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Influence of environmental knowledge and product knowledge on purchase intention towards upcycled clothing in China

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Abstract
Purpose: This study investigates the impact of environmental awareness and detailed product understanding on the decision-making process of Chinese consumers regarding the purchase of upcycled clothing, considering the mediating role of their attitudes.
Design/methodology/approach: This study collected quantitative data through an online survey completed by 301 participants. Structural equation modelling was utilized to analyse the hypotheses.
Findings: The study's results demonstrate that environmental knowledge, product knowledge, and attitudes positively influence the intention to purchase upcycled apparel. Furthermore, the research indicates that attitude serves as a mediator in the relationship between both environmental and product knowledge and the purchasing intention for upcycled clothing.
Research limitations/implications: This research employed self-administered questionnaires, depending on the respondents' ability to accurately comprehend and respond to each question. Moreover, the focus on Chinese consumers suggests that the findings may not be universally applicable to other demographic groups.
Practical implications: Grasping the significance of each factor that influences the intention to purchase upcycled apparel is essential. This knowledge allows fashion brands, retailers, and policymakers to devise strategies that effectively boost consumers' willingness to buy upcycled clothing.
Originality and Value: This study enriches the sustainable fashion literature by examining the direct and indirect effects of environmental knowledge and product knowledge on purchase intention towards upcycled apparel.

Keywords: sustainable fashion consumption, purchase intention, product knowledge, environmental knowledge attitude, upcycled apparel.

Introduction

The global fashion industry, significantly bolstered in value as noted by Peters et al. (2019), is increasingly dominated by the "fast fashion" trend, as highlighted by Nguyen et al. (2021). This

trend promotes the rapid production and consumption of low-cost, disposable apparel, a practice scrutinized for its environmental impact by Niinimäki et al. (2020). Fast fashion has notably shifted consumer attitudes, reducing concern for the materials used, durability of clothing, and disposal practices, as discussed by Lee et al. (2020).

In China, the garment sector remains a pivotal economic element, with profound ties to sustainability issues that affect not only economic but also social dimensions such as welfare, human rights, and equality, emphasized by various studies including Giau et al. (2020) and Islam et al. (2021). The current focus on sustainability imposes stringent demands on both consumers and producers within the industry, according to Todeschini et al. (2020).

Today's emphasis on sustainability has imposed heightened and rigorous demands on both consumers and producers in the sector (Todeschini et al., 2020). Yet, the industry's adherence to conventional production and consumption practices has led to significant strain on natural resources and the environment, drawing increased scrutiny from consumers (Gazzola et al., 2020). For instance, China currently produces approximately 26 million tons of textile waste annually, with projections suggesting a potential increase in the coming years (China National Textile & Apparel Council, 2021). Of this, only around 4 million tons are repurposed through recycling, primarily sourced from second-hand apparel (China National Textile & Apparel Council, 2021). Given the vast amounts of fabric waste, China is progressively establishing a system for collecting used clothing to foster a circular economy. Upcycled fashion emerges as a crucial solution to curb the environmental repercussions of the fashion world (China National Textile & Apparel Council, 2021).

Upcycling, the practice of converting used materials into superior quality products in their next life cycle, is advocated by researchers such as Marques et al. (2019), Park & Lin (2020), and Kim et al. (2021). This approach is increasingly recognized as an eco-friendly method that minimizes material and energy consumption, fostering sustainable methods in the textile industry, according to James & Kent (2019) and Pang et al. (2022). The rising interest in upcycled fashion from both academic circles and industry experts has spurred more research and innovative developments. Notable examples include the work of Yoo et al. (2021), Moora et al. (2021), and Oncioiu & Ifrim (2022), as well as the 2017 joint effort by Chinese brands LINING and TEIJIN. These brands transformed used clothing into premium recycled polyester fibers, demonstrating a strong commitment to sustainable fashion, as reported by the China National Textile & Apparel Council in 2021.

Despite studies like those by Caldera et al. (2021) and Polyportis et al. (2022) indicating a generally negative perception toward buying upcycled products, Wagner & Heinzel (2020) suggest that this reluctance may stem from consumers' unfamiliarity with these items. Therefore, it's crucial to improve awareness about upcycled apparel. Additionally, significant portions of the Chinese consumer base do not link the fashion industry with environmental concerns, as noted by Niinimäki et al. (2020) and Yoo et al. (2021). Prior research, including Byrd & Su (2021) and Kim & Bye (2022), has identified a lack of knowledge and awareness as a major barrier to sustainable fashion consumption. Consequently, this study aims to examine the influence of environmental and product knowledge on the purchase intentions for upcycled apparel in China, seeking to promote the adoption of sustainable fashion practices.

