-textile)

Activities covered	Scope	Motivations, other conclusions	Authors
Reuse motivations of electronic devices (e.g., computers)	Australia, in-depth interviews with consumers of college-level education	Psychological ownership and attachment, the usefulness of using products by extension, and frugality influence reuse behaviour	Simpson et al. [25]
Reuse and recycling patterns and motives of radio, TV, newspapers, and books	Mexico, direct observations of middle-sized families	Conservation practices and knowledge influence reuse and recycling behaviour. Higher-income people can store more (the higher their earnings, the higher their ability to build storage to keep items but less influence on recycling behaviour)	Corral-Verdugo [42]
Motivations to repair household appliances	Norway, a survey of household consumers aged 18–80	Better quality of products, price, availability of repair service and accessibility of user manuals motivates repair behaviour	Laitala et al. [33]
Consumers' motivation to repair (e.g., technological and modern materials)	UK and Sweden, semi-structured interviews with simple random sampling, purposive sampling of consumers who are interested in repair	Environmental concerns and economic benefits motivate consumers. Three aspects (technical, value, and emotional) influence repair motivations. However, some factors, such as socio-economic perception, lack of knowledge and skills, and time and effort, are barriers to repair behaviour	Terzioğlu [22]
Motivational factors toward recycling (household garbage, e.g., solid waste)	Malaysia, interview survey of households of urban residential areas	Intrinsic satisfaction and individual commitment influence recycling behaviour the most. Awareness and education on waste management and recycling are needed to overcome the solid waste crisis	Aini et al. [40]
Motivations and frequency of household recycling	Spain, interviews and surveys of random consumers in the street in the northern region	Environmentally conscious consumers are more interested in recycling if bins are near home	González-Torre & Adenso-Díaz [38]
Recycling motivation of packaging waste (i.e., paper, glass, plastic, and metal)	Sweden, a survey of random households in four different Swedish municipalities	Economic and moral motives, the convenience of bins motivates recycling	Hage et al. [39]
Determinants of recycling behaviour of waste materials: paper/card, plastics/ cans, and glass	Spain and USA, university students	Environmental knowledge, altruistic motivation, and actual and perceived knowledge increase motivation	Izagirre-Olaizola et al. [44]

Table 2 Summary of key publications regarding the motivation to reuse, repair, and recycle textile products

Activities covered	Scope	Motivations to reuse, repair, and recycling	Authors
Motivations of post-consumer textile waste management	Review articles from 1995 to 2021	Convenience and conditions of clothing influence consumers' disposal behaviour, whereas environmental concerns results in positive attitude towards recycling	Abdallah et al. [51]
Factors influencing clothing disposal behaviour	USA, a survey of a representative sample of college students	Economic concerns, environmental concerns, family subjective norms	Joung & Park-Poaps [24]
Post-consumer textile waste and disposal	Florida, USA, a cross-sectional study of publicly available data from 2014 to 2019	Higher incomes, more residential segregation, and more clothing stores have an influence	DeVoy et al. [64]
Drivers influencing reuse and recycling of textile products	Canada, online survey of consumers (residents of Ontario)	Fashion consumers reduce textile disposal and engage more in reuse and recycling	Weber et al. [56]
Repair behaviour of fashion-sensitive consumers of clothing products	Canada, New Zealand, and the USA, cross-sectional online survey of adult consumers	Higher-educated male consumers are more interested in repair than female consumers and pro-environmental practices encourage fashion-sensitive consumers to engage in clothing repair	Potdar et al. [60]
Reuse and recycling behaviour of textile consumption	USA, self-administered online survey of college students	Media sources, education, subjective norms	Noh [63]
Consumers' clothing disposal behaviour	China, questionnaire survey of Nanjing citizens	Perceived usefulness, attitude, perceived behavioural control, and subjective norms	Zhang et al. [62]
Circular fashion consumption	Middle East, Iraq	New raw materials with lower environmental impact contribute to circular fashion and sustainable solutions. Therefore, those materials must be used to reuse and recycle clothing	Shirvanimoghaddam et al. [1]
Repair behaviour	Hull City Council, UK Questionnaire survey in the university	Higher education, environmental responsibility, women consider more repair	Rogers et al. [58]
Reuse and recycling of clothing	Sweden, a qualitative research approach of stakeholders and consumers	Information and education, cooperation of charity organizations, and developing technology motivate the reuse and recycling of textiles. For instance, a smartphone app can be created that shows the location of the closest recycling centre or charity shop	Ekström & Salomonson [66]
Motivations of consumers' social recycling	Turkey, online and offline survey of consumers	Altruism, the satisfying feeling of generosity	Öztürk & Şahin [67]
Motivations for second-hand clothing	Norway, a representative sample of Norwegian consumers	Uniqueness and style, environmental, and economic reasons influence reuse	Laitala & Klepp [65]
Motivations toward sustainable disposal and reuse of textiles	Bangladesh, survey of consumers from various regions	Economic factors have an influence. Other factors include environmental concerns, interest in donating, etc	Urmi et al. [54]
Consumers' clothing disposal behaviour	Norway, survey of young women and students	Convenience, donation, gifts to friends	Laitala [55]

behaviours. Donation is an important form of post-purchase behaviour. For example, Urmi et al. [54] found that in Bangladesh, donating clothes to others is the most popular method for sustainably disposing of used garments, followed by reuse, recycling, and reduction. Laitala [55] highlights that many consumers discard clothing due to space limitations and prefer donating items for reuse rather than simply throwing them away. This behaviour is largely driven by convenience. Abdallah et al. [51] also observed that the convenience and condition of clothing items significantly impact disposal decisions, with environmental concerns primarily motivating recycling behaviours.

Post-purchase behaviour varies among consumers. A survey by Weber et al. [56] found that consumers with a high fashion index (fashion consumers) dispose of textile waste differently from those with a low fashion index (non-fashion consumers). While most participants either donated or discarded unwanted clothing, fashion consumers were more likely to use alternative disposal methods, such as reselling, swapping, and participating in take-back programs. Domina & Koch [57] observed a direct link between the frequency of clothing donations and factors like being a young adult or married. They also noted that resale rates were higher among younger consumers and tended to decline as educational levels increased.

Gender also plays a role in repair behaviour, with men generally more inclined to repair tools or cars, while women are more likely to engage in garment repairs. These preferences reflect traditional gender roles and societal expectations about skills and interests related to different types of repair [58]. Research further suggests that women take on a larger share of responsibilities in the post-consumer phase of fashion consumption [55]. For instance, McQueen et al. [59] found that women in Norway were more likely to repair their garments themselves, whereas men were more inclined to seek assistance. Potdar et al. [60] also noted that more educated consumers showed greater interest in repair, and women were more engaged in surveys about textile disposal and recycling [61]. Zhang et al. [62] explored how age, income, and gender influence clothing obsolescence, defined as consumers ceasing to wear or rarely wearing certain items. Their findings revealed that women and younger individuals experience clothing obsolescence more frequently, while those with lower incomes tend to hold on to their clothing for longer periods. College students develop a more positive attitude toward sustainable post-purchase behaviour when exposed to information about reuse and recycling through media sources [63].

