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Article

Planned Behavior under Economic Pressure: Understanding College Students' Intentions to Buy Second-Hand Digital Products

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Abstract

Driven by sustainability concerns, Chinese university students are increasingly purchasing second-hand digital products to balance economic savings with environmental protection. Grounded in the Theory of Planned Behavior (TPB), this study examines how environmental awareness and economic pressure influence purchase intentions through the mediating roles of attitude and subjective norms. Structural equation modeling (PLS-SEM) of 307 survey responses reveals that environmental awareness significantly drives purchase intention by enhancing both attitudes and subjective norms. Conversely, economic pressure affects intention solely through indirect mediation, showing no significant direct impact. Notably, the influence of environmental awareness on subjective norms emerged as the strongest pathway. By extending TPB to high-involvement, risk-sensitive goods, this research enriches the green consumption literature and offers practical implications for promoting environmentally responsible behaviors among youth.

1. Introduction

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The global market for second-hand digital products has witnessed substantial and sustained growth, firmly establishing itself as a critical segment within the consumer electronics industry. According to the International Data Corporation's [1] Worldwide Quarterly Used Device Tracker, over 195 million used and refurbished smartphones were shipped globally in 2023, with the market value reaching approximately $72.9 billion and growing at a rate that outperforms the new device market. According to another IDC report focusing on the Chinese market, China accounted for approximately 38% of the global used smartphone shipment volume in the second quarter of 2024, solidifying its position as the world's largest market [2]. In this massive and established market, university students are increasingly adopting second-hand devices as practical and sustainable alternatives. This emerging preference appears to be driven by two converging socioeconomic forces: the persistent economic pressures confronting student populations [3] and their rapidly evolving environmental consciousness [4].

Despite these observations, the academic literature remains relatively underdeveloped regarding the psychological mechanisms driving this specific behavior. While recent studies extending the TPB have identified price and environmental concern as influential determinants of general green consumption [5], the unique interaction between these drivers in the context

of digital electronics—a category characterized by high involvement and perceived risk—warrants deeper exploration. A critical research gap persists in understanding how economic constraints and environmental awareness jointly shape students' purchase intentions through core psychological constructs, specifically within an integrated theoretical framework.

To address these theoretical and empirical limitations, the present study adopts the TPB [6] as its overarching conceptual framework. We propose an extended model where economic pressure and environmental awareness exert indirect effects on purchase intention through the dual mediation of attitude and subjective norms.

Consequently, this study aims to: 1) investigate how environmental awareness and economic pressure influence Chinese university students' intentions to purchase second-hand digital products; 2) examine the mediating roles of attitude and subjective norms in the relationship between these antecedents and purchase intention within the TPB framework; 3) validate the applicability of the TPB model to the context of high-involvement, risk-sensitive consumer goods (i.e., used electronics).

2. Literature Review

2.1. Theoretical Foundation: The Theory of Planned Behavior

The TPB, originally introduced by Ajzen in 1991, has established itself as one of the most influential and systematically validated theoretical frameworks for understanding the psychological processes through which individual behavioral intentions are formed and subsequently translated into actual behaviors. This comprehensive framework posits that behavioral intention, serving as the most immediate cognitive antecedent to action is collectively determined by three fundamental psychological constructs: attitude toward the behavior, subjective norm, and perceived behavioral control. While acknowledging the importance of perceived behavioral control (PBC), this study intentionally focuses on the roles of attitude and subjective norm. This focus is justified because purchasing second-hand digital products online is a highly volitional behavior for university students, with few insurmountable external barriers, making the social-psychological pathways of attitude and normative influence particularly salient in this context. Attitude encompasses an individual's overall evaluative disposition toward performing a specific behavior, reflecting the degree to which the person perceives the behavior as favorable or unfavorable based on their beliefs about likely outcomes and the value they attach to those outcomes. Subjective norm captures the perceived social pressure originating from significant reference groups, indicating the extent to which individuals are motivated to comply with the expectations of others in their social environment. Perceived behavioral control represents the individual's assessment of their capability to perform the behavior, incorporating elements of self-efficacy, confidence levels, and the perceived availability of external resources and opportunities necessary for successful behavioral execution. This status is consistently affirmed in comprehensive reviews of the field, where the TPB remains a dominant theoretical lens for understanding pro-environmental behaviors, including various forms of sustainable consumption [7].

The remarkable versatility and explanatory power of the TPB framework have been demonstrated through its extensive and successful application across numerous behavioral domains, including health-related decision-making, online consumption patterns, environmental protection initiatives, and various sustainable practices such as waste sorting, recycling behaviors, and second-hand product consumption [8,9]. These diverse applications collectively attest to the model's theoretical flexibility and its cross-disciplinary value in deciphering the complex mechanisms underlying consumer decision-making processes. Furthermore, recognizing the need for contextual specificity, numerous empirical studies have productively extended the basic TPB structure by incorporating additional variables

beyond the original three dimensions to enhance the model's predictive accuracy and explanatory relevance. Such theoretical extensions frequently include constructs such as moral obligation, emotional responses, environmental concern, personal value systems, and brand trust, which typically function as important antecedents that influence the core components of the standard TPB model, thereby enriching its contextual applicability and theoretical sophistication [10].

Within the specific context of the current investigation, economic pressure and environmental awareness are strategically introduced as context-specific antecedent variables that are particularly relevant to understanding second-hand consumption behavior among contemporary university students. These two constructs effectively capture both the external financial constraints and internal pro-environmental motivations that collectively shape sustainable consumption decision-making in this demographic group. The extended TPB model developed in this study therefore aims to elucidate how these exogenous factors systematically influence students' behavioral intentions regarding second-hand digital product purchases through the crucial mediating mechanisms of attitude formation and subjective norm perception. By theoretically integrating these contextually relevant constructs into the established TPB framework, this research meaningfully expands the theoretical utility and application scope of TPB within the rapidly evolving domain of sustainable consumption, particularly in explaining the complex purchasing behaviors associated with potentially risky product categories such as used electronic devices.