Literature Review

Knowledge-Attitude-Behaviour Model (KAB)

The Knowledge-Attitude-Behaviour (KAB) model, established by Kallgren and Woods in 1986, suggests that a consumer's knowledge base directly impacts their attitudes towards behaviours, influencing their appeal or lack thereof. This model is particularly relevant to this

study for several reasons: First, it has been effectively used in diverse contexts, especially in researching pro-environmental behaviours. For example, Indrani et al. (2019) explored how environmental knowledge affects attitudes and subsequent eco-friendly actions, while Hossain et al. (2022) investigated the role of environmental and eco-label awareness in shaping pro-environmental consumer behaviours. Secondly, the KAB model provides a framework to examine the often-noted gap between knowledge and action, a topic that researchers like Blazquez et al. (2020) and Machado et al. (2022) have identified as under-explored within the context of upcycled fashion.

Purchase intention (PI)

The term "intention to buy" reflects a consumer's readiness to purchase a product following comprehensive evaluation, as defined by Ajzen in 2020. Originally framed by Ajzen in 1991, intention indicates an individual's proactive willingness to perform a specific action. Mainstream marketing research uses this concept to predict consumer behaviour, highlighting its critical role in bridging consumer attitudes with their subsequent actions. Furthermore, purchase intention is considered more expansively in some studies; Morwitz in 2014 elaborates that it also involves the likelihood of consumers recommending products or services to others. In the field of sustainable consumption, the significance of purchase intention is underscored by studies that link buying intentions to actual purchasing behaviours, as explored by Coderoni & Perito in 2020. Specifically, in upcycled fashion, purchase intention encompasses the probability of a consumer buying upcycled products, providing positive reviews, and their readiness to spend on these items, according to Yu & Lee in 2019.

Environmental knowledge (EK)

Understanding environmental issues involves grasping essential facts, concepts, and relationships concerning the natural world and its major ecosystems, a comprehension often referred to as environmental knowledge. Frick et al. (2004) emphasize its importance in explaining pro-environmental behaviours. However, the academic community remains divided on how significantly this knowledge impacts eco-friendly actions. Liu et al. (2020) argue for a substantial connection between general environmental understanding and pro-environmental behaviors. More recent research, like that by Farrukh et al. (2022) and Willard et al. (2022), indicates that individuals with a heightened long-term environmental awareness are more inclined to dedicate a larger portion of their budget to sustainable products and demonstrate a greater willingness to purchase eco-friendly goods.

Conversely, some research argued that environmental knowledge isn't a reliable predictor of eco-conscious behaviour (Wang et al., 2020; Choi & Johnson, 2019). Meramveliotakis and Manioudis (2021) suggested that although knowledge may not always correlate with action, it remains crucial for overcoming psychological barriers such as unawareness, fear, or misinformation. Lehrer (2018) also noted that a deficit in accurate or sufficient knowledge can hinder the ability to make informed choices in environmental matters.

In this study, we explore 'environmental apparel knowledge'—a term that refers to the understanding of the ecological impacts associated with clothing items (Sadiq et al., 2021).

Product Knowledge (PK)

Product knowledge encapsulates a consumer's familiarity with detailed aspects of a specific item (Lin & Chen, 2006). This understanding primarily stems from two main avenues: first-hand interactions with the product and the influence of targeted advertising (Wang & Hazen, 2016). When evaluating the various elements that shape purchasing decisions, product knowledge undeniably emerges as a cornerstone (Ho & Amin, 2023). Assessments related to a

product's intrinsic value and associated purchasing risks often anchor upon this foundational knowledge (Samiee & Chabowski, 2021).
Further, contemporary research has identified 'cost knowledge, green knowledge, and quality knowledge' as key components within the domain of product knowledge (Wang & Hazen, 2016). Given its paramount significance in forecasting consumer trends and sculpting long-standing market footholds, understanding consumer perceptions of product knowledge has become a focal point for both academic and industry circles (Rossanty, 2018).

