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THE IMPACT OF "TRADE-IN" POLICIES ON CONSUMERS' PURCHASE INTENTIONS FOR HOUSEHOLD APPLIANCES: EMPIRICAL EVIDENCE FROM GUANGZHOU RESIDENTS

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Abstract: Against the backdrop of China's nationwide household appliance trade-in policy aimed at promoting green consumption and expanding domestic demand, this study examines how policy instruments influence consumers' purchase intentions from a sustainability-oriented behavioral perspective. Drawing on the Howard–Sheth consumer behavior model, an integrated framework is constructed to analyze the effects of external policy stimuli—including subsidies, after-sales services, procedural arrangements, and recycling schemes—on purchase intention through perceived value, perceived risk, and social influence. Based on 965 valid questionnaires collected through online and offline surveys in Guangzhou, structural equation modeling is employed to test the proposed relationships. The results show that subsidy policies exert the strongest overall impact on purchase intention, mainly by enhancing perceived value and social influence, while procedural and recycling policies indirectly promote intention by improving value perception and social identification. Among cognitive factors, perceived value has the most significant positive effect, whereas perceived risk markedly suppresses purchase intention. These findings reveal the micro-level mechanisms of policy-driven sustainable consumption and provide practical implications for optimizing trade-in policy design beyond a subsidy-centered approach.
Keywords: Policy instruments; Trade-in policy; Consumer purchase intention; Howard–Sheth model; Structural equation modeling

1 INTRODUCTION

Since 2024, the Chinese government has implemented a comprehensive nationwide household appliance trade-in policy to stimulate consumption potential and promote a transition toward green and low-carbon development. By encouraging households to replace outdated appliances with high-efficiency and energy-saving products, the policy aims to optimize consumption structures, facilitate resource circulation, and support the national "dual-carbon" strategy. As an important policy instrument for stabilizing economic growth and expanding domestic demand, the trade-in program integrates fiscal subsidies, expanded coverage, improved recycling networks, and the promotion of green appliances. By the end of 2024, more than 33 million consumers nationwide participated in trade-in activities, generating hundreds of billions of yuan in appliance sales and significantly enhancing the contribution of appliance renewal consumption to economic growth. Despite these achievements, policy implementation still faces challenges, including limited consumer awareness of policy details, complex procedural arrangements, inadequate policy communication, and insufficient after-sales support, which hinder consumer participation and policy effectiveness.

A growing body of literature has examined trade-in policies and related consumption incentives from both macroeconomic and micro-behavioral perspectives. Domestic studies have predominantly focused on macro-level policy performance evaluation and market impact assessment, emphasizing the role of consumption upgrading, industrial renewal, and marketization processes in stimulating household demand [1,2]. Using econometric models, panel data analysis, and scenario simulations, prior research has demonstrated that fiscal subsidies and incentive-based policies can significantly boost appliance sales and accelerate the diffusion of energy-efficient products [3]. Some studies further integrate subsidy programs with energy efficiency labeling systems to evaluate their combined effects on consumer decision-making [4]. At the micro level, existing research identifies income level, price sensitivity, product performance awareness, and environmental consciousness as key factors influencing appliance purchasing behavior [5]. International studies extend this line of inquiry by incorporating behavioral and psychological perspectives, highlighting the roles of perceived value, perceived risk, trust in sustainability, and social norms in shaping green purchase intentions [6-8]. With the rise of digital and social media, recent research has also explored how online information exposure and content sharing influence consumer attitudes and green consumption behavior, particularly among younger cohorts [9]. Collectively, these studies offer valuable insights into the economic and behavioral impacts of policy incentives on appliance consumption.

However, despite these contributions, several limitations remain in existing literature. First, most studies focus on single policy instruments, especially subsidy policies, while relatively few examine the joint effects of multiple policy tools, such as after-sales services, procedural arrangements, and recycling systems, within a unified analytical framework [6,10]. Second, domestic research largely adopts a macro-level perspective, paying insufficient attention to the

micro-level cognitive mechanisms through which policy shapes individual consumer behavior [1]. Third, although international studies increasingly emphasize consumer cognition and social influence, their findings are not always directly transferable to China's specific policy context [7,8]. To address these gaps, this study constructs an integrated framework of "external stimuli–internal cognition–purchase intention" based on the Howard–Sheth consumer behavior model [10]. Using survey data collected from residents in Guangzhou and applying structural equation modeling (SEM), this research systematically examines how different trade-in policy instruments influence consumers' purchase intentions through perceived value, perceived risk, and social influence, thereby providing micro-level evidence to inform the optimization of trade-in policy design and implementation.

