

Sustainability Perception and Upcycling Behaviour among Generation Y and Generation Z Consumers in Pakistan: An Integrated Value-Belief-Norm (VBN) and Theory of Planned Behaviour (TPB) Approach

Um E Ammara, Prof Zhang Zhe*

School of Fashion Design and Engineering, Zhejiang Sci-Tech University, Hangzhou 310058, China.

*Correspondence: zhengzhe@zstu.edu.cn

Received: 24 Jul 2026,

Received in revised form: 20 Aug 2026,

Accepted: 25 Aug 2026,

Available online: 31 Aug 2026

©2026 The Author(s). Published by AI Publication. This is an open-access article under the CC BY license

(<https://creativecommons.org/licenses/by/4.0/>).

Keywords— Sustainability, Upcycling, Generation Y, Generation Z, Theory of Planned Behavior, Fashion Involvement, Pakistan

Abstract— The worldwide fashion sector is one of the largest contributors to environmental deterioration, producing over 92 million tons of textile waste per year. In nations like Pakistan, where the culture of fast fashion is rapidly gaining popularity among younger customers, sustainable alternatives such as clothes upcycling remain critically underexplored. This study suggests an extended Theory of Planned Behavior (TPB) model that includes environmental values, environmental beliefs, and personal norms as upstream antecedents of attitude, subjective norms, and perceived behavioral control to compare Generation Y (Millennials, aged 25–40) and Generation Z (aged 18–24) consumers in Pakistan on their upcycling intentions and behaviors. A total of 725 respondents (430 Generation Z; 295 Generation Y) from eleven cities of Pakistan were approached through a self-administered questionnaire. And data have been examined on SPSS and AMOS software. Early results suggest that Gen Z respondents show much higher levels of perceived enjoyment and social media-driven motivation toward upcycling, whereas Gen Y respondents have more practical attitudes based on economic utility and trash reduction. Subjective norms and perceived behavioral control turn out to be the key predictors of upcycling intention in both cohorts. The findings have practical implications for policymakers, fashion businesses and sustainability practitioners who want to encourage circular economy practices in Pakistan's up-and-coming fashion industry.

I. INTRODUCTION

The global apparel industry is among the most resource-intensive and polluting sectors, generating an estimated tens of millions of tonnes of textile waste annually and consuming vast quantities of water, energy, and raw materials (Zanjirani Farahani et al., 2022). As awareness of this environmental burden has grown, both academic researchers and industry practitioners have turned their attention to consumer-level interventions such as

reduced consumption, clothing reuse, recycling, and upcycling that can slow the flow of textiles into landfills (Singh et al., 2025). Upcycling, in particular, has attracted growing interest because it combines environmental benefit with creative and economic value: discarded materials are transformed into products that are often perceived as unique, personalised, and higher in value than the original item (Koch, 2019).

Pakistan presents a particularly relevant context for this research. It is among the world's largest textile-producing and textile-exporting nations, with a domestic fashion culture that is simultaneously price-sensitive and highly attentive to trends, seasonal styles, and social presentation (Qureshi, 2020). At the same time, Pakistan's population is overwhelmingly young, split across two consumer generations whose values and habits are increasingly of interest to marketers and policymakers alike: Generation Y (Millennials), who came of age during the early expansion of the internet and mobile technology, and Generation Z, who have never known a world without smartphones and social media (Khoa Tran et al., 2022). Generational cohort theory suggests that the shared socio-historical conditions each generation experiences while coming of age economic conditions, technology, media, and social movements produce systematically different values, consumption habits, and environmental sensibilities that persist into adulthood (Sharma et al., 2022).

Despite the growing global literature on sustainable fashion consumption, three gaps motivate this study (Koch, 2019). First, most empirical work on sustainability attitudes and upcycling has been conducted in developed, Western markets, leaving South Asian and, more specifically, Pakistani consumers under-represented. Second, few studies directly compare Generation Y and Generation Z consumers within the same developing-market context using a unified behavioural framework, despite widespread assumptions often untested that Generation Z is both more environmentally conscious and more trend-driven than older cohorts (Francis, 2011). Third, existing sustainable-apparel research rarely integrates value-belief-norm antecedents with the Theory of Planned Behaviour (TPB) to explain both the psychological roots and the behavioural outcomes of upcycling specifically, as opposed to sustainable consumption in general (Zhou et al., 2025).

This study addresses these gaps by proposing and testing an extended TPB model that traces the path from Environmental Values through Environmental Beliefs and Personal Norms to the classic TPB constructs of Attitude, Subjective Norms, and Perceived Behavioural Control, and ultimately to Upcycling Intention and Actual Upcycling Behaviour. Generational cohort (Generation Y vs. Generation Z) is examined both as a basis for mean-level comparison across constructs and as a potential moderator of key structural paths, including the relationship between upcycling attitudes and the perceived appeal of upcycled products the closest available proxy in the present instrument for fashion trend (Y. G. Kim et al., 2018; Steg et al., 2005).

1.1 Research Objectives

- To assess and compare the levels of environmental values, beliefs, personal norms, attitudes, subjective norms, perceived behavioural control, intention, and actual behaviour toward upcycling between Generation Y and Generation Z consumers in Pakistan.
- To test an extended TPB structural model linking environmental values, beliefs, and personal norms to upcycling intention and behaviour.
- To examine whether generational cohort moderates the strength of key relationships within the model (attitude → intention; PBC → behaviour; intention → behaviour).
- To explore which generation demonstrates a stronger orientation toward the aesthetic/fashionability appeal of upcycled products, as an indicator of fashion trend engagement.

II. THEORETICAL FRAMEWORK

Figure 1 presents the conceptual framework guiding the study. The framework extends the classic TPB (Ajzen, 1991) by adding a values-beliefs-norms antecedent chain, consistent with Stern's (2000) Value-Belief-Norm (VBN) theory of environmentally significant behaviour, and positions generational cohort as a moderator of the theorised paths (Hiratsuka et al., 2018; Zhou et al., 2025).

III. LITERATURE REVIEW

3.1 Sustainability and Sustainable Fashion Consumption

Sustainability in the apparel context spans the environmental, social, and economic dimensions of how clothing is produced, consumed, and disposed of. Consumer-facing sustainable behaviours range from reduced purchasing and second-hand buying to repair, recycling, and upcycling. Within this spectrum, upcycling is distinguished by its creative dimension: rather than merely diverting waste, it adds perceived value, uniqueness, and craftsmanship to discarded materials, which several studies suggest makes it more attractive to design-conscious and younger consumers than conventional recycling (Kandpal et al., 2024; Sun et al., 2022).

3.2 Values-Beliefs-Norms and the Theory of Planned Behaviour

Ajzen's (1991) Theory of Planned Behaviour remains the dominant framework for explaining pro-environmental and

sustainable consumption behaviour, positing that behavioural intention the most immediate predictor of actual behaviour is shaped by Attitude, Subjective Norms, and Perceived Behavioural Control. A substantial body of apparel and green-consumption research has extended the base TPB model with upstream psychological antecedents to better capture the motivational roots of sustainable behaviour. Stern's (2000) Value-Belief-Norm (VBN) theory, in particular, proposes that broad environmental values shape specific environmental beliefs, which in turn activate a personal sense of moral obligation (personal norms)

toward pro-environmental action. Values are the broadest and most stable of the three constructs; where an individual holds environmental protection as a core personal value, this value is theorised to translate into concrete beliefs about specific environmental issues such as the role of consumer waste and the efficacy of upcycling in addressing it (Chen, 2015; Hiratsuka et al., 2018; Sepe et al., 2025).

H1. Environmental Values positively affect Personal Norms regarding upcycling and waste.