Information, education, and the initiatives of charitable organizations play significant roles in motivating consumers to reuse their products. DeVoy et al. [64] examined the link between educational attainment, income, and textile waste generation, finding that individuals with higher education and income levels tend to produce more textile waste per person. Laitala & Klepp [65] concluded that both economic and environmental considerations influence the decision to reuse textile products. They also found that the appeal of unique items and specific styles affects the decision to purchase second-hand clothing. Using a network approach, Ekström & Salomonson [66] highlighted the critical role of various stakeholders—such as charitable organizations, government bodies, and technological support—in motivating recycling by collecting used products.

According to Shirvanimoghaddam et al. [1], recycling clothing items can serve as a sustainable solution by reducing solid waste. To support this, the use of raw materials with lower environmental impact, such as bamboo, hemp, and natural dyes, should be prioritized during the manufacturing process. Additionally, social recycling—offering unused products to others for free—can further contribute to sustainability [67]. Öztürk et al. also highlight that altruism and the sense of satisfaction from generosity play a significant role in motivating recycling behaviour, alongside other socio-economic benefits [68].

Table 2 presents key publications on post-purchase behaviour of fashion textile consumption.

Our review of the literature reveals that various factors influence consumers' post-purchase behaviour of fashion products. However, there is no consensus on which factors are the most important or their relative significance. Many studies are constrained by sample characteristics, as they often focus on specific social groups, such as university students, limiting the broader applicability of the findings. To address this gap, we have formulated several research hypotheses regarding the post-purchase behaviour of fashion consumers.

Building on the findings of Weber et al. [56], which indicate that fashion consumers tend to handle textiles more sustainably than non-fashion consumers, we propose the following hypotheses:

H1: Fashion consumers who purchase second-hand products engage in sustainable post-purchase behaviours more frequently than those who do not or rarely purchase such products.

H2: Fashion consumers can be categorized into distinct clusters based on their sustainable post-purchase behaviours.

Additionally, we applied the Theory of Planned Behaviour (Ajzen [69]) to formulate research hypotheses related to two specific post-purchase behaviours: repairing and giving away fashion products. Based on the work of Izaguirre-Olaizola et al. [44] and Mugge et al. [52], we propose our third hypothesis:

H3: Environmental knowledge positively influences environmental attitudes regarding fashion products.

While attitude has been explored as a key determinant of post-purchase behaviour, the findings are not entirely consistent. Drawing from the studies of Young et al. [70], Abelson [71], and Nadro et al. [72], we define the following hypotheses regarding attitudes and perceived behavioural control:

H4a: Attitude positively influences the intention to repair fashion products.

H4b: Attitude positively influences the intention to give away unwanted fashion products.

H5a: Perceived behavioural control positively influences the intention to repair fashion products.

H5b: Perceived behavioural control positively influences the intention to give away unwanted fashion products.

Finally, building on the research by Joung & Park-Poaps [24], which found that subjective norms influence behaviours such as reselling and donating, and Lang and Armstrong [73], who revealed a positive correlation between subjective norms and the intention to adopt sustainable clothing product-service systems, including clothing repair, we propose the following hypotheses regarding subjective norms:

H6a: Subjective norms positively influence the intention to repair fashion products.

H6b: Subjective norms positively influence the intention to give away unwanted fashion products.

Figure 1 illustrates the research's conceptual model, which is based on the Theory of Planned Behaviour.

3 Material and methods

To assess our research hypotheses, we conducted a representative survey of the citizens of Budapest, Hungary, a European capital with a vibrant fashion scene. The quantitative survey was designed to reflect the demographic composition of Budapest, including age, gender, education, income, occupation, and city districts. We employed a random sampling strategy and reached 500 citizens through telephone interviews conducted in December 2021. After addressing missing values and cleaning the data, we retained 452 responses for detailed analysis. Table 3 presents the demographic characteristics of the sample.

The questionnaire was designed to examine both the initial purchase and post-purchase behaviour of fashion product consumers. It included questions about the types of textile products purchased (new and/or second-hand), the factors influencing these purchases, and the determinants of various sustainable post-purchase behaviours, such as reusing, repairing, and recycling textile products.

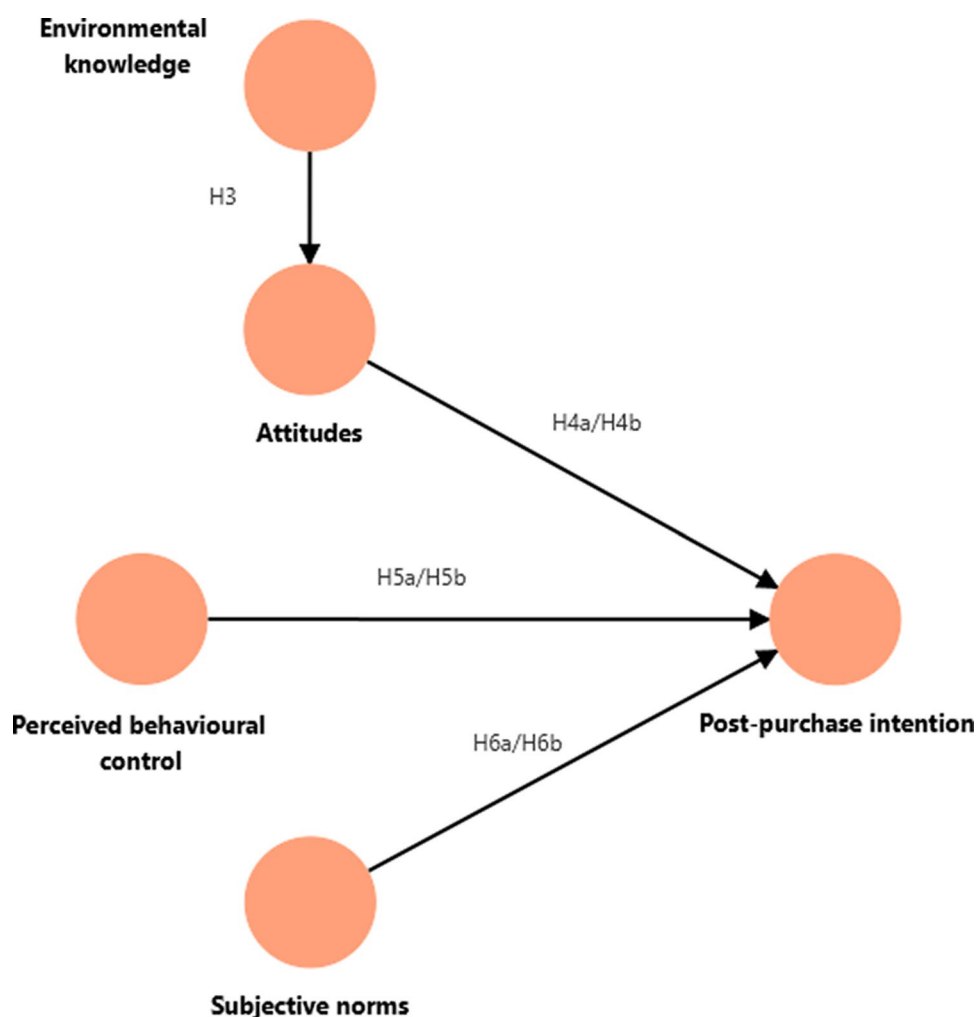
Our database provided valuable insights into fashion consumers' behaviour. Initially, we applied descriptive statistical methods to characterize the sample. Next, we aimed to identify and describe distinct consumer groups using clustering techniques, which are effective tools for understanding consumer behaviour [74]. We employed both hierarchical and K-means clustering methods, followed by post-hoc analyses (Welch's test and Games-Howell test) to validate the clusters. Finally, correlation analysis was used to further characterize the clusters. To identify the key factors influencing post-purchase behaviour, we developed a model based on the Theory of Planned Behaviour and analysed our data using SMART PLS (Ringle et al. [75]).