2 MODEL

2.1 Research Methodology

This study employs structural equation modeling (SEM) to empirically examine the relationships among latent variables. SEM consists of two components: the measurement model and the structural model [11]. The measurement model specifies the relationships between latent constructs and their observed indicators, while the structural model represents the causal pathways and relationships among latent constructs. SEM has been widely applied in consumer behavior and policy evaluation research, providing a robust framework for testing complex theoretical models involving mediating and moderating effects. The measurement model is specified as follows:

$$x = \Lambda_x \xi + \delta \tag{1}$$

where x is the vector of observed indicators corresponding to the exogenous latent variables, including subsidy policy, after-sales policy, procedural policy, and recycling policy (a total of 18 measurement items), Λx represents the factor-loading matrix of exogenous latent variables on their observed indicators (18×4), ξ denotes the 4×1 vector of exogenous latent variables, and δ means the measurement errors of the exogenous observed variables.

$$y = \Lambda_y \eta + \varepsilon \tag{2}$$

where y denotes the vector of observed indicators corresponding to the endogenous latent variables, including perceived value, perceived risk, social influence, and purchase intention (a total of 16 measurement items), Λ_y represents the factor-loading matrix of endogenous latent variables on their observed indicators (16×4), η denotes the 4×1 vector of endogenous latent variables, and ε means the measurement errors of the endogenous observed variables.

The structural model equation describes the influence relationships among latent variables and can be expressed as follows:

$$\eta = B\eta + \Gamma\xi + \zeta \tag{3}$$

where η represents the 4×1 vector of endogenous latent variables, B represents the 4×4 matrix of relationships among endogenous latent variables, reflecting the effects of perceived value, perceived risk, and social influence on purchase intention, Γ denotes the 4×4 matrix of effects of exogenous latent variables on endogenous latent variables, capturing the influence of the four types of policies on the three cognitive variables and purchase intention, and ζ means the vector of structural residuals, representing unexplained random disturbances.

2.2 Policy Classification and Research Hypotheses

Policy support serves as an essential safeguard for the effective implementation of household appliance trade-in programs. Drawing on the policy classification approaches proposed by Li and aligning them with the specific context of this study, the trade-in policy is categorized into four dimensions: subsidy policy, after-sales policy, procedural policy, and recycling policy, as shown in Table 1.

Table 1 Classification of Home Appliance-Related Policies Under the Trade-In Policy

Policy Type	Policy Subcategories	Main Policy Sources
Subsidy Policies	Direct Fiscal Subsidies Manufacturer Profit-Concession Subsidies Local Government Joint Subsidies	Action Plan for Promoting Large-Scale Equipment Upgrades and Consumer Goods Trade-In (State Council, 2024)
After-Sales Policies	Extended Warranty Service Benefits Installation and Old Appliance Removal Services After-Sales Recycling Guarantee Mechanism	Guiding Opinions on Improving the Home Appliance After-Sales Service System (Ministry of Commerce, 2023)
Procedural Policies	Digital Application Process Simultaneous Online-Offline Verification One-Stop Convenient Recycling Service	Action Plan for Promoting Consumer Goods Trade-In (State Council, 2024)

Policy Type	Policy Subcategories	Main Policy Sources
Recycling Policies	Old Appliance Recycling Subsidies Standardized Recycling Enterprise Access System Renewable Resource Utilization Incentives	Opinions of the General Office of the State Council on Accelerating the Construction of a Waste Recycling System (State Council, 2024)

Note: Data are compiled by the National Development and Reform Commission, the State Council, the Ministry of Ecology and Environment, and other relevant authorities.

2.2.1 Subsidy policy

Government subsidy policies constitute one of the most direct external stimuli influencing consumers' purchase decisions in trade-in programs. Previous empirical research has shown that subsidy incentives can significantly reduce consumers' perceived cost and risk and enhance their perceived value and confidence toward green products, thereby boosting purchase intention. For example, government subsidies have been found to reduce purchase costs and perceived risk while increasing social confidence in new energy vehicle adoption, leading to higher purchase intentions. In addition, policy incentives such as subsidies enhance consumers' perceived value of electric scooters and other green products and positively influence their purchase intentions. Moreover, policy incentives can interact with environmental awareness and perceived costs to further stimulate green consumption behavior.

H1a: Subsidy policy has a significant positive effect on perceived policy value.
H1b: Subsidy policy has a significant negative effect on perceived risk.
H1c: Subsidy policy has a significant positive effect on social influence.
H1d: Subsidy policy has a significant positive effect on purchase intention.