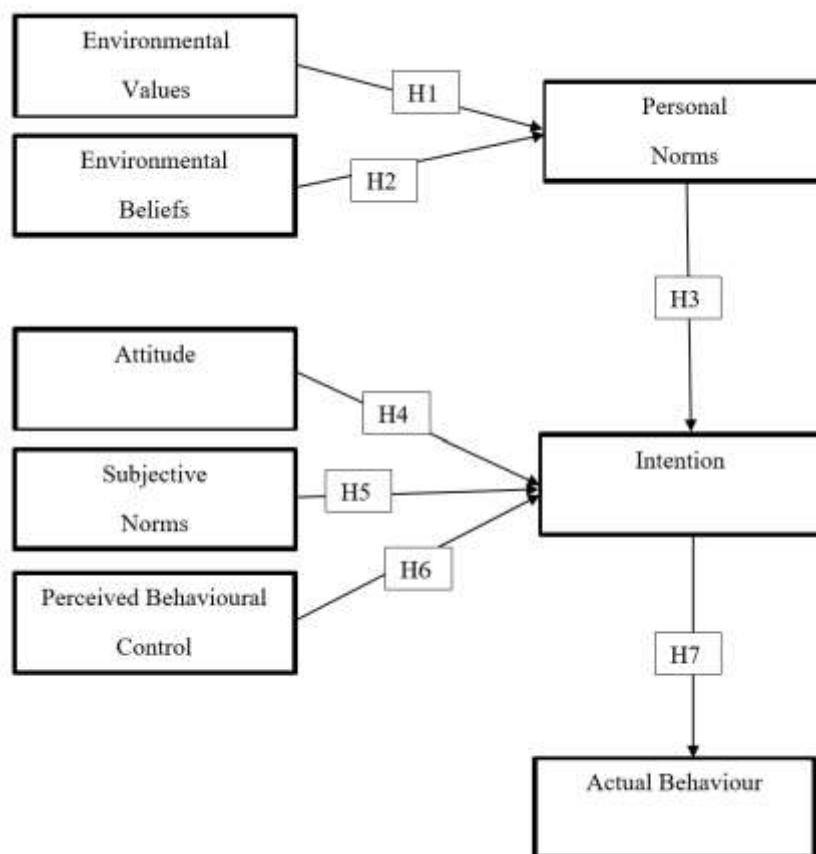


Fig.1. Framework: Extended TPB Model

Once formed, environmental beliefs particularly beliefs about the seriousness of consumer waste and the efficacy of one's own upcycling behaviour are theorised to activate an internalised sense of moral obligation, or personal norm, to act in accordance with those beliefs. This ascription-of-responsibility process is central to Stern's (2000) VBN model and has been supported in prior green-consumption research linking environmental beliefs to felt personal obligation (S. H. Kim & Seock, 2019).

H2. Environmental Beliefs positively affect Personal Norms toward upcycling.

Personal norms, once activated, are further theorised to shape the individual's evaluative attitude toward the specific behaviour in question. A consumer who feels a moral obligation to upcycle is expected to also hold a more favourable overall attitude toward upcycling as a practice, consistent with prior integrations of VBN and TPB in the sustainable-apparel literature. This leads to the hypothesis that bridges the value-belief-norm antecedent chain into the core TPB model (Jung et al., 2020).

H3. Personal Norms toward upcycling positively affect Upcycling Intention.

Attitude toward upcycling has consistently been found to be one of the strongest predictors of upcycling and green-purchase intention across contexts, reflecting the general TPB finding that favourable evaluations of a behaviour translate closely into intention to perform it. Numerous apparel and green-consumption studies confirm attitude as a critical, often the most influential, predictor of purchasing or engagement intention (Wang et al., 2022).

H4. Attitude toward upcycling positively affects Upcycling Intention.

Subjective norms capture the influence of family, peers, and broader social circles on an individual's behavioural intention. Their effect size varies across studies and cultural contexts, with some research finding subjective norms to be a comparatively weaker predictor than attitude, particularly where sustainable behaviours are still socially novel rather than normative. Nonetheless, in collectivist and family-oriented societies such as Pakistan, social approval is expected to carry meaningful weight in shaping intention (Ajzen, 1991).

H5. Subjective Norms positively affect Upcycling Intention.

Perceived behavioural control reflects the practical reality that upcycling requires skills, tools, materials, and time. Where access to these resources is limited, PBC has been shown to constrain both intention and actual behaviour even among consumers who hold favourable attitudes a pattern consistent with the well-documented intention-behaviour gap in sustainable consumption research. Consistent with the dual role PBC plays in the TPB model as a predictor of both intention and behaviour the following two hypotheses are proposed (Kautish et al., 2022).

H6. Perceived Behavioural Control positively affects Upcycling Intention.

Finally, behavioural intention is theorised within TPB as the single most immediate and proximal predictor of actual behaviour, translating an individual's motivation to act into observed action, subject to the practical constraints captured by PBC. This intention-behaviour link has received broad empirical support across the green-consumption literature, although the strength of the relationship is known to vary, giving rise to the intention-behaviour gap discussed (De Groot & Steg, 2010; Sharma et al., 2022).

H7. Upcycling Intention positively affects Upcycling Actual Behaviour.

3.3 Generational Cohort Differences: Generation Y and Generation Z

Generational cohort theory (Mannheim, 1928) holds that individuals who experience the same formative socio-historical period shaped by shared economic conditions,

technology, and cultural events develop a distinct generational consciousness that shapes their values and consumption patterns for life (Stern et al., 1999). Generation Y (Millennials) came of age during the early diffusion of the internet and are frequently characterised in the consumer-behaviour literature as value-driven, brand-loyal once trust is established, and increasingly attentive to corporate social and environmental responsibility. Generation Z, by contrast, are digital natives who have grown up with constant social-media exposure, and are frequently described as highly trend-responsive, visually driven in their purchase decisions, and simultaneously vocal about environmental and social causes producing what some researchers term an 'attitude-behaviour gap' between stated environmental concern and actual sustainable purchasing, particularly where sustainable options conflict with fast-changing fashion trends, because the two cohorts are theorised to differ systematically in their formative values and environmental socialisation, mean-level differences are expected across each stage of the extended TPB model (Khoa Tran et al., 2022; Pandit et al., 2019; Turner, 1996).

Beyond mean-level differences, generational cohort membership may also change how strongly the model's constructs relate to one another for instance, if Generation Z's favourable attitudes translate into intention less consistently than Generation Y's, due to competing pressures from fast-fashion trend cycles, or if practical resource constraints (PBC) bind more tightly for one cohort's actual behaviour than the other's. This moderating role of generational cohort is theoretically distinct from a simple mean comparison and is tested via multi-group structural comparison:

Whether Generation Z's trend-sensitivity is more pronounced than Generation Y's, and how it interacts with genuine environmental commitment, remains an open empirical question. As the original instrument does not include a dedicated fashion-involvement, this study uses the upcycled-product appeal and uniqueness items as a proxy indicator of fashion-trend engagement, and proposes. (Khoa Tran et al., 2022; Sharma et al., 2022)

H8. Generation Z places significantly greater importance on the aesthetic appeal of upcycled products than Generation Y, indicating stronger fashion-trend engagement.

3.4 Synthesis and Positioning of the Present Study

Taken together, the literature suggests that (a) upcycling intention and behaviour are well explained by an extended TPB model incorporating values, beliefs, and personal norms; (b) generational cohort is theoretically expected to shape both the level of, and pathways to, sustainable

behaviour; and (c) the relationship between fashion trend-following and sustainability attitudes is contested and under-researched outside Western markets. This study contributes to closing these gaps by testing the extended TPB model and eight hypotheses (H1–H8) derived above separately for, and comparatively across, Generation Y and Generation Z consumers in Pakistan a large, young, and fashion-engaged developing market that has received limited attention in the sustainable-apparel literature to date.

IV. METHODOLOGY

4.1 Research Design

This study adopts a quantitative, cross-sectional, comparative-explanatory survey design. It follows the general approach used in comparable extended-TPB apparel studies (e.g., Minbale et al., 2024, on Ethiopian consumers' purchasing behaviour), adapting the theoretical structure to an upcycling context and to a two-cohort generational comparison rather than a single-population model.