Attitude (ATT)
Attitude is defined as a psychological tendency manifested as either favour or disfavour towards a specific entity, a definition provided by Ajzen in 1991. This concept is crucial in predicting human behaviour and is a fundamental element in prominent behaviour-explanatory theories such as the Theory of Reasoned Action (TRA) formulated by Ajzen and Fishbein in 1975, and the Theory of Planned Behaviour (TPB) introduced by Ajzen in 1991.
Studies on sustainable consumption reveal that consumer attitudes are significant predictors of purchasing choices and actual buying behaviour, as noted by Cuomo et al. (2019) and Borusiak et al. (2020). Academic theories generally agree that changing consumer attitudes towards environmental conservation is essential for altering behaviours, as suggested by Geiger et al. (2019) and Tamar et al. (2021). Similarly, it is argued that positive attitudes towards sustainable fashion can significantly influence consumer purchasing intentions, a perspective supported by Grazzini et al. (2021).

Hypothesis Development

Environmental knowledge and purchase intention
Previous studies have found a positive relationship between knowledge of environmentally friendly apparel and the habits of purchasing such apparel, highlighting its significance to this study.
For example, research spearheaded by Byrd and Su (2021), Kim and Bye (2022), and Arora and Manchanda (2022) suggested a notable knowledge deficit regarding the environmental implications stemming from fashion consumption and production. This gap is often attributed to people's inability to connect fast fashion with its negative environmental repercussions, which in turn reduces their inclination to choose sustainable attire (Khare, 2023).
Therefore, discerning how knowledge about the fashion industry affects sustainable consumption patterns becomes vital to championing eco-friendly practices within the fashion sphere (Li & Leonas, 2022). Informed by the studies mentioned above, we put forth the subsequent hypotheses:
H1: Environmental knowledge positively influences purchase intention towards recycled apparel.

Product knowledge and purchase intention
Prior scholarly pursuits have underscored that upcycled goods present a mixed bag of merits and demerits (Adıgüzel & Donato, 2021). These products provide environmental advantages, including saving energy and minimizing landfill waste, along with economic benefits, such as lower costs compared to purchasing new items (Bhatt et al., 2019). Yet, these products grapple with challenges too. Predominant among these are perceptions tethered to their perceived subpar quality vis-a-vis new products and apprehensions surrounding their procurement (Pandit et al., 2019).

In light of these findings, our research seeks to probe deeper into the intricate tapestry of consumer product knowledge perceptions surrounding upcycled apparel. Building upon the insights drawn from prior studies, our study is poised to put forth a series of hypotheses that intend to further demystify this realm:
H2: Product knowledge significantly influences the purchase of upcycled apparel intention.

Mediating Effect of Attitude

Scholarly studies have extensively examined the relationship between environmental knowledge and attitudes. For example, Han et al. (2020) discovered a significant link between eco-label awareness and pro-energy-saving attitudes. Wang et al. (2021) similarly demonstrated that a deep understanding of ethical fashion positively influences Chinese consumers' attitudes towards such products. Additionally, Gulzari et al. (2022) found that environmental knowledge greatly impacts attitudes towards purchasing eco-friendly goods.
The connection between product knowledge and attitudes has received equal attention. Han et al. (2019) identified that product knowledge significantly enhances positive attitudes towards electric airplanes, influencing their adoption and purchase intentions. Furthermore, Nurhayati and Hendar (2020) highlighted that product knowledge enhances positive attitudes towards buying Halal food.
Based on these insights, we propose the following hypotheses to further investigate these relationships:

H3: Environmental knowledge has a significant impact on attitude.
H4: Product knowledge significantly affects attitude.
H5: Attitude crucially influences the intention to purchase upcycled apparel.
H6: Attitude serves as a mediator between environmental knowledge and the intention to purchase upcycled apparel.
H7: Attitude mediates the relationship between product knowledge and the intention to purchase upcycled apparel.