2.2. Antecedents of Green Consumption: Economic Pressure and Environmental Awareness

Economic pressure and environmental awareness have increasingly emerged as salient psychological and contextual drivers significantly influencing green consumption behavior—a pattern of consumer behavior that seeks to minimize environmental harm through informed and deliberate choices [11]. This is particularly evident in the digital circular economy, where practices like purchasing second-hand electronics are recognized for extending product life and reducing waste [12]. This influence is especially pronounced among university student populations who typically navigate a transitional life stage characterized by evolving financial autonomy while often still experiencing varying degrees of economic dependency.

Economic pressure, conceptually defined as individuals' perceived financial constraints and experienced budgetary stress, substantially heightens sensitivity to product pricing structures and significantly increases receptiveness to more affordable consumption alternatives such as second-hand goods, as substantiated by research from Netemeyer et al. [13] and Wicaksono et al. [14]. Empirical studies focusing on refurbished electronics further confirm that affordability is a primary motivator, particularly for younger consumers seeking value [15]. Under conditions of financial constraint, consumers demonstrably exhibit pronounced value-seeking tendencies and progressively adopt cost-effective consumption strategies, which frequently include active consideration and eventual purchasing of used digital products. Within the distinctive university context—where numerous students primarily rely on fixed financial allowances or limited part-time income—economic pressure plays a crucial and multifaceted role in shaping not only their immediate purchasing decisions but also their broader attitudinal orientation toward sustainable consumption practices and circular economy participation.

In complementary contrast, environmental awareness reflects an individual's integrated cognitive understanding and affective concern for ecological sustainability, coupled with a developing personal commitment to reducing environmental harm through conscious consumption choices. Individuals with heightened environmental awareness demonstrate stronger inclinations to embrace behaviors systematically aligned with carbon reduction objectives, resource recycling initiatives, and comprehensive sustainable consumption

practices, as evidenced by recent studies from Li et al. [16] and Xie and Rasool [17]. Research specifically on recycled electronics further confirms that consumers' green values are a pivotal driver of positive product perception and purchase intention [18]. Such environmental consciousness typically translates into an internalized moral responsibility to consume responsibly and to actively support circular economic systems, including participation in second-hand marketplaces that extend product lifecycles. A growing body of scholarly literature suggests that both economic pressure and environmental awareness may not directly determine behavioral intention; rather, their effects predominantly operate through complex psychological mechanisms. Crucially, recent research extending the TPB has empirically identified price (reflecting economic concerns) and environmental concern as the most influential determinants of second-hand purchase intention [5]. These findings underscore that such external and internal drivers primarily exert their influence through core TPB variables—including detailed attitudinal evaluations, perceived social influence dynamics, and evolving normative expectations, as highlighted in research by Ngo et al. [8] and Gupta et al. [19].

Therefore, in the present study, these two variables are conceptualized as key antecedents within the extended TPB framework, with their influence unfolding through indirect pathways mediated by attitude and subjective norm, rather than through direct behavioral outcomes.

2.3. Psychological Mediators: Attitude and Subjective Norm

Within the comprehensive theoretical framework of the TPB, attitude and subjective norm operate as fundamental socio-cognitive mechanisms that systematically translate the influence of broader contextual determinants into clearly defined behavioral intentions. A substantial and continuously expanding corpus of empirical investigations consistently demonstrates that well-established positive attitudes not only significantly enhance green purchase intentions but also function as essential psychological conduits, effectively mediating the impact of various antecedent variables. including perceived financial constraints, deeply internalized environmental concerns, and personal ecological values on subsequent behavioral outcomes, as robustly evidenced by recent scholarly contributions from Li et al. [16], Ngo et al. [8], and supporting findings from Wicaksono et al. [14], as well as earlier TPB-based evidence confirming the central mediating role of attitude in green consumption contexts [20].

In complementary theoretical distinction, subjective norm comprehensively captures the intricate network of perceived social pressures, collective expectations, and normative influences emanating from an individual's significant reference groups, potentially including immediate family members, academic peers, broader social circles, and influential institutional actors within educational environments. When individuals discern substantial social consensus or receive explicit endorsement for second-hand consumption practices—whether founded upon collective environmental responsibility, shared economic prudence, or emerging sustainable lifestyle trends, they manifest a pronounced propensity to align their personal consumption decisions with these normative expectations, as empirically validated by research findings from Gupta et al. [19], and further corroborated by Stolz [21]. Moreover, contemporary scholarly investigation reveals that robust subjective norms not only exert direct influences on behavioral intention but also engage in dynamic interplay with and substantially reinforce favorable individual attitudes, thereby establishing a mutually reinforcing synergistic relationship that considerably amplifies the overall intention to adopt and consistently maintain sustainable consumption behaviors, as comprehensively elucidated in Wicaksono et al.'s [14] integrative analysis and supported by Shang et al.'s [22] longitudinal study.

Building upon this robust theoretical foundation, the present investigation explicitly positions both attitude and subjective norm as central, parallel mediating constructs

within its expanded conceptual framework. These interconnected psychological mechanisms are theoretically conceptualized as the primary processing channels through which the effects of fundamental economic and environmental antecedents are cognitively evaluated, socially contextualized, and ultimately transformed into students' concrete purchase intentions regarding second-hand digital products. This sophisticated theoretical positioning not only remains firmly grounded in the core propositions of TPB but also meaningfully extends its application to the increasingly crucial domain of sustainable digital consumption, thereby providing enhanced explanatory power regarding the complex psychological underpinnings of contemporary youth consumption behavior within environmentally significant product categories, while simultaneously offering valuable insights for both theoretical advancement and practical intervention strategies in sustainable consumption initiatives.

2.4. Purchase Intention in the Context of Second-hand Digital Products

Within the framework of the TPB, purchase intention is recognized as the ultimate dependent variable that captures an individual's conscious planning and motivational readiness to engage in a specific consumption behavior. According to established literature, purchase intention represents an individual's subjective plan or motivational readiness to perform a specific purchase behavior within a foreseeable time frame [9]. This psychological construct serves as the most immediate antecedent to actual behavior and is principally determined by three core elements: attitudes toward the behavior, subjective norms [23]. When individuals develop favorable evaluations of a product, perceive strong social support from important referent groups, and believe they possess adequate resources or capacity to complete a transaction, their intention to execute the purchase becomes substantially stronger and more decisive.