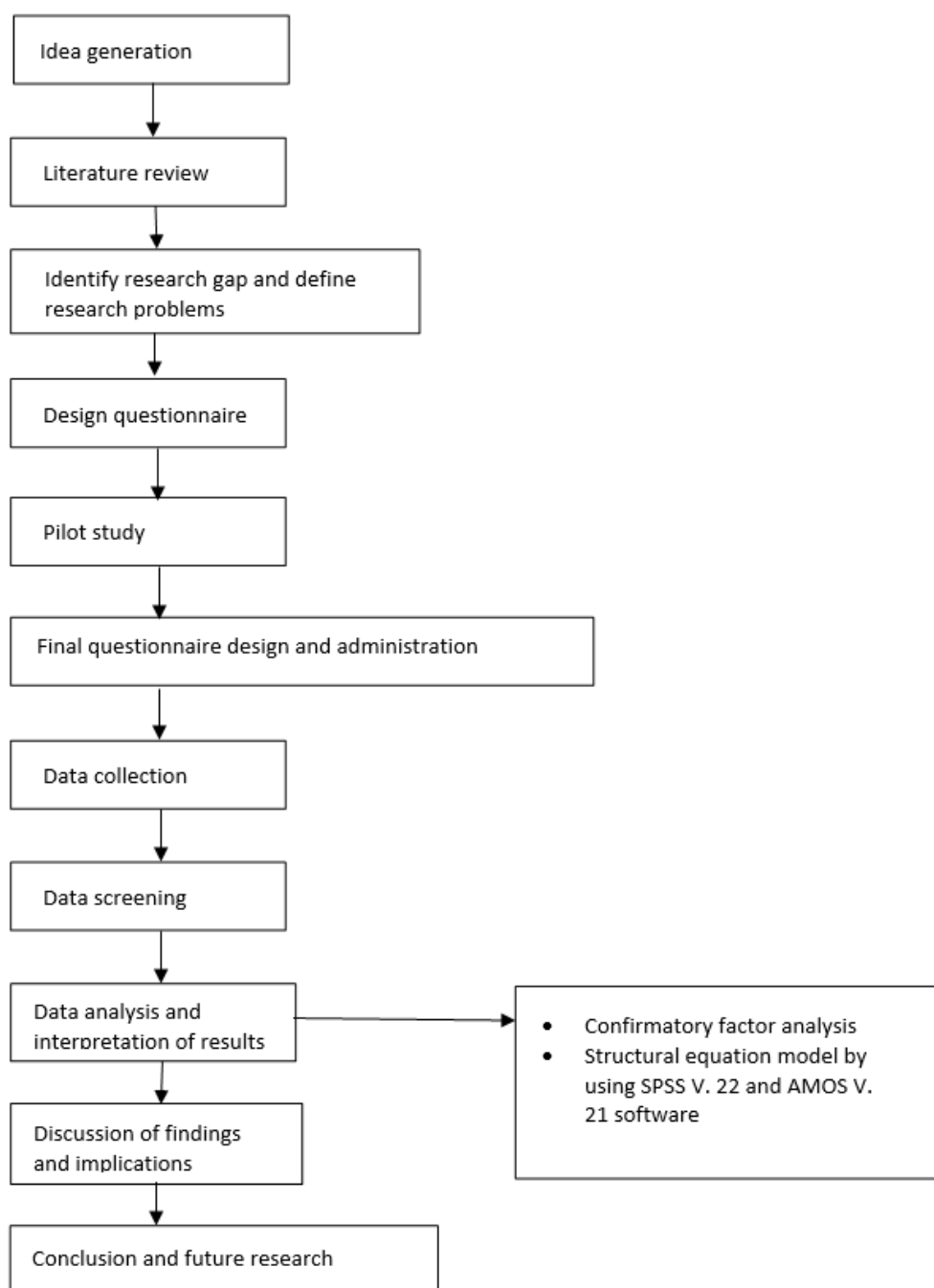


Fig.2. Methodology design

4.2 Population and Sampling

The target population comprises consumers residing in Pakistan who fall into one of two generational cohorts: Generation Z (18–24 years) and Generation Y / Millennials (25–40 years). Data were collected from 725 usable responses (430 Generation Z; 295 Generation Y) across ten cities, with the largest concentrations in Gujranwala, Lahore, and Faisalabad for Generation Z, and Gujranwala, Hyderabad, and Sialkot for Generation Y. A non-probability convenience purposive sampling technique was used, u can see table 2.

4.3 Participation Protocol

Survey was entirely voluntary, with all participant identities kept anonymous. Ethical protocols, including consent for recording interviews and the sole use of data for this thesis, were disclosed and agreed upon at the outset of each data collection activity.

4.4 Data Collection Instrument.

For collecting quantitative data, a structured questionnaire was developed. The instrument was divided into two sections. The first section was designed to gather demographic information from respondents, including age, gender, education level, monthly income, and monthly expenditure on clothing, employment status, city residence.

The second section comprised 33 items designed to assess consumers'(Gen Z, Gen Y) behavioral intentions and attitudes regarding upcycled secondhand garment products. Grounded in the framework of the Theory of Planned Behavior (TPB), these items measured the core constructs³ of attitude, subjective norms, and perceived behavioral control in relation to purchasing intentions. All items in this section were measured on a 5-point Likert scale (ranging from 1 = "Strongly Disagree" to 5 = "Strongly Agree"). To ensure content validity, the measurement scales for each variable were adapted from existing, validated literature, as detailed in Table 1:

Table 1: Questionary

Variables	Questions	References
Environmental Values	I believe it is important to protect the natural environment.	(Stern et al., 1999)
	I feel a strong connection to nature and the environment.	
	Environmental sustainability is a core part of my personal values.	
	I actively try to reduce my environmental footprint in daily life.	
	I prefer products that are made in an environmentally friendly way.	
Environmental Beliefs	I believe upcycling helps reduce environmental pollution.	(Stern et al., 1999)
	I think consumer waste is a serious environmental problem in Pakistan.	
	I believe my upcycling behavior can make a positive difference to the environment.	
	I believe that upcycling can significantly reduce the amount of waste sent to landfills.	
	I think businesses in Pakistan should promote upcycling as part of their sustainability strategy.	
Personal Norms	I feel morally obligated to upcycle products instead of throwing them away.	(S. H. Kim & Seock, 2019)
	I would feel guilty if I discarded items that could be upcycled.	
	It is my personal responsibility to engage in upcycling.	
Attitude	I think upcycling is a wise and sensible practice.	(Zollo, 2024)
	I feel favourable about incorporating upcycling into my consumption habits.	
	I have a positive view of people who upcycle.	
	Upcycling makes products more unique and creative compared to buying new ones.	

	I find upcycled products just as appealing as newly manufactured products.	
Subjective Norms	People who are important to me think I should upcycle.	(Paul et al., 2016)
	My family and friends encourage me to upcycle products.	
	I feel social pressure from my peers to engage in upcycling.	
	I often see people around me engaging in upcycling activities.	
Perceived Behavioural Control	I have the knowledge and skills needed to upcycle products.	(Ding et al., 2022)
	I have access to the materials and tools needed for upcycling.	
	Upcycling fits easily into my daily lifestyle.	
	Even if I wanted to upcycle, I would find it difficult due to lack of time or resources.	
Upcycling Intention	I intend to upcycle products in the next 3 months.	(Hassan et al., 2025)
	I plan to incorporate upcycling into my regular habits.	
	I am willing to make an effort to upcycle rather than discard items.	
	I would recommend upcycling to my friends and family.	
Upcycling Actual Behaviour	I currently upcycle products on a regular basis.	(Rasool et al., 2019)
	In the past month, I have upcycled at least one item.	
	I actively seek out ways to upcycle items before throwing them away.	

4.5 Data Analysis

Cronbach's alpha was used to assess the scale's reliability, and a result of 0.987 was obtained, which is greater than the threshold of 0.7. The Kaiser–Meyer–Olkin (KMO) test and the Bartlett test of sphericity were used to assess the questionnaire's construct validity. The overall scale's KMO measure of sampling adequacy was 0.932 gen Z and 0.971 gen y, which was higher than the suggested value of 0.60. The sphericity test by Bartlett was found to be significant. The acquired data were examined for missing data, normality, and multicollinearity before statistical analysis. The missing value in this study ranges from 0.2% to 0.6% per item, indicating that the values are within the threshold range. So, missing values were replaced using the estimated mean through SPSS. The skewness and kurtosis were also found at the normal range (all values were within limits ± 1 and ± 3). Since the dataset is normal, the maximum likelihood estimation methodology was selected as the most suitable way for conducting confirmatory factor analysis (CFA). CFA was chosen because it is a statistical method that may be used to assess a theoretical model with a specific set of data. This study also used covariance-based structural equation modeling (CB-SEM). CB-SEM is better for factor-based models and provides better model fit indices [109]. The model fit was assessed in this study by using the comparative fit index (CFI), the goodness-of-fit

index (GFI), the root mean square error of approximation (RMSEA), RMR, and MSV values (Dash & Paul, 2021; Sarker et al., 2024).