The various research methods employed throughout the study are illustrated in Fig. 2. Detailed information on each step of the research process, along with the results, is provided in the following section.

4 Results

4.1 Patterns of purchase and post-purchase behaviour of fashion consumers

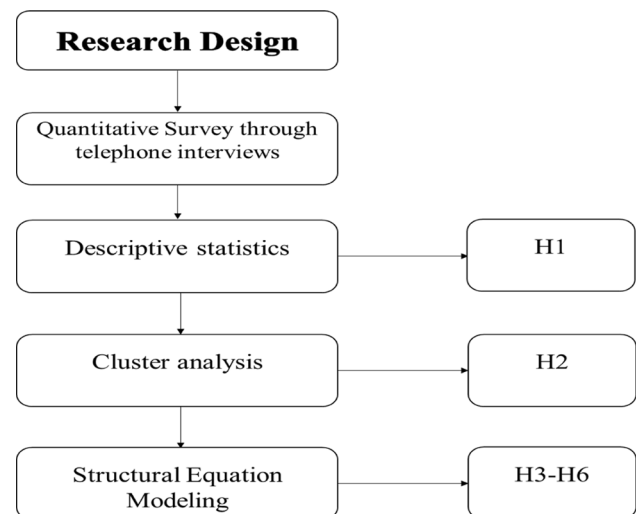
Figure 3 illustrates the respondents' initial purchase behaviour, categorizing the frequency of purchases of new and second-hand textile products over the course of a year.

Fig. 1 The research model using the Theory of Planned Behaviour**Table 3** Demographic profile of the respondents (N = 452)

Variable	Frequency	%	Variable	Frequency	%
Gender			Age		
Male	209	46.2	16–29	96	21.2
Female	243	53.8	30–44	130	28.8
Education			45–59	100	22.1
Lower than the 8th grade of primary school	1	0.2	Over 60	126	27.9
Primary school 8th grade	17	3.8	Monthly Income per capita (EUR)		
Secondary school without a high school diploma, with professional qualification	40	8.8	< 250	39	8.7
High school diploma	216	47.8	250–500	166	36.7
College or bachelor's degree	71	15.7	500–750	106	23.4
University or master's degree	98	21.7	750–1000	37	8.2
Postgraduate training (doctoral degree)	9	2.0	> 1000	60	13.3
			Don't know/don't answer	44	9.7

Regarding annual spending on new and used textiles, 87.8% of respondents spend less than EUR 500 on new products, while 58.8% spend the same amount on second-hand items. A typical consumer (40.3% for new and 48.2% for used products) spends less than EUR 125 per year on textiles. Notably, 1.8% of respondents do not purchase any new

Fig. 2 Research methods and respective research hypotheses



products, and 41.2% do not purchase used items. These figures indicate that, in Budapest, consumers still prefer new products over second-hand ones.

When categorizing purchase frequency into three groups (frequently, sometimes, and never), the data reveals that purchasing new and second-hand garments is associated with age, gender, occupation, and education. However, no significant relationship was found between purchasing new or second-hand garments and income or residential location. Although the relationships are generally weak to moderate, younger consumers, females, and those with a diploma tend to buy new garments more frequently than others. Additionally, retired individuals purchase significantly fewer items than those with employment. These findings are summarized in Table 4.

The questionnaire examined six different types of sustainable purchase behaviours. The results indicate that purchasing durable products is the most commonly practiced behaviour related to sustainability, followed by the preference for repairable goods and products made from environmentally friendly materials or recyclable items (see Fig. 4). On the other hand, products that are responsibly manufactured and those made from recycled materials are less popular among the respondents.

Some demographic variables are associated with different manifestations of sustainable purchase behaviour. Women are more likely than men to buy goods made from environmentally sound materials (Cramer's V significant at <0.05 , value: 0.157), products made from recycled materials (Cramer's V significant at <0.05 , value: 0.166), and items that are repairable

Fig. 3 Frequency of initial purchase of new and second-hand textile products (%)

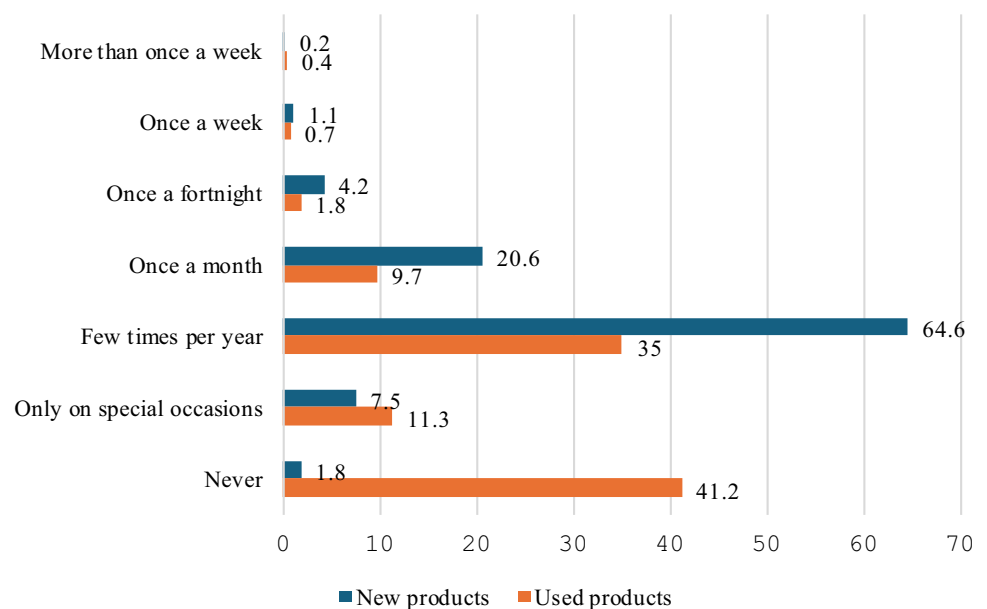


Table 4 Relationship between initial purchasing behaviour and demographic characteristics (values of Cramer's V)

Demographic variable	New	Used
Sex	0.120*	0.206***
Age	0.251***	0.161***
Occupation	0.271***	0.225*
Education	0.134*	0.115*
Income	–	–

Significance levels: *: < 0.05, **: < 0.01, ***: < 0.001

(Cramer's V significant at < 0.05, value: 0.161) or recyclable (Cramer's V significant at < 0.05, value: 0.160). However, there is no significant relationship between gender and the purchase of responsible or durable products.