Within generalized consumption contexts, purchase intention remains highly responsive to fundamental consumer concerns including value assurance and broader social acceptance. These considerations gain prominence in decision-making processes where perceived risk and social alignment influence behavioral outcomes. Established research demonstrates that well-formed positive attitudes and strong subjective norms function as effective psychological mechanisms that reduce perceived uncertainties while strengthening decision confidence. The mediating function of these psychosocial factors proves particularly valuable in converting preliminary consideration into established behavioral intentions, creating a crucial pathway between initial evaluation and actual behavioral commitment. This theoretical understanding reinforces the central role of attitude and subjective norm as key mediators in the intention formation process across diverse consumption scenarios.

Consequently, this study adopts purchase intention as its focal outcome variable, recognizing its capacity to capture not only the likelihood of actual transaction completion but also students' broader orientation toward sustainable and circular consumption practices within the evolving digital economy. This approach allows for a comprehensive understanding of how young consumers navigate the intersection of economic practicality and environmental consciousness in their consumption patterns.

Put together, we propose following hypotheses:

H1: Economic pressure has a significant positive effect on attitude.

H2: Economic pressure has a significant positive effect on subjective norm.

H3: Environmental awareness has a significant positive effect on attitude.

H4: Environmental awareness has a significant positive effect on subjective norm.

H5: Attitude has a significant positive effect on purchase intention.

H6: Subjective norm has a significant positive effect on purchase intention.

H7: Attitude mediates the relationship between economic pressure and purchase intention.

H8: Attitude mediates the relationship between environmental awareness and purchase intention.

H9: Subjective norm mediates the relationship between economic pressure and purchase intention.

H10: Subjective norm mediates the relationship between environmental awareness and purchase intention.

2.5 Conceptual Framework

Based on the literature review and research hypotheses, a conceptual framework has been developed, as illustrated in Figure 1.

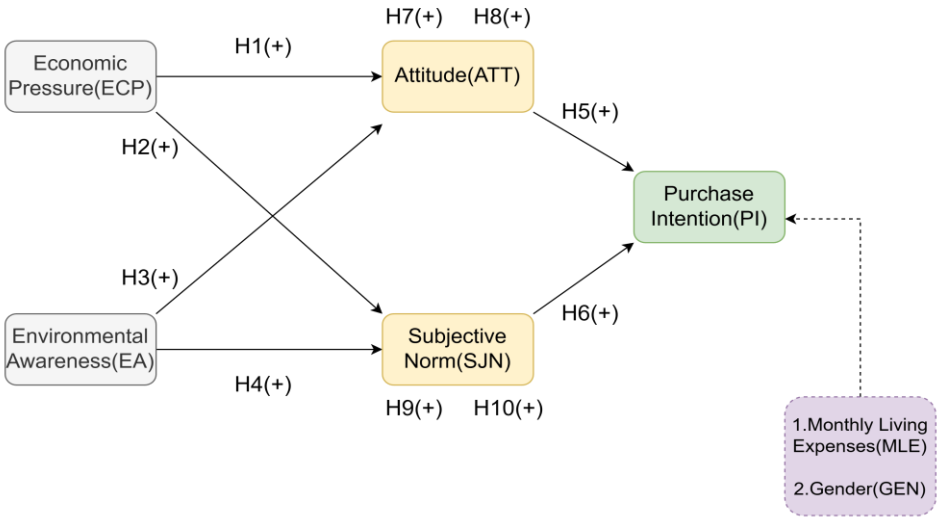

Figure 1. Conceptual Framework

3. Materials and Methods

3.1. Sample and Data Collection

The target population for this study comprised full-time university students in mainland China. This demographic was selected due to their dual characteristics of high environmental awareness and budget constraints, which make them a critical segment for second-hand digital consumption. Data were collected via the Wenjuanxing platform from April 2 to June 8, 2025, employing a convenience sampling strategy via mixed channels. To ensure a diverse sample, the survey was initially distributed in classrooms with the assistance of faculty members from universities in [e.g., Eastern and Central China / distinct provinces]. Subsequently, to broaden the geographic reach, the survey link was disseminated through student communities on major social media platforms, including WeChat and Xiaohongshu. Although the open nature of online distribution precludes an exact count of all represented institutions, the final sample reflects a broad geographic distribution across mainland China.

To ensure data validity, strict inclusion criteria and quality control measures were implemented. First, a screening question ("Are you currently a full-time university student?") was placed at the start of the survey; respondents who answered "No" were automatically terminated. Second, to prevent duplicate responses, the Wenjuanxing platform's technical restrictions were enabled to block multiple submissions from the same IP address and device. Finally, response time was monitored; questionnaires completed in less than (e.g., 2 minutes) were considered invalid and excluded from the analysis.

All measurement items were adapted from established scales in the English literature to fit the context of second-hand digital products. To ensure linguistic and conceptual

equivalence, a standard translation and back-translation procedure was followed [24]. The items were first translated into Chinese by a researcher proficient in both languages and then translated back into English by an independent bilingual scholar. A pilot test was conducted with 20 university students to assess item clarity and comprehension. Based on feedback, minor wording adjustments were made to enhance readability. No items were deleted at this stage, as initial reliability checks indicated satisfactory internal consistency.

A total of 349 questionnaires were initially collected. After removing invalid responses (e.g., screening failures, duplicates, or straight-lining), 307 valid responses were retained for analysis. The adequacy of the sample size was assessed using the 10-times rule [25], which states that the sample size should be at least ten times the maximum number of arrowheads pointing at a latent variable anywhere in the PLS path model. In this study, the dependent variable (Purchase Intention) has the most structural paths, with six predictors (including economic pressure, environmental awareness, attitude, subjective norms, and two control variables). Therefore, the minimum required sample size was 60. The final sample of 307 substantially exceeds this threshold, ensuring sufficient statistical power for robust model estimation.