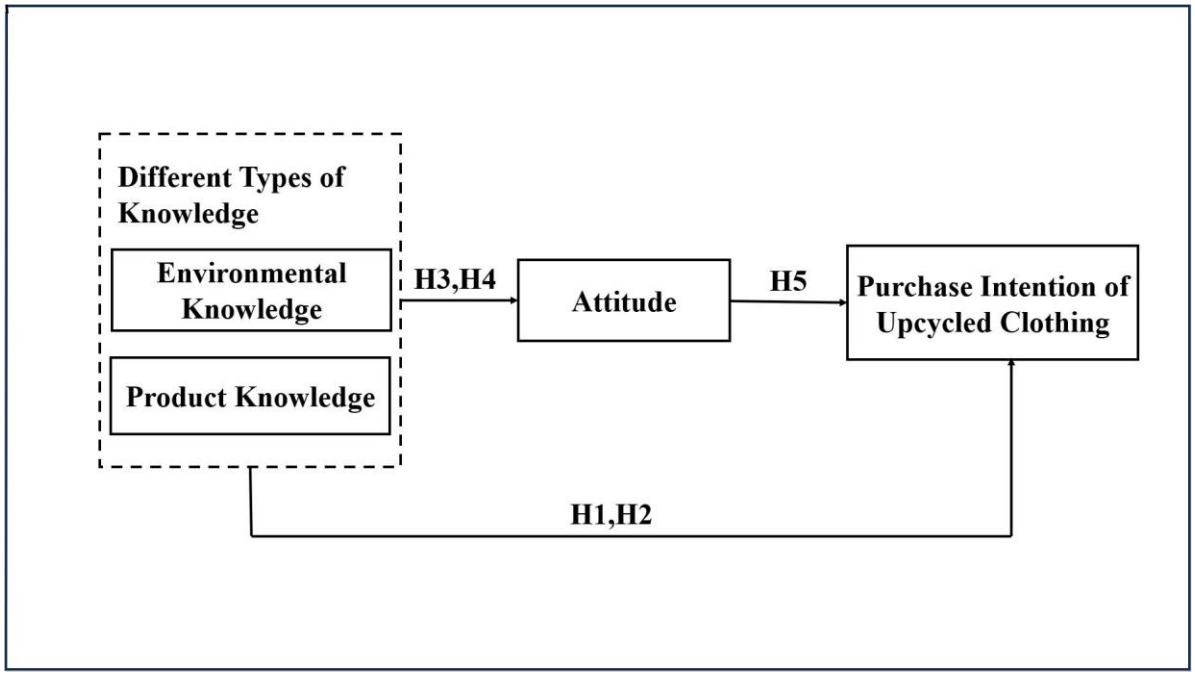

Figure. 1. Research Model

Methods

Measures

The study's constructs were formulated using scales derived from prior research. The assessment of purchase intention involved three items from studies by Armitage et al. (1999) and Yazdanpanah and Forouzani (2015). Attitude was measured using four items, recommended by Armitage et al. (1999), Fishbein et al. (2003), and Kim and Han (2010). To gauge environmental knowledge, four items from Kim and Damhorst (1998) were utilized, and product knowledge was assessed through three items from Blair and Innis (1996). All constructs, including purchase intention, attitude, environmental apparel knowledge, and product knowledge, were evaluated using a five-point Likert scale, which ranged from 1 (strongly disagree) to 5 (strongly agree).

Data and sample collection

Data for the study were collected through an online survey aimed at mainstream consumers to understand how environmental and product knowledge affects their attitudes towards upcycled apparel. WeChat, a major social media platform in China with a vast user base, was used to distribute the survey. This approach allowed for broad reach across various regions and demographics. The survey was tailored to the research objectives and shared on WeChat via features like groups, official accounts, and moments, facilitating engagement with a diverse participant pool.

Regarding sample size, Hair et al. (2020) recommend that for effective use of Partial Least Squares Structural Equation Modelling (PLS-SEM), the sample size should be at least ten times the number of paths targeting any specific latent construct within the model. This "10 times rule" guided the determination of a minimum sample size of 70 for this study. We used purposive sampling to select participants who met specific criteria relevant to our research goals. This non-probabilistic sampling method ensured the selection of participants who could provide targeted insights. Ultimately, 301 valid responses were gathered and analysed.

Participant Demographics

Table 1 details the demographics of the survey respondents. The gender breakdown shows 47.8% of participants were male and 52.2% were female, indicating a modestly higher female representation. Regarding age distribution, 38.9% of respondents were aged 26-35, making it the largest age group, followed by 27.2% who were between 36 and 45 years old. When it came to monthly earnings, the largest group (24.6%) earned between 3,000 - 5,000 RMB, trailed closely by those earning 5,001-8,000 RMB (23.3%) and 8,001-10,000 RMB (19.3%). Regarding educational background, bachelor’s degree holders dominated at 45.2%, followed by those with a college diploma (21.6%) and Master's degree (17.6%). In the employment sector, office workers made up 19.9% of respondents, followed by salespeople (18.6%), and factory workers (13.3%).