Middle-aged and older respondents are more likely to purchase goods made from environmentally sound materials compared to younger individuals (Cramer's V significant at < 0.01, value: 0.152). However, none of the other sustainable purchase behaviours show a significant relationship with age. Additionally, education, place of residence within the city, and income do not significantly influence sustainable purchase behaviours.

As shown in Fig. 5, the determining factors for purchasing new and second-hand garments are similar. Interestingly, most factors are rated lower for second-hand purchases, possibly reflecting respondents' lower expectations for second-hand products. The most notable difference is in the expectation of a product guarantee, with second-hand buyers generally not expecting a guarantee to accompany their purchases.

The survey measured a number of sustainable post-purchase behaviours by asking respondents how much they display each behaviour (Fig. 6). Using products as long as possible tops the list, followed closely by using unwanted products for another purpose and donating garments to a charity. Interestingly, respondents also keep their garments for a long time despite not using them.

The association between demographic parameters and sustainable post-purchase behaviours is demonstrated in Table 5. While the place of living, occupation and income is not associated with sustainable post-purchase behaviours, there is a clear difference between the behaviour of the two sexes: there is a slight tendency showing that men use their fashion products for longer periods of time. However, women give away unwanted products to family and friends more often, donate them to charity and repair them themselves. However, having used products repaired and taking them to recycling facilities does not distinguish the two sexes.

Age is associated only with two post-purchase behaviours, namely the length of use and having garments repaired: younger and middle-aged people tend to keep their garments for longer periods of time, and middle-aged people tend to have their garments repaired more often than other age groups. The level of education is only associated with how long people keep their garments: those with a university degree tend to keep their garments for longer periods of time.

Our research examined whether buyers of new and second-hand products behave differently during the post-purchase phase. We hypothesized that buyers of second-hand fashion products are more environmentally conscious, which would, in turn, lead to more sustainable post-purchase behaviour. Table 6 demonstrates the relationship

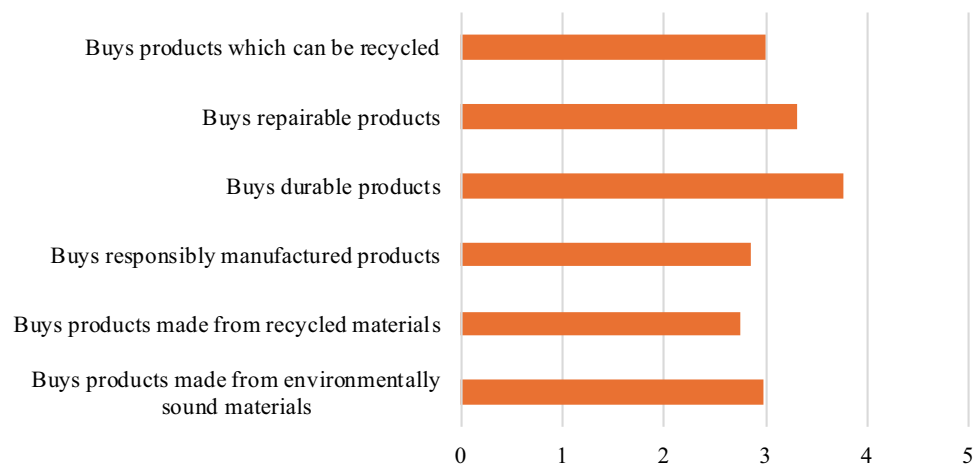
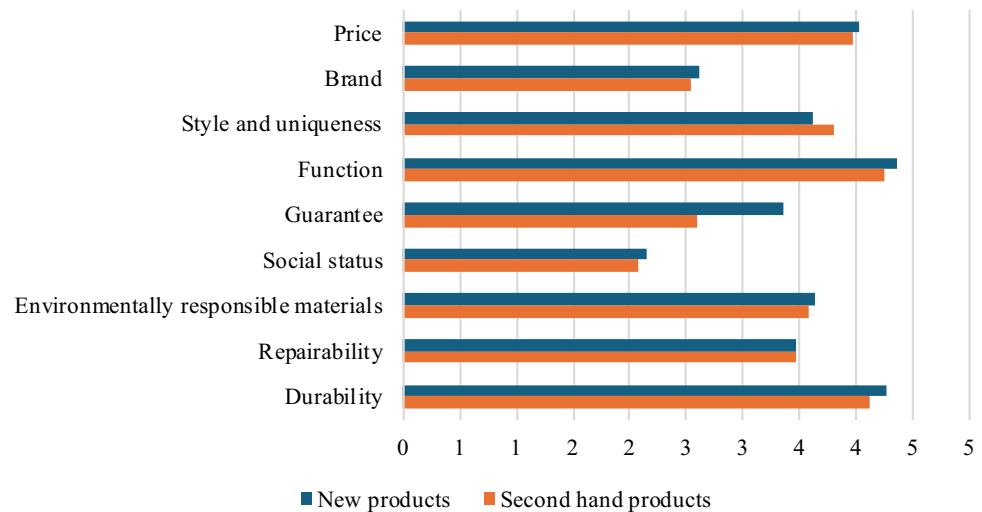
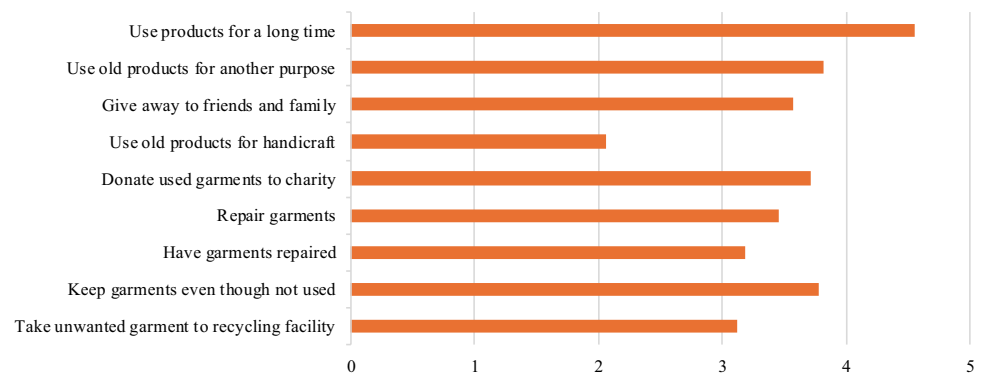
Fig. 4 Engagement in different sustainable purchase behaviours (average values, 1: not at all, 5: very much)

Fig. 5 Determining factors of new and second-hand product purchases**Fig. 6** Importance of sustainable post-purchase behaviours (average values)**Table 5** The association between demographic parameters and sustainable post-purchase behaviours

Demographic variable	Use for long time	Give away to friends	Donate to charity	Repair	Have repaired	Take to recycling facility
Sex	0.151*	0.288***	0.182**	0.202***	–	–
Age	0.142**	–	–	–	0.127*	–
Education	0.153*	–	–	–	–	–

Significance levels: *, < 0.05, **, < 0.01, ***, < 0.001

between initial purchase behaviour and post-purchase behaviour. Values provide the strength of correlation between the frequency of new and second-hand purchases and post-purchased behaviour assessed.