3.2. Measures

The survey instrument consisted of three sections. The first included screening questions to confirm participants' eligibility as current university students. The second section collected demographic information, including gender and monthly living expenses. The third section assessed five core constructs: economic pressure, environmental awareness, attitude, subjective norms, and purchase intention. All constructs were measured using items adapted from established scales and modified to fit the study context. Specifically, economic pressure was measured using items adapted from Netemeyer et al. [13], and environmental awareness from Ngo et al. [8]. Attitude and subjective norms were operationalized based on Ajzen's [6] original TPB framework, while purchase intention was measured using items adapted from Yan [9]. All items were assessed using a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree").

3.3. Data Analysis Procedures

Data analysis was conducted using SPSS 26 and SmartPLS 4.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were computed using SPSS to profile the sample. SmartPLS was employed for measurement model assessment and hypothesis testing. Partial least squares structural equation modeling (PLS-SEM) was chosen over covariance-based SEM due to several methodological considerations: the model includes multiple mediating paths and latent variables, the sample size (n = 307) is moderate, and the study aims to maximize prediction accuracy rather than assess model fit alone. Moreover, PLS-SEM is more appropriate for exploratory and theory-extending research, particularly when the model includes formative or reflective constructs and is not yet fully established in the literature. Internal consistency was evaluated using Cronbach's alpha and composite reliability (CR), while convergent validity was assessed through average variance extracted (AVE) and factor loadings. Discriminant validity was examined using the Fornell–Larcker [26] criterion. Finally, PLS-SEM was used to test the proposed conceptual model, with a particular focus on the indirect effects of economic pressure and environmental awareness on purchase intention via the mediating roles of attitude and subjective norms.

4. Results

4.1. Descriptive Statistics

Respondent profile is presented in Table 1. Among the respondents, 168 were male (54.7%) and 139 were female (45.2%). Regarding monthly living expenses, 39 participants (12.7%) reported expenses below 1,000 RMB, 172 participants (56.0%) reported expenses between 1,000 and 2,000 RMB, and 92 participants (29.9%) reported expenses above 2,000 RMB.

Table 1. Respondent Profile

Variable	Option	Frequency (Percentage)
Gender	Male	168（54.7%）
	Female	139（45.2%）
Monthly Living Expenses	Below 1000 RMB	39（12.7%）
	1001–2000 RMB	172（56.02%）
	Above 2000 RMB	92（29.9%）

4.2. Common Method Bias and Multicollinearity Test

Given that the data for this study were collected using self-reported questionnaires, the potential for common method bias (CMB) cannot be overlooked [27]. To mitigate this risk, procedural remedies were implemented during the survey design, including ensuring respondent anonymity and counterbalancing the order of measurement scales. To statistically assess CMB, Harman's single-factor test was conducted. The results revealed that the first unrotated factor accounted for 37.581% of the total variance, which falls below the commonly accepted threshold of 40% [28]. This suggests that common method bias does not pose a serious threat to the validity of the findings.

To further ensure the robustness of the model, the potential issue of multicollinearity among latent constructs was examined. Variance inflation factor (VIF) values were calculated using SmartPLS. The results indicated that all VIF values ranged from 1.272 to 1.585, which are well below the conventional threshold of 5 recommended by Hair et al. [29], and also below the more conservative cutoff of 3.3 suggested by Kock [30]. These findings confirm the absence of significant multicollinearity, thereby supporting the stability and reliability of the model estimation.

Taken together, these procedural and statistical results suggest that common method bias does not pose a serious threat to the validity of the findings in this study.

4.3. Reliability and Validity Analysis

Table 2. Presents the results of reliability analysis and convergent validity (n = 307)

Constructs	Cronbach' s Alpha	Composite Reliability	Average Variance Extracted (AVE)
Subjective Norm	0.800	0.857	0.501
Attitude	0.759	0.838	0.509
Environmental Awareness	0.752	0.843	0.574
Economic Pressure	0.788	0.855	0.541
Purchase Intention	0.708	0.820	0.534

As shown in Table 2, the results of the reliability analysis indicate that all measurement scales used in this study meet the established criteria. Specifically, the Cronbach's α values of all constructs exceed 0.7, demonstrating good internal consistency [31,32]. The CR values are all above 0.8, suggesting high construct reliability [25,26]. Regarding convergent validity, the AVE values of all latent variables are greater than 0.5, which meets the recommended threshold [26,32]. This indicates that the scales show satisfactory convergent validity in reflecting the latent constructs.

Table 3. Discriminant Validity based on the Fornell–Larcker criterion

	Subjective Norm	Attitude	Environmental Awareness	Economic Pressure	Purchase Intention
Subjective Norm	**0.708**				
Attitude	0.695	**0.714**			
Environmental Awareness	0.690	0.693	**0.758**		
Economic Pressure	0.618	0.612	0.526	**0.735**	
Purchase Intention	0.703	0.634	0.653	0.525	**0.731**

This study adopts the Fornell–Larcker criterion to assess discriminant validity among the constructs [25,26,32]. The diagonal values (in bold) represent the square root of the AVE for each construct, whereas the off-diagonal elements indicate the correlations between constructs. As shown in Table 3, the square root of AVE for each construct exceeds its corresponding inter-construct correlations, indicating satisfactory discriminant validity.

4.4. Path Analysis

The SmartPLS results show that the R^2 values for Subjective Norm (R^2 = 0.566), Attitude (R^2 = 0.565), and Purchase Intention (R^2 = 0.552) all exceed the threshold of 0.50, indicating moderate predictive accuracy for the endogenous constructs [33]. While PLS-SEM does not rely on conventional model fit indices used in covariance-based SEM, the R^2 values suggest that the model captures a substantial portion of variance in the key outcomes, supporting its explanatory utility in the context of second-hand digital product consumption (see Figure 2).