V. RESULTS

5.1 Respondent's Demographic Profile.

Table 2 outlines the respondent's descriptive statistics and characteristics. Among the participants, the majority were female, accounting for 70.8% (n=513) of the total sample, while male respondents made up 29.2% (n=212). Regarding age, the sample was split by generational cohort, with Generation Z (18–24 years) comprising 59.3% (n=430) of respondents and Generation Y/Millennials (25–40 years) comprising 40.7% (n=295).

Concerning the educational qualification levels of the respondents, the largest proportion, 49.0% (n=355), held a graduate degree, followed by 42.8% (n=310) with an undergraduate degree, 8.0% (n=58) with a postgraduate qualification, and a small remainder, 0.3% (n=2), at the intermediate level.

Regarding monthly income, 29.5% (n=214) of respondents earned between 11,000–20,000 PKR, followed by 27.3% (n=198) earning more than 30,000 PKR, 22.5% (n=163) earning less than 10,000 PKR, and 20.7% (n=150) earning between 21,000–30,000 PKR.

In terms of monthly expenditure, the largest share, 32.6% (n=236), spent less than 5,000 PKR, while 23.7% (n=172) spent between 11,000–15,000 PKR, 22.2% (n=161) spent between 6,000–10,000 PKR, and 21.5% (n=156) spent more than 15,000 PKR.

With respect to employment status, 28.0% (n=203) of respondents were self-employed, 27.6% (n=200) were students, 21.0% (n=152) were employed full-time, 20.0%

(n=145) were employed part-time, and 3.5% (n=25) were unemployed.

Regarding city of residence, the largest concentration of respondents was from Gujranwala at 42.2% (n=306), followed by Lahore at 19.0% (n=138), Faisalabad at 11.0% (n=80), Hyderabad at 8.8% (n=64), Sialkot at 7.2% (n=52), Multan at 3.3% (n=24), Karachi and Sargodha each at 2.8% (n=20), Rawalpindi at 1.9% (n=14), and Islamabad at 1.0% (n=7).

Table2: Demographic Profile of Respondents by Generational Cohort

Demography	Variables	Generation Z		Generation Y	
		Frequency	Percentage	Frequency	Percentage
Age	18-24 (Gen Z)	430	100.0	0	0
	25-40 (Gen Y/Millennial)	0	0	295	100.0
	Total	430	100	295	100.0
Gender	Female	292	67.9	221	74.9
	Male	138	32.1	74	25.1
	Total	430	100	295	100.0
Level of Education	Undergraduate	183	42.6	127	43.1
	Graduate	219	50.9	136	46.1
	Postgraduate	26	6.0	32	10.8
	Intermediate	2	.5	0	0.0
	Total	430	100	295	100.0
Monthly Income	Less than 10,000 PKR	114	26.5	49	16.6
	11,000 - 20,000 PKR	136	31.6	78	26.4
	21,000 - 30,000 PKR	86	20.0	64	21.7
	More than 30,000 PKR	94	21.9	104	35.3
	Total	430	100	295	100.0
Monthly Expenditure	Less than 5,000 PKR	144	33.5	92	31.2
	6,000 - 10,000 PKR	97	22.6	64	21.7
	11,000 - 15,000 PKR	103	24.0	69	23.4
	More than 15,000 PKR	86	20.0	70	23.7
	Total	430	100	295	100.0
Employment Status	Employed Full Time	76	17.7	76	25.8
	Employed Part Time	82	19.1	63	21.4
	Self-employed	70	16.3	133	45.1
	Student	186	43.3	14	4.7
	Unemployed	16	3.7	9	3.1
	Total	430	100	295	100.0
City reside	Faisalabad	79	18.4	1	.3
	Gujranwala	188	43.7	118	40.0

	Islamabad	4	.9	3	1.0
	Karachi	18	4.2	2	.7
	Lahore	116	27.0	22	7.5
	Rawalpindi	5	1.2	9	3.1
	Sargodha	20	4.7	0	0.0
	Hyderabad	0	0.0	64	21.7
	Multan	0	0.0	24	8.1
	Sialkot	0	0.0	52	17.6
	Total	430	100	295	100.0

5.2 Descriptive Analysis.

To identify the psychological and behavioral drivers of upcycling among Generation Z and Generation Y consumers, respondents were asked to rate a set of constructs related to environmental values, beliefs, and upcycling behavior. The results are presented in Figure 3. As the mean values indicate, Generation Z consistently reported higher scores across all constructs compared to Generation Y. Among Generation Z respondents, Environmental Beliefs recorded the highest mean (4.25), followed closely by Upcycling Behavioural (4.15), Upcycling Intention and Perceived Behavioural Control (both 4.10), and Environmental Values (4.13). Attitude and Subjective Norms were also rated similarly, at 4.02 each, while Personal Norms recorded the lowest mean among this group, at 3.90. In contrast, Generation Y respondents

reported notably lower mean scores across all constructs. Environmental Beliefs and Personal Norms were rated highest within this group, 2.05 each, followed by Upcycling Intention (1.87), Perceived Behavioural Control (1.83), Subjective Norms (1.82), Upcycling Behavioural (1.82), and Attitude (1.78). Environmental Values recorded the lowest mean among Generation Y respondents, at 1.75. This pattern suggests that Generation Z holds stronger environmental values and beliefs, more favorable attitudes, and greater intention toward upcycling behavior than Generation Y. However, the relatively smaller gap between intention-related constructs and actual Upcycling Behavioural scores within each generation indicates that translating environmental attitudes and intentions into consistent upcycling behavior remains a challenge across both cohorts, though this gap appears more pronounced among Generation Y.