Table 1. Demographic Information of Respondents

Characteristic	Categories	N	%
Gender	Male	144	47.8
	Female	157	52.5
Age	18-25	19	6.3
	26-35	117	38.9
	36-45	82	27.2
	46-55	40	13.3

	56-65	28	9.3
	>65	15	5.0
Income	<3000	41	13.6
	3000-5000	74	24.6
	5001-8000	70	23.3
	8001-10000	58	19.3
	10001-20000	32	10.6
	>20000	26	8.6
Education Level	Junior High School	21	7.0
	Senior High School	26	8.6
	College diploma	65	21.6
	Bachelor's degree	136	45.2
	Master's degree	53	17.6
Occupation	Government Employee	4	1.3
	Business Managers	5	1.7
	Office Workers	60	19.9
	Professionals	34	11.3
	Factory Workers	40	13.3
	Salesperson	56	18.6
	Self Employed	18	6.0
	Agricultural Workers	12	4.0
	Retire	15	5.0
	No Occupation yet	5	1.7
	Current Students	19	6.3

Findings

The data were processed using SEM-PLS (4.0) statistical software, a tool frequently employed in social science research (Sarstedt & Cheah, 2019; Purwanto et al., 2021; Sobaih et al., 2022).

Measurement Model

Table 2 showcases standardized factor loadings, which varied between 0.721 and 0.928, confirming their acceptability. All AVE values for the constructs met the required benchmark, and the composite reliability values ranged from 0.797 to 0.866, surpassing the 0.70 mark, thus confirming their adequacy. The study evaluated the reflective measurement model using metrics such as reliability, convergent validity, and discriminant validity, adhering to the criteria set by Hair et al. (2019). Composite reliability was assessed for each indicator based on its loadings, as recommended by Wong (2019). The Fornell-Larcker criterion was utilized to establish discriminant validity, as per Rasoolimanesh (2022).

Table 2 also outlines the results from the confirmatory factor analysis, displaying the standardized factor loadings for the items within each construct. To ensure convergent validity, three criteria—factor loading, average variance extracted (AVE), and composite reliability—specified by Hair and Alamer (2022) were checked. Each item's factor loading needed to exceed 0.60, the AVE for each construct should be above 0.50, and the composite reliability for each should surpass 0.70. According to Table 2, factor loadings ranged from 0.721 to 0.928, all AVE values met the minimum requirements, and composite reliability scores varied from 0.797 to 0.866, confirming the adequacy of the measurements.

Table 2. Confirmatory Factor Analysis

Item	Factor loadings	Composite Reliabilities	Average Variance Extracted
ATT1	0.760	0.847	0.581
ATT2	0.748		
ATT3	0.785		
ATT4	0.756		
EK1	0.926	0.866	0.621
EK2	0.721		
EK3	0.763		
EK4	0.725		
PK1	0.777	0.814	0.594
PK2	0.737		
PK3	0.744		
PI1	0.784	0.797	0.567
PI2	0.725		
PI3	0.800		

The analysis confirmed discriminant validity in line with the Fornell and Larcker (1981) criteria. In the Fornell-Larcker matrix, the diagonal elements, which are the square roots of the Average Variance Extracted (AVE) for each construct, surpassed the inter-construct correlations, as Table 3 details and as noted by Hilkenmeier et al. (2020). This indicates that each construct is uniquely defined, establishing its discriminant validity. The reliability and validity metrics ensure the integrity of the latent constructs within the variables. Verifying these measures is essential prior to proceeding with the structural model analysis, as recommended by Hair et al. (2022).

Table 3. The Fornell-Larcker for Each Variables.

	ATT	EK	PI	PK
ATT	**0.762**			
EK	0.741	**0.788**		
PI	0.706	0.731	**0.77**	
PK	0.726	0.736	0.651	**0.753**

Structural Model

After validating the measurement model, the structural model was analyzed. According to Hair et al. (2021), R2 values, which measure the amount of variance explained, are classified as weak (0.25), moderate (0.50), or strong (0.75). Table 4 reveals that the model accounted for 72.6% of the variance in attitude motivation and 57.5% in the intention to buy upcycled apparel, demonstrating the strength of the model's predictive capability.

Table 4 The coefficient of determinants

Endogenous variables	Coefficient of determination(R2)
ATT	0.726
PI	0.575

The research hypotheses were evaluated using a bootstrapping method with 5,000 subsamples to determine a 95% confidence interval, following the approach recommended by Hair et al. (2021). The analysis confirmed a significant and positive effect of both environmental apparel knowledge and product knowledge on attitude towards, and intention to purchase, upcycled apparel. Additionally, the results underscored that attitude directly enhances the intention to buy upcycled apparel and acts as a mediator between both types of knowledge and purchasing intentions. Detailed outcomes are presented in Table 5.