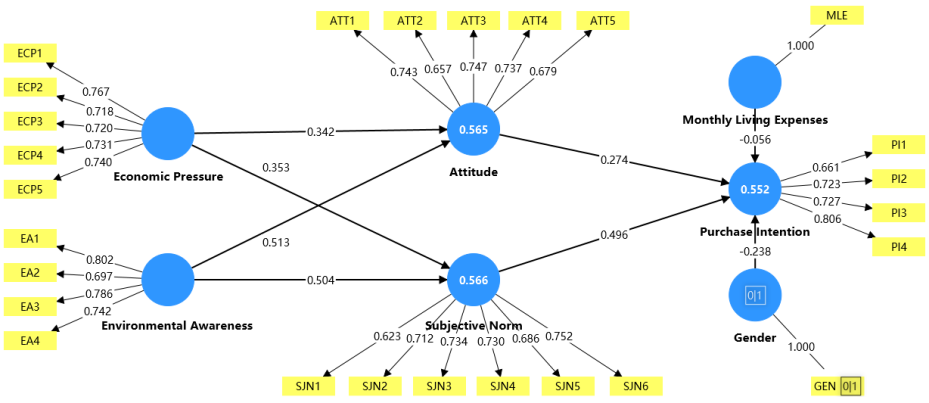

Figure 2. Structural Model Path Diagram (Based on PLS-SEM)

4.4.1. Direct Effect

Table 4. Results of Direct Effect Analysis

Hypothesis	Path (Direct)	Estimate(β)	Standard Error (SE)	t-value	p-value	f^2	Remark
H1	ECP -> ATT	0.342	0.050	6.882	0.000	0.194	Significant
H2	ECP -> SJN	0.353	0.052	6.846	0.000	0.208	Significant
H3	EA -> ATT	0.513	0.053	9.753	0.000	0.438	Significant
H4	EA -> SJN	0.504	0.058	8.690	0.000	0.424	Significant
H5	ATT -> PI	0.274	0.059	4.678	0.000	0.086	Significant
H6	SJN -> PI	0.496	0.061	8.164	0.000	0.283	Significant

Note: EA = Environmental Awareness; ECP = Economic Pressure; ATT = Attitude; SJN = Subjective Norm; PI = Purchase Intention.

All six hypothesized direct paths within the structural model were found to be statistically significant (see Table 4). Specifically, economic pressure showed significant and positive effects on both attitude ($\beta = 0.342$, $t = 6.882$, $p < 0.001$) and subjective norm ($\beta = 0.353$, $t = 6.846$, $p < 0.001$), providing support for H1 and H2. Likewise, environmental awareness exerted significant positive influences on attitude ($\beta = 0.513$, $t = 9.753$, $p < 0.001$) and subjective norm ($\beta = 0.504$, $t = 8.690$, $p < 0.001$), thereby confirming H3 and H4.

To further assess the substantive strength of these relationships, Cohen's f^2 effect sizes were examined. Environmental awareness demonstrated large effects on both attitude ($f^2 = 0.438$) and subjective norm ($f^2 = 0.424$), highlighting its dominant role in shaping students' psychological predispositions toward second-hand digital products. In comparison, economic pressure exhibited medium effects on attitude ($f^2 = 0.194$) and subjective norm ($f^2 = 0.208$), indicating that financial constraints influence consumption intentions primarily through cognitive and normative evaluations rather than through direct behavioral motivation.

Regarding the formation of purchase intention, both attitude ($\beta = 0.274$, $t = 4.678$, $p < 0.001$) and subjective norm ($\beta = 0.496$, $t = 8.164$, $p < 0.001$) were found to have significant positive effects, thus supporting H5 and H6. The corresponding f^2 values further suggest that subjective norm plays a medium-to-large role ($f^2 = 0.283$) in driving intention, whereas attitude exerts a smaller but still meaningful effect ($f^2 = 0.086$).

Taken together, these findings provide robust empirical support for the proposed extended TPB framework. Importantly, the results indicate that economic pressure and environmental awareness do not influence purchase intention directly; instead, their effects are transmitted indirectly through attitude and subjective norm. Environmental awareness emerges as the most influential antecedent shaping these mediating psychological mechanisms, while subjective norm constitutes the strongest proximal determinant of purchase intention. The f^2 analysis further underscores the central role of attitudinal and normative processes in explaining sustainable second-hand digital product consumption among university students.

4.4.2. Mediation Effect

Table 5. Results of Mediation Effect Analysis

Hypothesis	Path (Indirect)	Estimate(β)	Standard Error (SE)	t-value	p-value	Remark
H7	ECP -> ATT -> PI	0.094	0.024	3.839	0.000	Significant mediation
H8	EA -> ATT -> PI	0.141	0.035	4.023	0.000	Significant mediation
H9	ECP -> SJN -> PI	0.175	0.033	5.310	0.000	Significant mediation
H10	EA -> SJN -> PI	0.250	0.046	5.427	0.000	Significant mediation

Note: EA = Environmental Awareness; ECP = Economic Pressure; ATT = Attitude; SJN = Subjective Norm; PI = Purchase Intention.

As shown in Table 5, the mediation analysis results confirm that both economic pressure and environmental awareness exert significant indirect effects on college students' purchase intention of second-hand digital products via attitude and subjective norm.

Specifically, the indirect effect of environmental awareness through attitude is statistically significant ($\beta = 0.141$, $t = 4.023$, $p < 0.001$), supporting H8. Its indirect effect through subjective norm is even stronger ($\beta = 0.250$, $t = 5.427$, $p < 0.001$), providing support for H10.

Similarly, economic pressure shows significant indirect effects on purchase intention through both attitude ($\beta = 0.094$, $t = 3.839$, $p < 0.001$) and subjective norm ($\beta = 0.175$, $t = 5.310$, $p < 0.001$), validating H7 and H9, respectively.

Taken together, these results provide consistent empirical support for the mediating roles of both attitude and subjective norm within the extended TPB model. Among the four paths, the mediation of environmental awareness via subjective norm yields the largest effect size, suggesting that perceived social expectations play a particularly salient role in shaping students' sustainable consumption behavior. This highlights the importance of incorporating social influence mechanisms when promoting green consumption practices among young consumers.

5. Discussion

5.1. Main findings

The path analysis confirms the robust mediating roles of attitude and subjective norms within the extended TPB framework, elucidating how environmental awareness and economic pressure converge to shape purchase intentions in the digital circular economy. This finding aligns with previous research demonstrating that environmental concern and related psychological antecedents are important predictors of sustainable purchase intention when integrated within TPB models [22,34].