2.2.2 After-sales policy

For durable consumer goods, reliable after-sales service constitutes a critical component in establishing consumers' long-term trust and value perception. Existing studies indicate that service quality not only directly contributes to consumers' perceived value but is particularly salient in high-involvement product contexts. Meanwhile, comprehensive after-sales protection measures—such as extended warranty periods, clearly defined service responsibilities, and rapid response mechanisms—are regarded as effective risk-mitigation tools that significantly reduce consumers' perceived risk. In addition, positive after-sales service experiences serve as a key trigger for user-generated content (UGC) and electronic word-of-mouth (eWOM), substantially amplifying social influence through evaluation and recommendation mechanisms on social platforms. Furthermore, high-quality after-sales service enhances overall customer experience, thereby significantly strengthening consumers' purchase and repurchase intentions. Based on the above discussion, the following hypotheses are proposed:

H2a: After-sales policy has a significant positive effect on perceived policy value.
H2b: After-sales policy has a significant negative effect on perceived risk.
H2c: After-sales policy has a significant positive effect on social influence.
H2d: After-sales policy has a significant positive effect on purchase intention.

2.2.3 Procedural policy

Process complexity in trade-in programs constitutes one of the primary barriers to consumer participation. Prior research in technology and policy adoption consistently demonstrates that perceived ease of use is a critical antecedent of individuals' acceptance and behavioral intention. In the context of public policy implementation, the convenience of procedural arrangements—such as one-stop services, simplified administrative requirements, and online application platforms—can be conceptualized as policy-related ease of use. Such procedural facilitation reduces consumers' time and cognitive costs associated with participation, enhances their perceived value of the policy, and mitigates uncertainty during the decision-making process. Consequently, streamlined and transparent policy processes are expected to play a positive role in shaping consumers' psychological responses and behavioral intentions. Based on this reasoning, the following hypotheses are proposed:

H3a: Procedural policy has a significant positive effect on perceived policy value.
H3b: Procedural policy has a significant negative effect on perceived risk.
H3c: Procedural policy has a significant positive effect on social influence.
H3d: Procedural policy has a significant positive effect on purchase intention.

2.2.4 Recycling policy

A standardized and well-functioning recycling system constitutes a critical component of the value loop in appliance trade-in programs. Prior studies on take-back and recycling policies indicate that the convenience of recycling services and the perceived fairness of recycling prices significantly influence consumers' willingness to participate in green recovery programs. When recycling channels are accessible, transparent, and economically reasonable, consumers are more likely to perceive trade-in programs as beneficial and worthwhile.

Moreover, uncertainty regarding the residual value of used products is a major source of perceived risk in replacement decisions. Empirical evidence suggests that transparent and well-regulated recycling policies can effectively alleviate consumers' concerns about asset depreciation and disposal outcomes, thereby strengthening their overall evaluation of policy value and reducing decision-related risk. In addition, visible and well-organized recycling systems contribute to

the social legitimacy of green consumption practices, reinforcing normative pressures and social influence through demonstration and peer effects. Based on the above theoretical considerations, the following hypotheses are proposed:

H4a: Recycling policy has a significant positive effect on perceived policy value.

H4b: Recycling policy has a significant negative effect on perceived risk.

H4c: Recycling policy has a significant positive effect on social influence.

H4d: Recycling policy has a significant positive effect on purchase intention.

According to consumer behavior theory, the effects of external policy stimuli on individual decision-making are ultimately mediated through internal psychological processes. Extensive research has established perceived value as a primary determinant of consumers' purchase intentions, particularly in contexts involving economic incentives and quality–price trade-offs. In parallel, perceived risk has been widely recognized as a critical inhibiting factor in consumer decision-making, as uncertainty regarding financial, performance, or procedural outcomes may significantly suppress purchase intentions.

Within the context of China's collectivist cultural environment, social influence—often conceptualized as subjective norms—plays a particularly salient role in shaping individual consumption behavior. Prior studies on green consumption indicate that social approval, peer influence, and normative pressure can substantially enhance consumers' willingness to engage in environmentally responsible purchasing decisions. Based on the above theoretical considerations, the following hypotheses are proposed:

H5a: Perceived policy value has a significant positive effect on purchase intention.

H5b: Perceived risk has a significant negative effect on purchase intention.

H5c: Social influence has a significant positive effect on purchase intention.

In summary, the study constructs a model illustrating how multiple policy dimensions within the trade-in program influence consumers' appliance-purchase behaviors, as shown in Figure 1.