Table 5. Hypotheses Test Results

Path	Path coefficients	T statistics	P values	LLCI (5.00%)	ULCI (95.00%)	Result
EK -> PI	0.385	4.559	0	0.241	0.521	H1 Supported
PK -> PI	0.175	2.61	0.009	0.065	0.289	H2 Supported
EK -> ATT	0.682	16.11	0	0.61	0.749	H3 Supported
PK -> ATT	0.211	4.443	0	0.133	0.291	H4 Supported
ATT-> PI	0.255	3.422	0.001	0.134	0.376	H5 Supported
EK -> ATT->PI	0.174	3.202	0.001	0.089	0.266	H6 Supported
PK -> ATT->PI	0.054	2.863	0.004	0.025	0.086	H7 Supported

Discussion and Conclusion

This research explored how environmental awareness, product knowledge, and attitudes affect consumer intentions to purchase upcycled clothing. In light of ongoing environmental challenges and the urgent call for sustainable practices, the fashion sector must prioritize eco-conscious initiatives. Equally important is the shift that consumers need to make from conventional products to environmentally friendly alternatives, which propels the sustainable fashion movement forward. In sync with this perspective, it becomes paramount for stakeholders including marketers, manufacturers, and policymakers to lead the way, embedding sustainability at the core of their operations, and thereby furthering sustainable development.

This research found that both environmental and product knowledge significantly and positively influence attitudes and the intention to purchase upcycled apparel. While previous studies have shown mixed results regarding the impact of environmental knowledge on sustainable consumption, this investigation underscores that awareness of environmental and societal concerns related to fashion significantly affects the buying decisions of Chinese consumers, corroborating findings from Blazquez et al. (2020), Salem and Alanadoly (2021), and Hassan (2022). Additionally, this study aligns with earlier research by Wang et al. (2019), Zheng et al. (2021), and Zameer and Yasmeen (2022), confirming a strong positive connection between product knowledge and intentions to purchase upcycled apparel. The role of attitude as a mediator in these relationships is also affirmed, echoing previous research by Sun, Y and Wang (2020), Sadiq et al. (2021), and Chaihanchanchai and Anantachart (2023).

Theoretical Implications

This research advances our comprehension of sustainable consumption. The study introduces a pathway model that links environmental knowledge and product knowledge with purchase intention through attitude, specifically within the sustainable fashion consumption context. This is particularly relevant for both marketing and consumer behavior studies. Moreover, emphasizing the value of equipping consumers with enhanced sustainability and product knowledge can foster a positive attitude, highlighting sustainable consumption patterns, especially in non-Western settings. The insights gained from this study can further enrich our grasp of the driving factors and outcomes related to intentions to buy upcycled apparel.

Practical and Social Implications

This study offers a comprehensive model for marketers to gauge the effects of attitude, environmental knowledge, and product knowledge on the purchase intentions of upcycled apparel. It highlights the necessity of educational campaigns to boost consumer environmental consciousness. Additionally, it is vital for sustainably marketed fashion products to clearly articulate the environmental or societal issues they aim to address.

Due to prevalent uncertainties around upcycled apparel, potential buyers may be reluctant to proceed with purchases. Overcoming this challenge requires policymakers, marketers, and supply chain professionals to effectively communicate the benefits and scientific backing of upcycled apparel to the public. Such transparency can empower the fashion industry and retailers to steer consumers towards more sustainable choices, thereby advancing sustainable development objectives.

Limitations and Suggestions for Future Research

This research contributes valuable insights to existing literature; however, it's important to acknowledge its limitations, which open paths for further investigation. A notable limitation is the reliance on self-administered questionnaires for data collection. The accuracy of responses depends on the participants' comprehension and interpretation of the questions. To enhance the reliability of future studies, employing a variety of data collection methods could provide more robust validation and enrichment of the findings.

Another limitation lies in the sample size, which restricts the generalizability of the results to a wider population. For a more comprehensive exploration of the hypotheses, subsequent research should involve a larger sample to ensure a more extensive data set.

Geographically, this study is rooted in China. Future research might extend to other developed and developing nations to gain a more global perspective.

Lastly, the range of variables chosen for this study's framework could be expanded in future research. Integrating additional factors like engagement with fashion, perceived risks, and a deeper understanding of sustainable fashion might offer a more nuanced view of their influence on purchase intentions.

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