Table 6 demonstrates that the relationship between the purchase of new fashion products and selected post-purchase behaviours is either missing or is rather weak. Only the behaviours ‘giving away to friends and family’, ‘donating to charity’ and ‘repair’ increase with increased purchasing frequency. While the relationship between the frequency of purchasing second-hand garments and sustainable post-purchasing behaviours is still rather weak in most cases, the relationship is stronger than in the case of new garment purchases. Those who buy second-hand garments more often tend to give away, use for handicrafts, repair and donate their clothing items more often than those who do not buy second-hand garments.

Table 6 Relationship between initial purchase behaviour and post-purchase behaviour (values of Cramer's V)

Post-purchase behaviour	New fashion products	Second-hand fashion products
Use products for a long time	–	–
Use old products for a different purpose	–	–
Give away to friends and family	0.107*	0.201***
Use old products for handicraft	–	0.171***
Donate used garments for charity	0.099*	0.152**
Repair garments	0.108*	0.135*
Have garments repaired	–	–
Take unwanted garment to recycling facility	–	0.131*

Significance levels: *: < 0.05, **: < 0.01, ***: < 0.001

4.2 Clusters of fashion consumers regarding sustainable post-purchase behaviour

To better understand the characteristics of consumers engaging in post-purchase behaviour, we carried out cluster analysis using the variables describing actual post-purchase behaviour. Romesburg [76], describes cluster analysis as a technique used to identify and group similar objects. Three out of the nine post-purchase variables, namely 'use products for a long time,' 'use old products for handicraft,' and 'keep garments even though not used,' did not differentiate fashion consumers considerably. Thus, clusters of consumers were sought after using the remaining six variables: 'use old products for another purpose,' 'give away to friends and family,' 'donate used garments to charity,' 'repair garments,' 'have garments repaired' and 'take unwanted garments to a recycling facility.'

First, we carried out hierarchical cluster analysis (Ward method), which indicated that two or four clusters of consumers may be identified. K-means cluster was then applied to create and assess the two and four clusters, respectively. The 4-cluster solution turned out to be superior both statistically (higher Eta-squared for each variable) and regarding the interpretation of the resulting clusters, and it was thus retained for further analysis. Post-hoc analysis (Welsch test and Games-Howell test) showed that not all, but most, cluster means were significantly different (see Fig. 7).

Interpreting the four clusters based on their means according to the cluster variables resulted in the following clusters:

Cluster 1: *Non-engaged fashion consumers*: low score in each post-purchase category.

Cluster 2: *Committed fashion consumers*: high score in each post-purchase category.

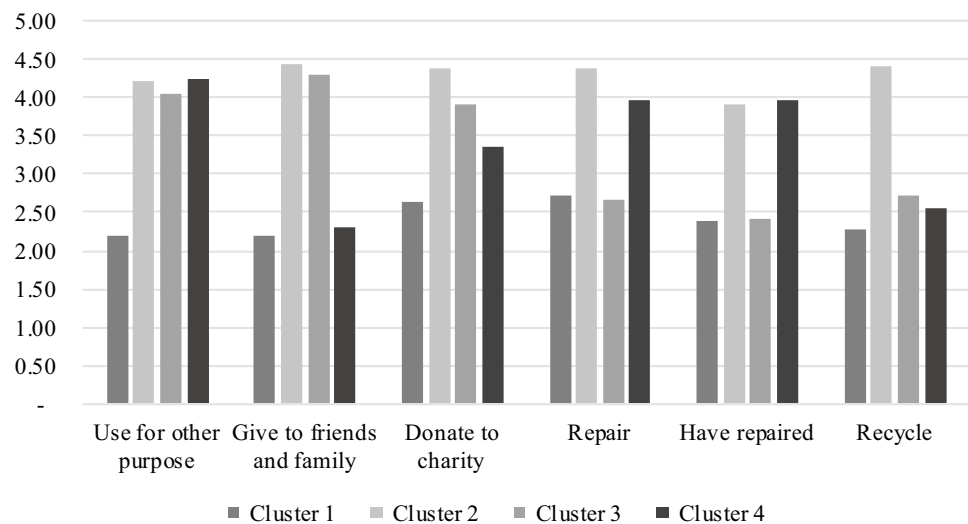
Cluster 3: *Give away fashion consumers*: high score in the giving away categories only, low score in repair and recycle categories.

Cluster 4: *Repair fashion consumers*: high score in repair categories only, low to average score in giving away and recycling categories.

While clusters differ in size, each has a significant number of members: 78, 137, 145, and 92, respectively, with the smallest number in the 'Non-engaged fashion consumer' group and the highest in the 'Give away fashion consumer' group. Table 7 demonstrates the major characteristics of the four clusters.

Among the demographic characteristics of the sample, only gender significantly influences cluster membership, while income, education, profession, and place of living do not have an effect. Males are significantly overrepresented in Cluster 1 and Cluster 4. While we may expect that they engage less in post-purchase activities than females, it is rather surprising to find that there are more male respondents among 'Repair fashion consumers' than expected based on sample participation. This is most likely explained by the fact that women who repair their garments also engage in other post-purchase activities and thus belong to the 'Committed consumers' category. Most respondents (in any cluster) believe that environmental problems pose important challenges to mankind, a notion especially prominent among 'Committed fashion consumers.' However, actual knowledge of environmental and social labels is relatively low, reaching more than 40% only in the case of 'Committed fashion consumers.'

Specific environmental and social problems relating to the fashion industry do not seem to divide the four clusters similarly to the attitudes towards the role of companies. However, there is a small but significant difference between

Fig. 7 Results of clustering: variable means**Table 7** Characteristics of the clusters

	Cluster 1: Non-engaged consumers	Cluster 2: Committed consumers	Cluster 3: Give away consumers	Cluster 4: Repair con- sumers
Gender***	m: 60.3% f: 39.7%	m: 37.2% f: 62.8%	m: 40.7% f: 59.3%	m: 56.5% f: 43.5%
Income, education, profession, place of living	Not significant			
	Share of cluster members in agreement with the state- ment:			
Environmental problems are important challenges***	82.1%	92.7%	88.3%	88.0%
The fashion industry is one of the most significant polluters	Not significant			
The fashion industry causes social problems	Not significant			
I know several environmental and social labels**	23.0%	44.5%	39.3%	33.7%
Changing consumer behaviour is important***	82.1%	89.1%	82.1%	84.8%
Companies should produce more durable goods	Not significant			
Fashion companies should offer repair services	Not significant			
Giving away garments gives me a good feeling***	61.5%	95.6%	96.6%	71.7%
By selling/swapping old garments I can help others***	62.8%	90.5%	80.7%	67.4%
Buying durable, repairable, and recyclable products gives me a good feeling***	65.4%	89.1%	81.3%	73.9%
	Share of cluster members for whom the aspect is impor- tant/very important:			
How much does price matter when buying new?***	68.2%	80.7%	72.0%	74.4%
How much does the guarantee matter when buying new?***	39.4%	68.1%	47.5%	45.5%
How much do environmentally sound materials matter when buying new?***	44.7%	75.5%	54.5%	58.9%
How much does repairability matter when buying new?***	35.5%	71.8%	45.5%	52.2%

Significance levels: *: < 0.05, **: < 0.01, ***: < 0.001

how members of different clusters see the role of consumers in reducing the impacts of the fashion industry. Consumers committed to sustainable post-purchase behaviour seem to be more aware of other phases (namely the purchasing phase) of their consumption since they place higher importance on important decision factors such as price, guarantee, and especially environmentally sound materials and repairability than members of other clusters.