First, environmental awareness drives intention through two distinct psychological pathways. It directly fosters favorable attitudes, aligning with findings that environmental cognition promotes pro-environmental orientations [8,16], and is consistent with evidence showing that positive attitudes toward green products significantly enhance intention [34]. Simultaneously, it amplifies receptiveness to social norms, acting as a catalyst for norm internalization [17]. Notably, this normative pathway is particularly pronounced, supporting the view that reuse behaviors are socially motivated rather than purely individualistic [14], which corresponds with studies highlighting the role of subjective norms in green consumption behavior [20]. Such findings indicate that both cognitive and normative processes are essential conduits through which environmental awareness influences intention [22].

This social mechanism is intensified when individuals face concurrent economic pressure; as Gupta et al. [19] suggest, financial constraints combined with ecological concern heighten susceptibility to peer validation, making social approval a critical driver for adopting second-hand electronics. In contrast, economic pressure influences intention predominantly through indirect cognitive and social channels rather than direct behavioral impetus. Financial constraints reframe second-hand consumption from a mere compensatory choice to a strategically advantageous and socially validated practice. This pattern is consistent with extant literature showing that economic considerations influence sustainable purchasing indirectly via attitudes and normative perceptions [35].

Collectively, these findings validate the dual-mediation architecture of the TPB. They extend the theory by demonstrating how economic rationality and environmental ethics jointly operate through integrated psychological mechanisms. The predominance of environmental awareness as a stable antecedent underscores its potential as a focal point for intervention. Consequently, this study offers actionable insights for educational institutions and platforms aiming to cultivate circular economy engagement among the youth demographic.

5.2. Theoretical Implications

This study advances the literature on sustainable consumption and the TPB in three specific ways:

First, it enriches the TPB framework by integrating economic and environmental antecedents into a unified model. unlike previous research that often examines economic constraints or environmental concerns in isolation, this study models these drivers simultaneously. This holistic approach provides a comprehensive explanation of how conflicting motivations—utilitarian necessity (economic pressure) and altruistic values (environmental awareness)—jointly shape consumer behavior in the digital circular economy.

Second, it clarifies the psychological mechanisms driving green consumption through dual mediation pathways. The analysis confirms that attitude and subjective norms are not merely parallel predictors but serve as essential conduits for external pressures. By demonstrating how individual evaluations and social expectations interact to translate antecedent factors into purchase intentions, this study reinforces the explanatory power of the TPB in complex decision-making contexts.

Third, it extends the application of TPB to the domain of second-hand digital products. While TPB is widely used for low-involvement green goods (e.g., organic food), its application to high-involvement, risk-sensitive digital devices remains under-explored. This study validates the model in a context where quality and reliability concerns are paramount. Notably, the finding that environmental awareness acts as a robust predictor—capable of offsetting perceived risks when supported by social norms—offers new theoretical insights into risk mitigation in the circular economy.

5.3. Practical implications

From a managerial perspective, educational institutions should strategically leverage the demonstrated power of social influence to foster sustainable consumption habits. Since subjective norms emerged as a critical driver, universities should move beyond passive environmental education to actively cultivating a normative campus culture. Administrators are encouraged to implement participatory programs, such as regular second-hand product fairs and campus recycling events, which not only provide convenient access to devices but also increase the visibility of reuse behaviors. By integrating sustainability-themed awareness campaigns with these physical activities, universities can effectively strengthen students' positive attitudes and transform second-hand consumption from a mere economic choice into a socially endorsed campus norm.

Concurrently, second-hand trading platforms can optimize their market penetration by aligning their strategies with the psychological drivers of young consumers. Given the study's finding that environmental awareness significantly mitigates perceived risks when supported by social validation, platforms should emphasize environmental value propositions in their marketing communications—explicitly quantifying the ecological benefits of extending a device's lifecycle. Furthermore, to address the high-involvement and risk-sensitive nature of digital electronics, operators should actively utilize social proof mechanisms, such as authentic user testimonials and peer-driven communities on social media. Creating a transparent, community-oriented consumption atmosphere will help reduce psychological barriers, thereby translating environmental awareness and economic incentives into sustained purchase intentions.

5.4. Limitations and Future Research

While this research offers valuable theoretical insights and practical implications, it is essential to acknowledge several methodological and conceptual limitations that simultaneously present promising avenues for future scholarly investigation.

First, this study faces limitations regarding sample representativeness and generalizability, stemming from both the sampling method and the specific profile of the participants. The use of convenience sampling, while efficient, may not fully capture the diversity within the broader university student population. More fundamentally, the generalizability of the findings is constrained by the exclusive focus on university students in mainland China. The unique interplay of cultural values, educational environments, and socioeconomic conditions within this group may yield relationship patterns that differ from other demographics or cultural contexts. Consequently, future research should employ more robust sampling strategies (e.g., multistage cluster sampling) and, importantly, test the model with more diverse populations. This includes extending it to different age cohorts, socioeconomic backgrounds, regions within China, and cross-national settings to examine how cultural and economic factors moderate the identified psychological mechanisms.

Second, the study's empirical foundation relies exclusively on cross-sectional, self-reported survey data, which, despite providing valuable snapshot insights, inherently limits the capacity to establish definitive causal relationships among the constructs examined. Although both procedural remedies and statistical controls were implemented during the research design and data analysis phases to mitigate potential common method variance, the fundamental nature of cross-sectional data collection remains inherently constrained in capturing the dynamic, evolving nature of psychological processes and behavioral intentions. Future research would benefit considerably from employing longitudinal designs that track how attitudes, norms, and intentions evolve over time, or experimental approaches that systematically manipulate key independent variables to establish clearer causal precedence and better understand the temporal dynamics underlying the observed relationships.

Finally, although our extended TPB model successfully demonstrates the mediating roles of attitude and subjective norm, it does not incorporate perceived behavioral control, a fundamental component within the original TPB framework that captures individuals' assessments of their ability to perform target behaviors. The exclusion of PBC represents a theoretically significant limitation, particularly given the potentially crucial role that control perceptions might play in contexts involving technologically complex products like second-hand digital devices, where concerns about verification capabilities, after-sales support, and usage competence may substantially influence behavioral decisions. Subsequent research would greatly enhance our understanding by systematically integrating PBC into the analytical framework, while also exploring additional psychologically relevant constructs such as moral obligation, perceived risk dimensions, environmental identity, emotional associations, or platform trust factors that may further illuminate the complex decision-making

processes surrounding sustainable consumption in high-involvement, potentially risky product categories like pre-owned electronics.