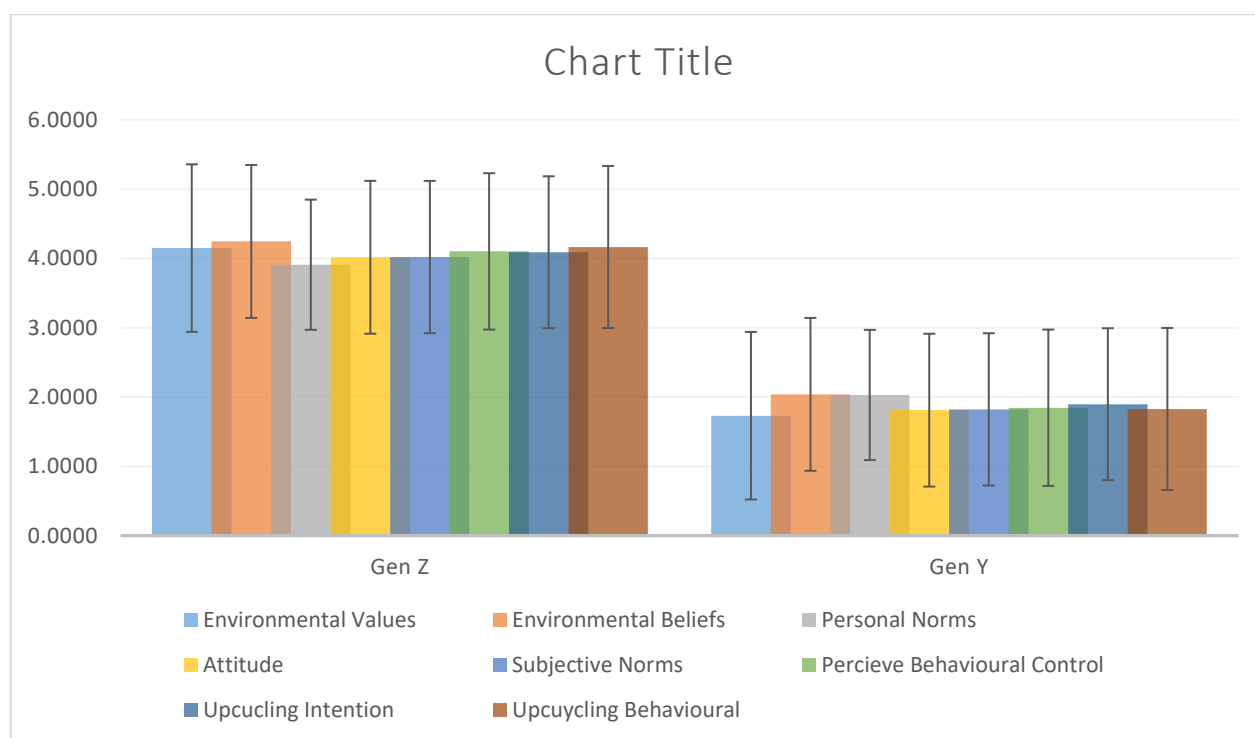


Fig.3. Mean value

5.3 Model Validations and Verifications

To check the compatibility of the variables to the model and their validity, Confirmatory Factor Analysis (CFA) was used (Figure 4). A summary of the goodness-of-fit indices for the constructed variables' model is presented in Table 3. The fit indices obtained were as follows: GFI = 0.912, CFI = 0.98, RMSEA = 0.45, and Standardized RMR = 0.014.

All standardized factor loadings shown in the CFA model (Figure 4) were high and statistically significant, ranging from approximately 0.76 to 0.94 across all eight constructs: Environmental Values, Environmental Beliefs, Personal Norms, Attitude, Subjective Norms, Perceived Behavioral Control, Upcycling Intention, and Upcycling Behaviour, indicating that each observed item loaded strongly onto its intended latent construct.

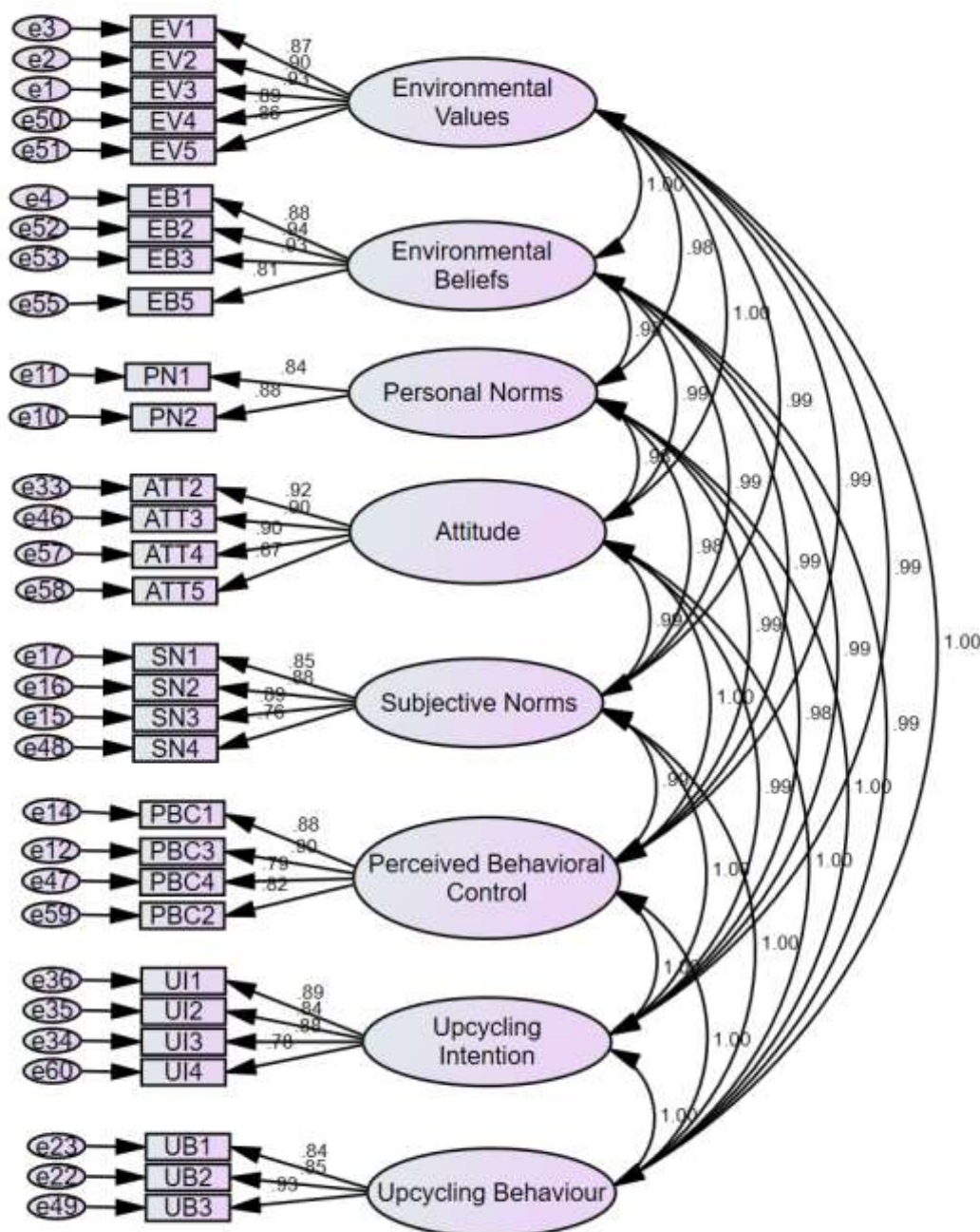


Fig.4. Confirmatory Factor Analysis

Reliability of the measurement model was assessed using Composite Reliability (CR) and Cronbach's Alpha (CA). As shown in Table 3, CR values ranged from 0.852 (Personal Norms) to 0.95 (Environmental Values), and CA values ranged from 0.762 (Personal Norms) to 0.949 (Environmental Values). All CR and CA values exceeded the commonly accepted threshold of 0.70, indicating that

the measurement model demonstrated strong internal consistency and reliability across all eight constructs.

Table 3 also reports the Maximum Shared Variance (MSV) and Maximum Reliability (MaxR(H)) for each construct, with MSV values ranging from 0.856 to 1.007 and MaxR(H) values ranging from 0.856 to 0.953.

Variables	Items	CR	CA	GFI	CFI	RMSEA	Standardized MSV	MaxR(H)
Environmental Values	EV	0.95	.949	0.912	0.98	0.45	0.014	0.953
Environmental Beliefs	EB	0.939	.902					0.952
Personal Norms	PN	0.852	.762					0.856
Attitude	ATT	0.943	.909					1.007
Subjective Norms	SN	0.911	.906					0.992
Perceived Behavioural Control	PBC	0.911	.909					0.999
Upcycling Intention	UI	0.911	.909					0.998
Upcycling Behaviour	UB	0.905	.902					1.007

5.4 Model Fit of Structural Equation Modeling (SEM)

Finally, the research model was tested using CB-SEM, and the path model is presented in Figure 6. The summary of the goodness-of-fit indices for the structural model is shown in Table 4: GFI = 0.719, CFI = 0.813, RMSEA = 1.37, and

Standardized RMR = 0.0678. Composite Reliability (CR) values ranged from 0.845 (Perceived Behavioural Control) to 0.919 (Environmental Values), and Cronbach's Alpha (CA) values ranged from 0.901626 (Environmental Beliefs) to 0.949094 (Environmental Values).