Clusters 3 and 4, namely give-away and repair-oriented consumers, seem similar in many respects. However, those who prefer giving away their unwanted garments find more satisfaction in such behaviour than those who rather repair their textile products. It is interesting to note that cluster membership, which indicates the level of engagement in different sustainable post-purchase behaviours, does not seem to relate to any variables, which characterize the amount

of consumption. Thus, there is no significant relationship between cluster membership and whether cluster members plan to reduce the amount of their fashion consumption in the future or whether they plan to keep their garments for longer periods of time. This means those engaged in sustainable post-purchase behaviours do not necessarily take a more sustainable approach when considering their initial purchases.

4.3 Factors influencing post-purchase intention

To investigate the factors influencing various types of sustainable post-purchase behaviours among fashion consumers, we applied the Theory of Planned Behaviour as developed by Ajzen [69]. According to this theory, attitudes, subjective norms and perceived behavioural control impact behavioural intentions, which in turn affect actual behaviour. Behaviour results from a person's perspective, arbitrary behavioural standards, and perceived behavioural control. The belief in the consequence of conduct is an attitude that can be positive or negative. Social pressure to conform to behaviour is related to subjective norms, while perceived behavioural control demonstrates how people can control their behaviour. The TPB theory is a general theoretical framework for anticipating behavioural intentions in many contexts, including consuming fashion textiles. When someone acts, their attitudes determine how much they enjoy or dislike something and whether they are satisfied. A person will have a favourable attitude towards engaging in an activity if they know its beneficial effects. Therefore, consumer attitudes favourably impact sustainable post-purchase intentions and behaviour [77, 78].

According to Ajzen [69], subjective norms typically convey how significant the individual feels to others (family, friends, and colleagues) in their social surroundings or how they anticipate them to behave. Perceived behavioural control is the perception of whether an action is simple or challenging to complete [79]. By adapting the Theory of Planned Behaviour, this study intended to investigate the determining factors of two sustainable post-purchase behaviours, namely repairing and giving away fashion products.

Table 8 demonstrates the constructs of the research model and the items (indicator variables) of the questionnaire used to measure the constructs. Indicator variables were adopted from previous research regarding the determinants of sustainable consumption behaviour. Items describing environmental knowledge were adopted from Chi et al. [80], who assessed consumer intentions to purchase slow fashion apparel and defined environmental knowledge as the ability to recognise environmental problems, as well as the causes and consequences of problems. Items regarding attitude were adopted from Chi et al. [90] and Sreen et al. [82] who assessed the impact of culture, behaviour and gender on green purchase intention. The construct of subjective norms was developed based on Cialdini et al. [83] who discussed how normative pressures shape decision making and McNeill et al. [84] who suggested that repairing and extending the lifecycle of fashion products is a positive practice influenced by social norms. The construct of perceived behavioural control was adopted from Sreen et al. [82] and Nam et al. [85], who explored factors influencing consumers' purchase intention of green sportswear. Finally, the construct of post-purchase intention was adopted from Nam et al. [85] and Joung [86] who assessed fast-fashion consumers' post-purchase behaviours.

Items associated with the latent variables were handled according to Hair et al. [87]: items with a loading value below 0.4 were removed while items with loadings between 0.4 and 0.7 were retained if they improved the measurement model regarding composite reliability and AVE. As a result, in both the 'repair' and the 'give-away' models three items associated with 'environmental knowledge', namely EK4, EK5 and EK6; two items associated with 'Attitude', namely ATT2 and ATT3 were removed. Additionally, two items associated with 'perceived behavioural control' were removed to improve the model leaving only PBC1 in both models.

Results of the analysis of the measurement models are shown in Tables 9 and 10. Indicator reliability refers to the proportion of variance in an observed variable (indicator) that is explained by the underlying latent construct in a measurement model, while composite reliability is used to evaluate the internal consistency of a latent construct. Both measures exceed threshold values (0.4 and 0.7, respectively) in both measurement models (repair and give-away). Moreover, high AVE (Average Variance Extracted) values show that the indicators of the constructs are well-correlated and represent the same underlying concept. These results demonstrate the reliability and validity of the two models.

Discriminant validity was measured using the Heterotrait-monotrait ratio (HTMT) criterion to confirm that each latent variable differs from others. According to Henseler et al. [88], a threshold value of 0.90 indicates that the path model includes constructs that are conceptually very similar, i.e., a lack of discriminant validity. Hair et al. [89] describes discriminant validity as acceptable, with an upper limit of 0.90. Tables 11 and 12 demonstrate that the HTMT is lower than this threshold value in both the 'repair' and the 'give-away' models and confirm that the constructs are distinct and not confounded.

Table 8 Questionnaire items used in the 'repair' and 'give-away' models

Latent variable	Code	Item	Repair	Give away
Environmental knowledge	EK1	Environmental problems are among the most critical issues of our age	x	x
	EK2	The fashion industry is one of the most polluting industries regarding water pollution	x	x
	EK3	The production of fashion products creates social problems	x	x
	EK4	Fashion product producers cannot solve the environmental and social problems of the industry alone	x	x
	EK5	Changing consumer behaviour is an essential element of solving environmental problems	x	x
	EK6	I know several labels and emblems that prove the environmental and social benefits of clothing products	x	x
Attitude	ATT1	Buying too many fashion (clothing) products harms the environment	x	x
	ATT2	Companies should produce longer-lasting fashion products	x	x
	ATT3	Fashion companies should offer repair services	x	x
	ATT4	The burden on the environment can be reduced by repairing and reusing fashion products	x	x
	ATT5	Purchasing fashion products that can be used for an extended period, repaired, or recycled is satisfactory	x	x
Perceived behavioural control	PBC1	If it were entirely up to me, I am confident that I would purchase fashion products that can be used for a long time, repaired, and recycled	x	x
	PBC2	Purchasing fashion products that can be used for a long time, repaired, and recycled is totally within my control	x	x
	PBC3	In the future, it is entirely up to me whether or not I repurchase fashion products that can be used for a long time, repaired, and recycled	x	x
Subjective norm	SN1	If I repair and use my fashion products for a long time, most importantly, people agree with my decision	x	
	SN2	It is trendy to repair and use clothes for a long time	x	
	SN3	It is common practice in my family to pass clothing items to each other if we no longer need them		x
	SN4	I know many people who give away their fashion products to others when they do not need them anymore		x
Post-purchase intention	PPI1	In the future, I intend to buy fashion products that can be used for an extended period of time	x	x
	PPI2	In the future, I plan to buy fashion products that can be repaired	x	
	PPI3	I intend to repair fashion products after purchasing them	x	
	PPI4	In the future, I plan to buy fashion products that can be recycled		x
	PPI5	I intend to give away the fashion products I do not need to others who can still use them		x