6. Conclusion

This study successfully develops and empirically validates an extended TPB framework that systematically investigates how economic pressure and environmental awareness collectively shape university students' purchase intentions toward second-hand digital products. Through rigorous structural equation modeling analysis, the research demonstrates that these two contextual antecedents operate through distinct yet complementary psychological pathways, specifically through the dual mediation mechanisms of attitude formation and subjective norm perception. The established model offers a more nuanced and comprehensive understanding of green purchase psychology within a consumption context characterized by the simultaneous presence of sustainability imperatives, thereby addressing important theoretical gaps in the existing literature.

From a theoretical perspective, the findings make substantive contributions by not only validating the applicability of TPB within the emerging digital second-hand market domain but also meaningfully enriching the framework through the incorporation of context-specific antecedent variables. The research demonstrates how economic rationality and environmental ethics interact through social influence mechanisms to drive sustainable consumption decisions, providing important insights into the complex psychological processes underlying contemporary youth consumption patterns. Methodologically, the study advances the field by establishing robust measurement scales for assessing second-hand digital product consumption behavior and revealing the relative importance of different psychological pathways in the decision-making process.

In practical terms, the research outcomes deliver actionable guidance for multiple stakeholders. For educational institutions, the findings highlight the importance of leveraging social influence processes and enhancing environmental education to foster sustainable consumption habits among students. For trading platforms and marketers, the study provides evidence-based strategies for messaging optimization, peer influence utilization, and trust-building mechanisms that can effectively promote circular consumption behaviors. The strongly confirmed role of subjective norms suggests that creating supportive social environments and normative pressures may be particularly effective in encouraging second-hand digital product adoption.

While providing valuable insights, this research also acknowledges certain limitations that point toward promising future research directions. Subsequent studies could benefit from examining additional potential mediators such as perceived risk and trust, exploring cross-cultural variations in these psychological mechanisms, and employing longitudinal designs to capture the evolution of consumption patterns over time. Furthermore, investigating the role of digital platform features and certification mechanisms in mitigating perceived risks would represent a valuable extension of this work.

In conclusion, this research effectively bridges the theoretical gap between economic rationality and environmental ethics through the examination of social influence mechanisms, while simultaneously advancing both academic understanding and practical applications in the rapidly evolving landscape of youth consumption. The demonstrated efficacy of the extended TPB model in explaining second-hand digital product consumption suggests its potential utility for understanding other forms of sustainable consumption behavior, thereby contributing to the broader advancement of circular economy objectives and environmental sustainability initiatives.

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Abbreviations

The following abbreviations are used in this manuscript:

AVE	Average Variance Extracted
CMB	Common Method Bias
CR	Composite Reliability
IDC	International Data Corporation
PBC	Perceived Behavioral Control
PLS	Partial Least Squares
PLS-SEM	Partial Least Squares Structural Equation Modeling
SE	Standard error
SEM	Structural Equation Modeling
SmartPLS	Software for partial least squares structural equation modeling (version 4.0)
SPSS	Statistical Package for the Social Sciences (version 26)
TPB	Theory of Planned Behavior
VIF	Variance Inflation Factor

References

1. **IDC.** IDC: More than 195 million used smartphones shipped in 2023 as market value reaches $72.9 billion. *International Data Corporation* 2024. Available online: https://my.idc.com/getdoc.jsp?containerId=prUS52611624 (accessed on 5 December 2025).
2. **IDC.** IDC: China accounts for 38% of the global used smartphone market in 2Q24. *International Data Corporation* 2024. Available online: https://my.idc.com/getdoc.jsp?containerId=prCHC52593524 (accessed on 5 December 2025).
3. **Li, L.; Yang, S.; Li, Y.; Song, H.** A survey on the current situation of consumption and financial planning among college students. *Finance* **2021**, *11*, 97–105. https://doi.org/10.12677/fin.2021.113012.
4. **Kirbiš, A.** Environmental attitudes among youth: How much do the educational characteristics of parents and young people matter? *Sustainability* **2023**, *15*, 11921. https://doi.org/10.3390/su151511921.
5. **Rodrigues, M.; Proença, J.F.; Macedo, R.** Determinants of the purchase of secondhand products: An approach by the theory of planned behaviour. *Sustainability* **2023**, *15*, 10912. https://doi.org/10.3390/su151410912.
6. **Ajzen, I.** The theory of planned behavior. *Organ. Behav. Hum. Decis. Process.* **1991**, *50*, 179–211. https://doi.org/10.1016/0749-5978(91)90020-T.
7. **Yuriev, A.; Dahmen, M.; Paillé, P.; Boiral, O.; Guillaumie, L.** Pro-environmental behaviors through the lens of the theory of planned behavior: A scoping review. *Resour. Conserv. Recycl.* **2020**, *155*, 104660. https://doi.org/10.1016/j.resconrec.2019.104660.