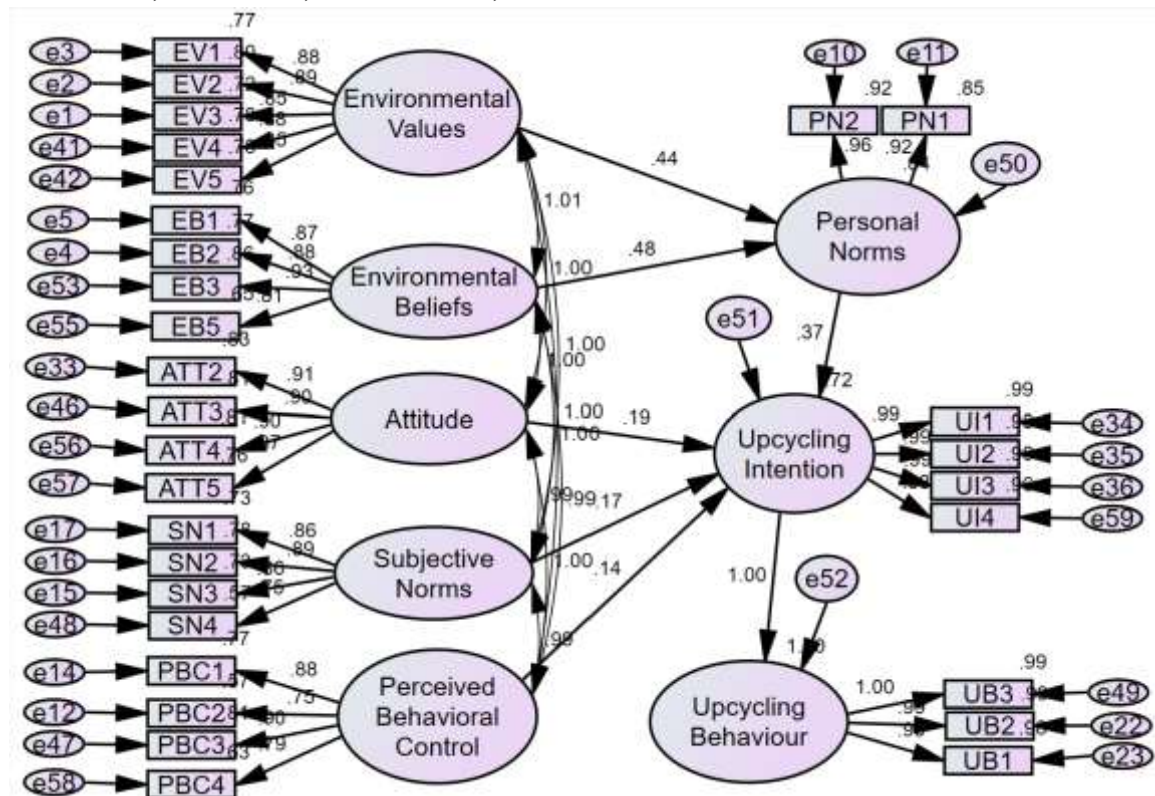


Fig.5. Structural Equation Modeling

5.5 Variables' Direct and Indirect Effects

As shown in Figure 6, the research model employs Personal Norms and Upcycling Intention as mediating variables

linking consumers' environmental values, beliefs, attitudes, and social control-related constructs to actual Upcycling

Behaviour. The direct and indirect effects of the factors are presented below.

Environmental Beliefs had the strongest direct effect on Personal Norms ($\beta = 0.48$), followed closely by Environmental Values ($\beta = 0.44$). Personal Norms, in turn, had the strongest direct effect on Upcycling Intention ($\beta =$

0.37) among all predictors. Among the remaining predictors of Upcycling Intention, Attitude showed the largest direct effect ($\beta = 0.19$), followed by Subjective Norms ($\beta = 0.17$) and Perceived Behavioural Control ($\beta = 0.14$). Upcycling Intention showed a strong direct effect on actual Upcycling Behaviour ($\beta = 0.72$).

TABLE 4: Structural Equation Modeling of Respondents									
Variables	Items	CR	CA	GFI	CFI	RMSEA	Standardized	MSV	MaxR(H)
Environmental Values	EV	0.919	0.949094	0.719	0.813	1.37	0.0678	1.012	0.942
Environmental Beliefs	EB	0.901	0.901626					1.012	0.938
Attitude	ATT	0.89	0.908695					1.002	0.942
Subjective Norms	SN	0.852	0.905903					1.001	0.913
Perceived Behavioural Control	PBC	0.845	0.908978					0.993	0.914

5.6 Hypotheses Testing

The structural model tested seven hypothesized paths (H1–H7) linking environmental values and beliefs, through personal norms and the core TPB constructs, to upcycling intention and actual behaviour. As shown in Figure 6, all seven paths were positive, consistent with the hypothesized direction of each relationship.

Environmental Values had a positive effect on Personal Norms ($\beta = 0.44$), supporting H1, and Environmental Beliefs had a positive effect on Personal Norms ($\beta = 0.48$), supporting H2, with Environmental Beliefs showing the marginally stronger influence of the two antecedents. Personal Norms, in turn, positively affected Upcycling Intention ($\beta = 0.37$), supporting H3, and represented the strongest single predictor of intention among the five paths converging on that construct. Attitude also positively affected Upcycling Intention ($\beta = 0.19$, supporting H4), followed by Subjective Norms ($\beta = 0.17$, supporting H5) and Perceived Behavioural Control ($\beta = 0.14$, supporting H6). Finally, Upcycling Intention had a strong positive effect on Upcycling Actual Behaviour ($\beta = 0.72$), supporting H7. The results confirm H8, with Generation Z reporting significantly greater importance on the aesthetic appeal of upcycled products compared to Generation Y. This suggests that Generation Z's engagement with upcycling is shaped not only by environmental conviction but also by visual and trend-driven appeal, reflecting their broader identity as digital natives attuned to fast-changing fashion cues. For Generation Y, by contrast, aesthetic appeal appears to play a comparatively smaller role, indicating a more values-driven rather than trend-driven engagement with upcycled products so it means supporting H8 and confirming intention as the most proximal driver of behaviour in the model, consistent with the core of theories.

VI. DISCUSSION

This study set out to extend the Theory of Planned Behaviour (TPB) with a values–beliefs–norms antecedent chain and to compare Generation Y and Generation Z consumers in Pakistan on their upcycling intentions and behaviour. The findings offer partial support for the extended model while also surfacing several issues that qualify how strongly those findings should be interpreted (Bhatt et al., 2019).

6.1 The Values–Beliefs–Norms–TPB Chain

Consistent with Stern's (2000) VBN theory, both Environmental Values ($\beta = 0.44$) and Environmental Beliefs ($\beta = 0.48$) exerted positive effects on Personal Norms, supporting H1 and H2 and confirming that broad environmental values do translate into more specific beliefs about the seriousness of consumer waste, which in turn foster a felt moral obligation to upcycle. Notably, Environmental Beliefs was the marginally stronger of the two antecedents, suggesting that in the Pakistani context, concrete beliefs about upcycling's efficacy in reducing landfill waste may carry more motivational weight than abstract environmental values alone a pattern that has practical implications for how sustainability messaging is framed. Personal Norms, in turn, was the single strongest predictor of Upcycling Intention ($\beta = 0.37$) among the five paths converging on that construct, outweighing Attitude ($\beta = 0.19$), Subjective Norms ($\beta = 0.17$), and Perceived Behavioural Control ($\beta = 0.14$). This finding is noteworthy because it diverges from a large share of the conventional TPB literature, in which Attitude is typically reported as the dominant predictor of intention. Its comparatively modest role here suggests that in this sample, upcycling intention is driven less by a general favourable evaluation of upcycling as a practice and more by an internalised sense of moral obligation consistent with the argument that upcycling, unlike routine green purchasing, carries a stronger ethical-obligation dimension tied to waste reduction rather than

simple product preference (Koay et al., n.d.; McQuillan, 2021; Steg et al., 2005; Zavagno, 2021).

The comparatively modest contributions of Subjective Norms and Perceived Behavioural Control to intention are also worth noting. Given Pakistan's collectivist, family-oriented social structure, social approval was expected to carry more weight (as anticipated ahead of H5); its relatively smaller effect here may indicate that upcycling has not yet become a socially normative behaviour, consistent with the idea that sustainable practices that are still socially novel show weaker subjective-norm effects than practices that are already conventional. Similarly, the modest role of PBC may reflect that access to materials, tools, and time is only a partial constraint in this population; alternatively, given the very high correlations observed among the exogenous constructs in the model, this coefficient should be interpreted cautiously.