Table 9 Evaluation of the 'repair' measurement model

Latent variable		Loadings	Indicator reliability	Composite reliability	Average variance extracted
Environmental knowledge	EK1	0.740	0.548	0.803	0.576
	EK2	0.781	0.610		
	EK3	0.756	0.571		
Attitude	ATT1	0.753	0.567	0.798	0.568
	ATT2	0.746	0.556		
	ATT3	0.762	0.580		
Perceived behavioural control	PBC1	1.000	–	–	–
Subjective norm	SN1	0.918	0.842	0.849	0.739
	SN2	0.797	0.635		
Post-purchase intention	PPI1	0.814	0.663	0.864	0.680
	PPI2	0.900	0.810		
	PPI3	0.754	0.569		

Table 10 Evaluation of the 'give-away' measurement model

Latent variable		Loadings	Indicator reliability	Composite reliability	Average variance extracted
Environmental knowledge	EK1	0.740	0.548	0.803	0.576
	EK2	0.781	0.610		
	EK3	0.756	0.571		
Attitude	ATT1	0.744	0.567	0.798	0.568
	ATT2	0.747	0.556		
	ATT3	0.770	0.580		
Perceived behavioural control	PBC1	1.000	–	–	–
Subjective norm	SN3	0.834	0.696	0.840	0.724
	SN4	0.867	0.752		
Post-purchase intention	PPI1	0.812	0.659	0.779	0.542
	PPI4	0.752	0.566		
	PPI5	0.634	0.402		

Table 11 Discriminant validity: Heterotrait-Monotrait Ratio (HTMT)—'repair' model

Latent variable	Attitude	Environmental knowledge	Perceived behavioural control	Repair intention	Subjective norm
Attitude					
Environmental knowledge	0.808				
Perceived behavioural control	0.543	0.307			
Post-purchase intention	0.601	0.302	0.751		
Subjective norm	0.470	0.287	0.439	0.662	

In Table 11, attitude and environmental knowledge are closely linked with environmental knowledge, but their connections to the subjective norm and perceived behavioural control are weaker. Perceived behavioural control has a strong connection with post-purchase intention, highlighting its predictive role. Then, post-purchase intention is strongly influenced by perceived behavioural control and moderately by attitude. Then, the subjective norm is moderately associated with post-purchase intention but less influential in other relationships.

Table 12 Discriminant validity: Heterotrait-Monotrait Ratio (HTMT)—‘give-away’ model

Latent variable	Attitude	Environmental knowledge	Perceived behavioural control	Repair intention	Subjective norm
Attitude					
Environmental knowledge	0.808				
Perceived behavioural control	0.543	0.307			
Post-purchase intention	0.769	0.454	0.705		
Subjective norm	0.392	0.258	0.329	0.793	

Next, we evaluated the structural models to determine the two models’ capability to predict the target constructs, namely the two post-purchase intentions: ‘repair’ and ‘give-away’. First, we checked the collinearity of the predictor constructs by analysing VIF values. An inner model VIF exceeding 3.3 is generally seen as a sign of potential standard method bias. Therefore, if all VIFs in the inner model, determined through a full collinearity test, are 3.3 or lower, the model can be considered free from common method bias [90]. The results shown in Table 13 indicate that all VIF values are below the threshold, so collinearity is not a critical issue in either model. This means that each predictor (namely attitude, perceived behavioural control and subjective norm) contributes uniquely to explaining repair and give-away intentions, which ensures the interpretability and validity of the structural model.

This study adhered to the guidelines proposed by Hair et al. [89] to evaluate the variables’ mediation effect. Path coefficients for both the ‘repair’ and ‘give-away’ models are provided in Table 14. In the ‘repair’ model, path coefficients show a strong relationship between environmental knowledge and attitudes, perceived behavioural control, and post-purchase intention, i.e., repair. At the same time, subjective norms have a moderate effect on post-purchase intention, while attitude has the weakest effect. In the ‘give-away’ model, the relationship between environmental knowledge and attitudes has a similar strength since the measurement items related to them are the same in the two models. However, perceived behavioural control has a much weaker effect on give-away intention. Attitude and subjective norms have a stronger effect on post-purchase intention (i.e., giving away unwanted fashion products) than in the repair case.

R^2 values show the combined effect of the exogenous latent constructs on attitude, repair intention, and giveaway intention in the two models. According to Hair [87], the R^2 value of attitude is weak, while the R^2 values of post-purchase intention ‘repair’ and post-purchase intention ‘give-away’ are much higher and in the case of repair can be considered moderate (see Table 15).

Effect sizes (f^2) on R^2 show if an exogenous construct substantially impacts the endogenous constructs. Effect sizes determined in the two models are shown in Table 14. According to Cohen [91], f^2 values of 0.02, 0.15, and 0.35, respectively, represent small, medium, and large effects of an exogenous latent variable, and effect size values of less than 0.02

Table 13 VIF values

	‘Repair’ model	‘Give-away’ model
Environmental knowledge → attitude	1.257	1.249
Attitude → post-purchase intention	1.000	1.000
Perceived behavioural control → post-purchase intention	1.318	1.263
Subjective norm → post-purchase intention	1.186	1.095

Table 14 Path coefficients, t values, P values, and f^2 effect sizes for the two models

	‘Repair’					‘Give-away’				
	Path coeff	t value	P value	f^2 effect size	P value	Path coeff	t value	P value	f^2 effect size	P value
EK → ATT	0.517	12.733	0.000	0.365	0.000	0.515	12.54	0.000	0.360	0.000
ATT → PPI	0.118	2.668	0.008	0.023	0.208	0.230	5.274	0.000	0.078	0.012
PBC → PPI	0.512	12.478	0.000	0.408	0.000	0.375	8.031	0.000	0.204	0.000
SN → PPI	0.263	6.219	0.000	0.119	0.005	0.305	5.685	0.000	0.155	0.009

indicate no effect. In the ‘repair’ model, perceived behavioural control has a large effect size; social norms and attitudes have a small effect size on repair intentions; however, in the case of attitudes, this small effect size is not significant. In the ‘give away’ model, perceived behaviour control still has the largest effect, although smaller than in the ‘repair’ model; social norms have a moderate effect size, and attitude has a small effect size, although statistically significant.

5 Discussion of results

Our survey examined the behaviour and motivations of consumers purchasing second-hand fashion products and engaging in various sustainable post-purchase activities.

In Budapest, Hungary, the majority of fashion consumers purchase new fashion products, with only 58.8% buying second-hand items. Interestingly, the factors influencing the purchase of new and second-hand products are largely similar, with the exception of a reduced emphasis on guarantees when buying second-hand products. We hypothesized that consumers who purchase second-hand fashion products exhibit distinct behaviours during the post-purchase phase compared to those who buy less frequently or avoid second-hand products entirely. Our findings partially support this hypothesis, revealing differences in certain post-purchase behaviours. While the relationship between the frequency of buying second-hand fashion products and engaging in sustainable post-purchase activities is weak to moderate, significant patterns emerge. Consumers who regularly buy second-hand fashion are more likely to donate unwanted garments to charity, repurpose old items for handicrafts, repair their clothes, and take them to recycling facilities. These behaviours occur more frequently among second-hand buyers than among those who seldom or never buy second-hand products. However, second-hand buyers do not tend to use their garments for extended periods compared to other consumers. These findings support our first hypothesis (H1), highlighting a nuanced link between second-hand fashion purchases and sustainable post-purchase practices.