8. **Ngo, T.T.A.; Vo, C.H.; Tran, N.L.; Nguyen, K.V.; Tran, T.D.** Factors influencing Generation Z's intention to purchase sustainable clothing products in Vietnam. *PLOS ONE* **2024**, *19*, e0315502. https://doi.org/10.1371/journal.pone.0315502.
9. **Yan, G.; Li, Y.; Zhang, T.; Mu, C.** Purchase intention for second-hand luxury goods: An empirical study of Chinese consumers. *J. Consum. Behav.* **2024**, *23*, 45–59. https://doi.org/10.1371/journal.pone.0304967.
10. **Vermeir, I.; Verbeke, W.** Sustainable food consumption among young adults in Belgium: Theory of planned behaviour and the role of confidence and values. *Ecol. Econ.* **2008**, *64*, 542–553. https://doi.org/10.1016/j.ecolecon.2007.03.007.
11. **Kumari, R.; Verma, R.; Debata, B.R.; Ting, H.** A systematic literature review on the enablers of green marketing adoption: Consumer perspective. *J. Clean. Prod.* **2022**, *366*, 132852. https://doi.org/10.1016/j.jclepro.2022.132852.
12. **Megha.** Determinants of green consumption: A systematic literature review using the TCCM approach. *Front. Sustain.* **2024**, *5*, 1428764. https://doi.org/10.3389/frsus.2024.1428764.
13. **Netemeyer, R.G.; Warmath, D.; Fernandes, D.; Lynch, J.G.** How am I doing? Perceived financial well-being, its potential antecedents, and its relation to overall well-being. *J. Consum. Res.* **2018**, *45*, 68–89. https://doi.org/10.1093/jcr/ucx109.
14. **Wicaksono, P.A.; Sari, D.P.; Azzahra, F.; Sa'adati, N.A.** Analysis of consumer behaviour in purchasing second-hand fashion products: An extended theory of planned behaviour model. *Int. J. Sustain. Dev. Plan.* **2024**, *19*, 2955–2964. https://doi.org/10.18280/ijsdp.190813.
15. **Haaker, T.; Ho, H.W.L.** Young Dutch consumers' purchase intention of refurbished electronic devices and influencing factors: An empirical study. *Maastricht Stud. J. Sustain. Circ. Econ.* **2023**, *1*. https://doi.org/10.26481/mup.2302.16.
16. **Li, S.; Rasiah, R.; Zheng, S.; Yuan, Z.** Influence of environmental knowledge and green trust on green purchase behaviour. *Environ.-Behav. Proc. J.* **2023**, *8*, 353–358. https://doi.org/10.21834/e-bpj.v8i26.5141.
17. **Xie, S.; Rasool, G.** Impact of social media on young generation's green consumption behavior through subjective norms and perceived green value. *Sustainability* **2023**, *15*, 3739. https://doi.org/10.3390/su15043739.
18. **Obadă, D.-R.; Dabija, D.-C.; Fârte, G.-I.** Consumer perception towards electronic products from recycled components. *Heliyon* **2024**, *10*, e26475. https://doi.org/10.1016/j.heliyon.2024.e26475.
19. **Gupta, N.; Dawar, S.; Goyal, P.K.; Sharma, M.** Motivation behind second hand product buying: Is the development of sustainable consumption? *IOP Conf. Ser. Earth Environ. Sci.* **2023**, *1279*, 012003. https://doi.org/10.1088/1755-1315/1279/1/012003.
20. **Paul, J.; Modi, A.; Patel, J.** Predicting green product consumption using theory of planned behavior and reasoned action. *J. Retail. Consum. Serv.* **2016**, *30*, 234–243. https://doi.org/10.1016/j.jretconser.2015.11.006.
21. **Stolz, K.** Why do(n't) we buy second-hand luxury products? *Sustainability* **2022**, *14*, 8656. https://doi.org/10.3390/su14148656.
22. **Shang, W.; Zhu, R.; Liu, W.; Liu, Q.** Understanding the influences on green purchase intention with moderation by sustainability awareness. *Sustainability* **2024**, *16*, 4688. https://doi.org/10.3390/su16114688.
23. **Kim, N.; Lee, K.** Environmental consciousness, purchase intention, and actual purchase behavior of eco-friendly products: The moderating impact of situational context. *Int. J. Environ. Res. Public Health* **2023**, *20*, 5312. https://doi.org/10.3390/ijerph20075312.
24. **Brislin, R.W.** Back-translation for cross-cultural research. *J. Cross-Cult. Psychol.* **1970**, *1*, 185–216. https://doi.org/10.1177/135910457000100301.
25. **Hair, J.F.; Hult, G.T.M.; Ringle, C.M.; Sarstedt, M.** *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, 2nd ed.; Sage: Thousand Oaks, CA, USA, 2017.

26. **Fornell, C.; Larcker, D.F.** Evaluating structural equation models with unobservable variables and measurement error. *J. Mark. Res.* **1981**, *18*, 39–50. https://doi.org/10.1177/002224378101800104.
27. **Doty, D.H.; Glick, W.H.** Common methods bias: Does common methods variance really bias results? *Organ. Res. Methods* **1998**, *1*, 374–406. https://doi.org/10.1177/109442819814002.
28. **Podsakoff, P.M.; MacKenzie, S.B.; Lee, J.Y.; Podsakoff, N.P.** Common method biases in behavioral research: A critical review of the literature and recommended remedies. *J. Appl. Psychol.* **2003**, *88*, 879–903. https://doi.org/10.1037/0021-9010.88.5.879.
29. **Hair, J.F.; Ringle, C.M.; Sarstedt, M.** PLS-SEM: Indeed a silver bullet. *J. Mark. Theory Pract.* **2011**, *19*, 139–152. https://doi.org/10.2753/MTP1069-6679190202.
30. **Kock, N.** Common method bias in PLS-SEM: A full collinearity assessment approach. *Int. J. e-Collab.* **2015**, *11*, 1–10.
31. **Nunnally, J.C.; Bernstein, I.H.** *Psychometric Theory*, 3rd ed.; McGraw-Hill: New York, NY, USA, 1994.
32. **Hair, J.F.; Babin, B.J.; Anderson, R.E.; Black, W.C.** *Multivariate Data Analysis*, 8th ed.; Cengage Learning: Boston, MA, USA, 2019.
33. **Chin, W.W.** The partial least squares approach to structural equation modeling. In *Modern Methods for Business Research*; Marcoulides, G.A., Ed.; Lawrence Erlbaum Associates: Mahwah, NJ, USA, 1998; pp. 295–336.
34. **Zaremohzzabieh, Z.; Ismail, N.; Ahrari, S.; Samah, A.A.** The effects of consumer attitude on green purchase intention: A meta-analytic path analysis. *J. Bus. Res.* **2021**, *132*, 732–743. https://doi.org/10.1016/j.jbusres.2020.10.053.
35. **Borusiak, B.; Szymkowiak, A.; Horska, E.; Raszka, N.; Żelichowska, E.** Towards building sustainable consumption: A study of second-hand buying intentions. *Sustainability* **2020**, *12*, 875. https://doi.org/10.3390/su12030875.