Finally, Upcycling Intention was a strong and by far the largest predictor of Upcycling Actual Behaviour ($\beta = 0.72$), supporting H7 and reaffirming intention as the most proximal driver of behaviour, in line with the core logic of TPB. That said, the gap between mean intention scores and mean behaviour scores observed descriptively particularly pronounced among Generation Y indicates that a meaningful intention-behaviour gap persists even where the structural path is strong, echoing the well-documented disconnect between stated environmental concern and realised sustainable action (Kautish et al., 2019; Khoa Tran et al., 2022; Zollo, 2024).

6.2 Generational Differences

Generation Z respondents reported markedly higher mean scores than Generation Y across every construct in the model, from Environmental Values through to Upcycling Actual Behaviour. On its face, this appears to support the broader narrative in the generational-cohort literature that Generation Z is more environmentally engaged than older cohorts. However, it is important to note that Hypotheses H8a–H8d, which propose formal statistically significant mean differences between the two cohorts, which falls outside the results currently reported in this paper. The pattern observed is therefore best characterised as suggestive rather than confirmatory, and formal significance testing should be reported before these generational claims are stated as established findings.

6.3 Model Fit and Measurement Considerations

A candid discussion of this study's structural model results must also address its fit statistics. While the measurement model (CFA) showed strong fit (GFI = 0.912, CFI = 0.98, Standardized RMR = 0.014), the full structural model (SEM) fell notably short of conventional thresholds: GFI = 0.719 and CFI = 0.813 are both below the commonly accepted

0.90 cutoff, and the reported RMSEA of 1.37 is far outside the acceptable range (<0.10), which would ordinarily indicate a poorly specified structural model rather than an acceptable one. In addition, two standardized path estimates exceeded 1.0 (PBC $\rightarrow$ Intention = 1.093; Intention $\rightarrow$ Behaviour = 1.024), a pattern known as a Heywood case, which typically signals multicollinearity among latent predictors or model misspecification rather than a substantively meaningful "over-100%" effect. This is consistent with the very high inter-construct correlations (approximately 0.90–1.01) observed among the exogenous variables in the structural diagram, suggesting that Environmental Values, Environmental Beliefs, Attitude, Subjective Norms, and PBC may not be as empirically distinct from one another as the theoretical model assumes in this dataset.

Taken together, these diagnostics suggest that the structural results reported here while directionally consistent with all seven hypothesized relationships should be treated as preliminary. Before these findings are finalised for publication, the model would benefit from re-examination for redundant or overlapping items across constructs, potential respecification (e.g., allowing selected error covariances, reviewing cross-loadings), and re-estimation with corrected or re-verified fit statistics. This is a common and addressable step in SEM-based consumer research and does not undermine the value of the theoretical contribution, but it does mean the specific magnitude of the path coefficients should be interpreted with caution until the fit issues are resolved.

6.4 Practical Implications

Despite the above caveats, the overall pattern of results personal norms and environmental beliefs functioning as the primary drivers of intention, and intention driving behaviour has practical relevance for fashion brands, sustainability practitioners, and policymakers in Pakistan. First, campaigns aimed at increasing upcycling uptake may be more effective if they emphasise concrete beliefs about waste's environmental cost and the tangible efficacy of upcycling, rather than relying solely on generic pro-environmental messaging, given the stronger observed role of beliefs and personal norms relative to general attitude. Second, the comparatively muted role of subjective norms suggests an opportunity: if upcycling is not yet socially normative in Pakistan, targeted efforts to visibly showcase peer and family engagement in upcycling (e.g., through social media, community programmes, or retailer-led initiatives) could help activate this pathway more strongly, particularly for Generation Z, who are heavily influenced by social and digital cues. Third, the descriptive intention-behaviour gap, especially among Generation Y, points to

the value of practical enablers accessible upcycling workshops, drop-off points for materials, or simplified DIY guidance that reduce the friction between wanting to upcycle and actually doing so.

VII. CONCLUSION

This study examined upcycling behaviour among Generation Y and Generation Z consumers in Pakistan through an extended Theory of Planned Behaviour model that incorporated Environmental Values, Environmental Beliefs, and Personal Norms as upstream antecedents of the classic TPB constructs. Drawing on survey data from 725 respondents across eleven Pakistani cities, the study makes several contributions to the sustainable-fashion literature.

Substantively, the results affirm that environmental values and beliefs shape upcycling intention indirectly through personal norms, and that personal norms more than general attitude appear to be the dominant psychological driver of intention in this sample, a finding that nuances the standard TPB assumption that attitude is typically the strongest predictor. Intention, in turn, was confirmed as a strong direct driver of actual upcycling behaviour, though the descriptive gap between intention and behaviour, particularly among Generation Y respondents, underscores that stated willingness does not automatically translate into consistent action.

Descriptively, Generation Z consumers reported consistently higher engagement than Generation Y across every construct in the model, lending preliminary support to the broader assumption that younger consumers are more environmentally engaged with sustainable fashion practices. However, this study stops short of confirming that difference statistically, and the proposed moderating role of generational cohort on the model's structural pathways, along with the comparative importance of aesthetic appeal as a marker of fashion-trend engagement, remain open questions that this dataset has not yet fully resolved.

This study also contributes methodologically by testing an integrated VBN-TPB framework specifically for upcycling as distinct from sustainable consumption more broadly within a large, non-Western, textile-producing developing economy that has received limited empirical attention to date. At the same time, the structural model's fit statistics indicate that the current specification requires further refinement before its path coefficients can be treated as final, and this should be addressed as a priority in any subsequent revision of the analysis.

For fashion businesses and policymakers seeking to advance circular-economy practices in Pakistan, the findings suggest that interventions grounded in concrete

environmental beliefs and personal moral responsibility, paired with practical support that closes the intention-behaviour gap, are likely to be more effective than messaging based on attitude change alone. Future research should prioritise: (1) re-estimating the structural model with attention to the fit and multicollinearity issues identified here (2) testing H8 with appropriate group-comparison statistics on the aesthetic-appeal items; and (4) extending the model to other emerging markets to assess the generalisability of the values-beliefs-norms-TPB pathway to upcycling behaviour beyond the Pakistani context.

Funding: This research was supported by the Chinese Government Scholarship (CSC Scholarship), provided by the China Scholarship Council (CSC) under the Ministry of Education of the People's Republic of China.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The information presented in this study is available in the manuscript. Additional data is available upon request from the author concerned.

Conflicts of Interest: The authors declare no conflict of interest.

REFERENCES

- [1] Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, (50(2): 179-211). [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- [2] Bhatt, D., Silverman, J., & Dickson, M. A. (2019). Consumer interest in upcycling techniques and purchasing upcycled clothing as an approach to reducing textile waste. *International Journal of Fashion Design, Technology and Education*, (12(1): 118-128). <https://doi.org/10.1080/17543266.2018.1534001>
- [3] Chen, M. F. (2015). An examination of the value-belief-norm theory model in predicting pro-environmental behaviour in Taiwan. *Asian Journal of Social Psychology*, (18(2), 145-151). <https://doi.org/10.1111/ajsp.12096>
- [4] Dash, G., & Paul, J. (2021). CB-SEM vs PLS-SEM methods for research in social sciences and technology forecasting. *Technological Forecasting and Social Change*, (173: 121092). <https://doi.org/10.1016/j.techfore.2021.121092>
- [5] De Groot, J. I., & Steg, L. (2010). Relationships between value orientations, self-determined motivational types and pro-environmental behavioural intentions. *Journal of*