Among the various sustainable post-purchase options, the most commonly practiced behaviours were using garments for an extended period and repurposing old garments for other purposes. Giving garments away to friends and family and donating to charity were also frequent practices, followed by repairing garments and taking unwanted items to recycling facilities.

Using clustering techniques, we identified four distinct groups of consumers: ‘non-engaged’, ‘committed’, ‘give-away’, and ‘repair’ fashion consumers. ‘Non-engaged’ consumers represented the smallest cluster, while ‘give-away’ consumers formed the largest group, closely followed by ‘committed’ consumers. Among the demographic variables assessed, only gender significantly differentiated the clusters, with men being overrepresented in both the ‘non-engaged’ and ‘repair’ groups.

Beyond their engagement in sustainable post-purchase behaviours, the clusters also exhibit differences in their members’ attitudes toward the environment, but not their attitudes towards the environmental and social impacts of the fashion industry. In most areas examined, the ‘repair’ and ‘give-away’ clusters show minimal differences. Nevertheless, members of the ‘give-away’ cluster stand out for deriving satisfaction from helping others by donating their old garments. The identified clusters are both statistically significant and meaningful, providing strong support for our second hypothesis (H2).

Table 15 R^2 values in the two models

	Attitude	Post-purchase intention: ‘repair’
R^2	0.267	0.512
R^2 adjusted	0.266	0.509
	Attitude	Post-purchase intention: ‘give-away’
R^2	0.265	0.453
R^2 adjusted	0.263	0.449

To better understand the motivations driving sustainable post-purchase behaviours among fashion consumers, we tested two models grounded in the Theory of Planned Behaviour (TPB). These models incorporated constructs aimed at explaining consumers' intentions to repair garments and give away unwanted fashion products. Our findings confirm that TPB is a valuable framework for analyzing factors influencing sustainable post-purchase behaviours in the fashion industry.

Among the constructs examined, attitude toward environmental issues had the weakest impact on intentions to repair and give away garments. Social norms exhibited a moderate influence, while perceived behavioural control emerged as the strongest predictor of both sustainable post-purchase intentions. Based on an analysis of path coefficients and effect sizes, we accepted hypotheses H4b, H5a, H5b, H6a, and H6b. However, we rejected H4a, as the effect size of attitude on repair intentions was very low and statistically insignificant. These findings contribute to the existing literature on fashion consumer behaviour by analyzing a representative sample of residents from a major European city and employing multiple, complementary research methods.

Our findings align with those of Weber et al. [58], demonstrating that individuals who frequently purchase both new and second-hand fashion products (*'fashion consumers'*) are more likely to engage in sustainable post-purchase activities. However, our results do not corroborate the findings of Potdar et al. [60], who reported that older, more educated male consumers are more inclined to repair clothing than female consumers. While the *'Repair fashion consumers'* cluster includes a significantly higher proportion of men, this does not necessarily indicate that men engage in repair activities more frequently than women, especially considering the higher representation of women in the *'Committed consumers'* cluster.

When examining gender roles more broadly, women are notably overrepresented in the *'Committed consumers'* cluster, which places greater emphasis on textile disposal and recycling. This finding reinforces prior research that highlights women's active involvement in these aspects of sustainable fashion consumption. Moreover, our results support studies [57, 60, 61, 63, 70] showing that women who repair their garments also tend to participate in other post-purchase activities, thus aligning with the characteristics of the *'Committed consumers'* category.

Many studies suggest that environmental concerns influence sustainable post-purchase behaviours. However, our findings indicate that, at least in the context of Budapest, this factor has the weakest—if any—effect on both repair and give-away behaviours. Instead, other considerations, such as economic and convenience factors (as highlighted by Laitala & Klepp [66] and Urmi et al. [56]), appear to play a more significant role, particularly in repair activities.

These insights have important implications for practitioners, businesses, policymakers, and NGOs working to promote more sustainable lifestyles. While purchasing second-hand fashion can help reduce textile consumption, our findings suggest that second-hand buyers do not necessarily engage in environmentally friendly practices in other areas of their fashion consumption. Although there is a relationship between the frequency of buying second-hand products and certain sustainable post-purchase behaviours, the overall sustainability of second-hand fashion consumption cannot be taken for granted.

It is often believed that fostering positive attitudes toward the environment through consumer education can drive sustainable consumption patterns. However, our results show that attitudes are the weakest predictors of repair and give-away intentions. While other post-purchase activities, such as recycling, may be more influenced by attitudes, our findings suggest that education alone may not be sufficient to address the challenges of sustainable fashion consumption.

Instead, greater emphasis should be placed on improving the reparability of products and showcasing practical examples of sustainable practices. These approaches may have a more substantial impact on encouraging sustainable fashion consumption and reducing the environmental burden of the fashion industry.

6 Conclusions: limitations and future research directions

While our study provides significant insights for academics and professionals, several limitations should be acknowledged.

First, our research focuses exclusively on consumers in Budapest, without including data from other European regions or countries. As a result, the findings reflect the behaviour of a large urban population but may not be generalizable to other contexts. Future research should expand the geographical scope to include diverse regions for a broader understanding of sustainable post-purchase behaviour of fashion consumers.

Second, this study concentrates solely on the apparel sector. To gain a more comprehensive understanding of sustainable post-purchase behaviour in general, future studies should explore other product categories, such as food and

electronics. Examining these sectors could reveal unique patterns and motivations among consumers of different product types.

Third, our data collection method, namely telephone-based questionnaires, has inherent limitations. The findings rely on self-reported data, which may be influenced by response bias or inaccuracies in how consumers perceive their own behaviours. Future research could employ alternative methodologies, such as in-person interviews, online surveys, or experimental designs, to uncover deeper insights and validate results.

In this study, we tested aspects of the Theory of Planned Behaviour (TPB) to explore sustainable post-purchase behaviour. Future research should consider integrating alternative theoretical frameworks to better capture the complexities of consumer behaviour in this context. Scholars could also explore marketing models and experimental approaches with diverse samples, such as younger or older populations, or specific generational cohorts like Generation Z, to better understand variations across demographic groups.

Our findings highlight the associations between demographic variables and sustainable post-purchase behaviours. These insights can inform tailored marketing strategies and policy interventions to promote sustainable practices among different consumer segments. By building on this research, future studies can deepen the understanding of sustainable consumption practices and contribute to developing effective strategies for fostering environmentally responsible behaviours across a range of consumer contexts.

Author contributions Arifa Parvin Kemi contributed to the manuscript in the following ways: Research gap and conceptualization, exploration of the research gap. Development of the research questions and objectives of the research. Conducting the literature review. Data analysis using multivariate statistical methods. Preparation of the introduction, literature review, results, and discussion sections. Gyula Zilahy contributed to the study in the following ways: Development of the research questions and objectives of the research. Validation of study results with existing literature. Supervision and review of data analysis. Preparation of the results, and discussion sections. Final check of results and recommendations

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Data availability The database generated and analyzed in the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate According to the regulation of the Research Ethics Committee of the Corvinus University of Budapest (Provision of the Rector No. 2/2020.) a research ethics permission is not required for the research reported in this article. Consent from all participants involved in the study was obtained with their full awareness and understanding.

Competing interests The authors declare no competing interests.

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