- Environmental Psychology*, (30(4): 368-378). <https://doi.org/10.1016/j.jenvp.2010.04.002>
- [6] Ding, L., Liu, M., Yang, Y., & Ma, W. (2022). Understanding Chinese consumers' purchase intention towards traceable seafood using an extended Theory of Planned Behavior model. *Marine Policy*, (137: 104973). <https://doi.org/10.1016/j.marpol.2022.104973>
- [7] Francis, D. (2011). Daily rituals of dress: Women re-creating themselves over time. *Generations*, (35(3), 64–70).
- [8] Hassan, M., Mahmood, Z., & Khakwani, I. (2025). Impact of religiosity on Pakistani youth green purchase intentions and behavior: extending theory of planned behavior. *Journal of Islamic Marketing*, (16(1): 1-25). <https://doi.org/10.1108/JIMA-03-2023-0095>
- [9] Hiratsuka, J., Perlaviciute, G., & Steg, L. (2018). Testing VBN theory in Japan: Relationships between values, beliefs, norms, and acceptability and expected effects of a car pricing policy. *Transportation Research Part F: Traffic Psychology and Behaviour*, (53, 74–83). <https://doi.org/10.1016/j.trf.2017.12.015>
- [10] Jung, H. J., Choi, Y. J., & Oh, K. W. (2020). Influencing factors of Chinese consumers' purchase intention to sustainable apparel products: Exploring consumer "attitude-behavioral intention" gap. *Sustainability*, (12(5): 1770). <https://doi.org/10.3390/su12051770>
- [11] Kandpal, V., Jaswal, A., Santibanez Gonzalez, E. D., & Agarwal, N. (2024). Circular economy principles: shifting towards sustainable prosperity. In Sustainable energy transition: Circular economy and sustainable financing for environmental, social and governance (ESG) practices. *Cham: Springer Nature Switzerland*, (125–165). <https://doi.org/10.1016/j.susmat.2023.e00617>
- [12] Kautish, P., Paco, A., & Thaichon, P. (2022). Sustainable consumption and plastic packaging: Relationships among product involvement, perceived marketplace influence and choice behavior. *Journal of Retailing and Consumer Services*, (67: 103032). <https://doi.org/10.1016/j.jretconser.2022.103032>
- [13] Kautish, P., Paul, J., & Sharma, R. (2019). The moderating influence of environmental consciousness and recycling intentions on green purchase behavior. *Journal of Cleaner Production*, (228: 1425-1436). <https://doi.org/10.1016/j.jclepro.2019.04.389>
- [14] Khoa Tran, Tuyet Nguyen, Yen Tran, Anh Nguyen, Khang Luu, & Y. Nguyen. (2022). Eco-friendly fashion among generation Z: Mixed-methods study on price value image, customer fulfillment, and pro-environmental behavior. *Plos One*, (17(8): 0272789). <https://doi.org/10.1371/journal.pone.0272789>
- [15] Kim, S. H., & Seock, Y. K. (2019). The roles of values and social norm on personal norms and pro-environmentally friendly apparel product purchasing behavior: The mediating role of personal norms. *Journal of Retailing and Consumer Services*, (51: 83-90). <https://doi.org/10.1016/j.jretconser.2019.05.023>
- [16] Kim, Y. G., Woo, E., & Nam, J. (2018). Sharing economy perspective on an integrative framework of the NAM and TPB. *International Journal of Hospitality Management*, (72: 109-117). <https://doi.org/10.1016/j.ijhm.2018.01.008>
- [17] Koay, Kian Yeik, Chee Wei Cheah, & Hui Shan Lom. (n.d.). An integrated model of consumers' intention to buy second-hand clothing. *International Journal of Retail & Distribution Management*, (50, 11 (2022): 1358-1377). <https://doi.org/10.1108/IJRDM-10-2021-0470>
- [18] Koch, K. (2019). Clothing upcycling, textile waste and the ethics of the global fashion industry. *ZoneModa Journal*, (9(2):173-184). <https://doi.org/10.6092/issn.2611-0563/10053>
- [19] McQuillan, V. A. (2021). Exploring circularity in clothing resale: a new materialism and value perspective. *University of Glasgow*.
- [20] Pandit, P., Nadathur, G. T., & Jose, S. (2019). *Upcycled and low-cost sustainable business for value-added textiles and fashion*. (pp. 95-122).
- [21] Paul, J., Modi, A., & Patel, J. (2016). Predicting green product consumption using theory of planned behavior and reasoned action. *Journal of Retailing and Consumer Services*, (29: 123-134). <https://doi.org/10.1016/j.jretconser.2015.11.006>
- [22] Qureshi, N. A. (2020). Relationships of firms in the textile industry in Pakistan: an exploration of Talukaat (Doctoral dissertation, University of Surrey). <https://doi.org/10.15126/thesis.00854168>
- [23] Rasool, F., Zuberi, N. A., Siddiqui, N. U., & Madni, M. (2019). Using the Theory of Plan Behavior and Norm Activation Model to Understand Individual Energy Conservation Behavior in Karachi, Pakistan: Using the Theory of Plan Behavior and Norm Activation Model to Understand Individual Energy Conservation Behavior in Karachi, Pakistan. *International Journal of Economic and Environmental Geology*, (10(1): 93-99). <https://doi.org/10.46660/ijee.v10i1.318>
- [24] Sarker, B. K., Sarker, D. K., Rani Shaha, S., Saha, D., & Sarker, S. (2024). Why Apply SPSS, SmartPLS and AMOS: An Essential Quantitative Data Analysis Tool for Business and Social Science Research Investigations. *International Journal of Research and Innovation in Social Science (IJRISS)*. <https://doi.org/10.47772/IJRISS.2024.8090224>
- [25] Sepe, F., Valerio, M., Anna, P., & Mario, T. (2025). Fashion and sustainability: Evidence from the consumption of second-hand clothes. *Corporate Social Responsibility and Environmental Management*, (32(1): 947-962). <https://doi.org/10.1002/csr.2973>
- [26] Sharma, N., Paço, A., & Kautish, P. (2022). The impact of eco-innovation on green buying behaviour: the moderating effect of emotional loyalty and generation. *Management of Environmental Quality: An International Journal*, (33(4), 1026–1045). <https://doi.org/10.1108/MEQ-11-2021-0267>
- [27] Singh, A., Sahay, S. S., & Sharma, P. (2025). Overview of textile waste. *Nanotechnology-Assisted Recycling of Textile Waste: Sustainable Tools for Textiles*, (1–27). <https://doi.org/10.1002/9781394175017.ch1>
- [28] Steg, L., Dreijerink, L., & Abrahamse, W. (2005). Factors influencing the acceptability of energy policies: A test of

- VBN theory. *Journal of Environmental Psychology*, (25(4), 415–425).
- [29] Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review*, (81–97).
- [30] Sun, J., Safdar, H., Jaffri, Z. U. A., Ibn-ul-Hassan, S., & Ozturk, I. (2022). Substantiating nexus between consumption values and sustainable consumption behavior: a way toward sustainable business. *Frontiers in Psychology*, (13: 908391). <https://doi.org/10.3389/fpsyg.2022.908391>
- [31] Turner, J. C. (1996). Henri Tajfel: an introduction. Social groups and identities: *Developing the Legacy of Henri Tajfel*, (1, 23).
- [32] Wang, C., Yao, X., Sinha, P. N., Su, H., & Lee, Y. K. (2022). Why do government policy and environmental awareness matter in predicting NEVs purchase intention? Moderating role of education level. *Cities*, (131: 103904). <https://doi.org/10.1016/j.cities.2022.103904>
- [33] Zanjirani Farahani, R., Asgari, N., & Van Wassenhove, L. N. (2022). Fast fashion, charities, and the circular economy: challenges for operations management. *Production and Operations Management*, (31(3): 1089-1114). <https://doi.org/10.1111/poms.13596>
- [34] Zavagno, A. (2021). *Upcycling as a design strategy to innovate fashion processes and create a local value chain with the support of digital technologies: The Offbeat District case*.
- [35] Zhou, Q., Ji, X., Li, N., & Zhou, L. (2025). Consumers' second-hand clothing purchase intention: integrating TPB, face consciousness and past purchase experience. *Frontiers in Psychology*, (16: 1645116). <https://doi.org/10.3389/fpsyg.2025.1645116>
- [36] Zollo, L. (2024). Ethical identity, social image and sustainable fashion: still an impossible deal? A sociopsychological framework of ethical consumers' attitude-behavior gaps. *Journal of Consumer Marketing*, (564–582). <https://doi.org/10.1108/JCM-08-2023-6213>