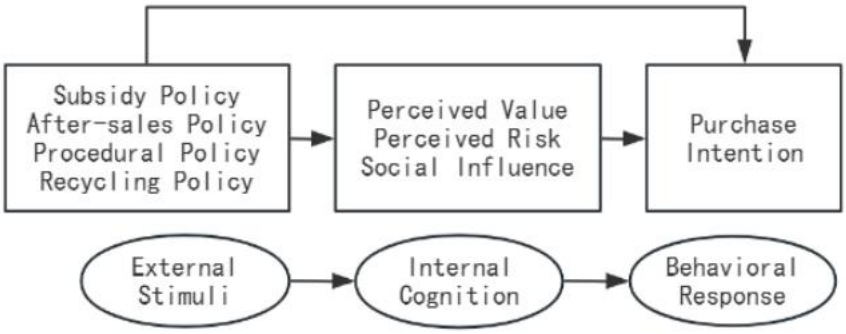

Figure 1 Conceptual Model of Influencing Factors

2.3 Measurement of Variables

To ensure the reliability and validity of the scales, this study adapted items from well-established domestic and international instruments, while tailoring them to the specific context of the trade-in policy. A stratified sampling approach was employed, and based on field surveys and in-depth interviews, a questionnaire was designed and pre-tested with over 50 respondents to collect feedback on item clarity and relevance. According to the feedback, modifications were made to the semantic expression, response option differentiation, and logical sequence of certain items, ensuring the scales possessed good content validity and internal consistency.

All eight latent variables in this study were measured using a five-point Likert scale, with a total of 34 items. The descriptive statistics of the measurement variables are presented in Table 2.

Table 2 Descriptive Statistics of Measurement Variables

Latent	Item Code	Measurement Item	Mean	SD
Purchase Intention	PI1	I am willing to participate in the trade-in program to purchase new household appliances.	3.94	0.81
	PI2	I would recommend participation in the trade-in program to people around me.	3.82	0.86
	PI3	I would prioritize participation in similar activities in the future.	4.05	0.78
	PI4	I believe the trade-in program aligns with my future consumption plans.	3.97	0.82
Perceived Value	PV1	The trade-in program allows me to obtain a high cost-performance ratio.	3.96	0.80
	PV2	The trade-in program reduces my purchasing costs.	4.02	0.76
	PV3	Through trade-in, I can purchase household appliances with better performance.	4.08	0.74
	PV4	The trade-in program improves my household's living quality.	3.89	0.79
Perceived Risk	PR1	I am concerned that the trade-in process is complicated to operate.	3.41	0.89

Latent	Item Code	Measurement Item	Mean	SD
	PR2	I am concerned that subsidy redemption or after-sales services may be unreliable.	3.58	0.85
	PR3	I am concerned that the recycling price for old appliances is low or not transparent.	3.67	0.82
	PR4	I am concerned that the promotional information may not match the actual program.	3.72	0.80
	SI1	People around me have a supportive attitude toward the trade-in program.	3.88	0.81
Social Influence	SI2	Seeing others participate in trade-ins increases my purchase intention.	4.01	0.77
	SI3	Media and online publicity influence my perception of the program.	3.95	0.79
	SI4	Recommendations from family or friends affect my participation decision.	4.07	0.75
	BP1	The trade-in subsidies are substantial and attractive.	4.10	0.74
	BP2	The subsidy policy covers a wide range of appliance types.	4.05	0.77
Subsidy Policy	BP3	The subsidy application process is clear and easy to operate.	3.84	0.82
	BP4	Subsidies are redeemed in a timely and transparent manner.	3.90	0.80
	BP5	The subsidy amount significantly reduces my actual payment.	4.05	0.78
	BP6	I believe the subsidy policy is fair and just.	3.83	0.84
	AP1	After-sales services respond promptly.	3.87	0.80
After-sales Policy	AP2	The policies for repairs, returns, and exchanges are clear.	3.91	0.76
	AP3	After-sales staff provide good service and solve problems quickly.	3.93	0.79
	AP4	After-sales policies make me feel confident to participate in the program.	3.89	0.81
	PP1	The trade-in application process is convenient and efficient.	3.89	0.83
Procedural Policy	PP2	Multiple online and offline channels make the process easy to operate.	3.95	0.79
	PP3	The program rules are transparent and easy to understand.	4.00	0.75
	PP4	Overall processing time is short, and the experience is satisfactory.	3.92	0.80
	RP1	The recycling price is reasonable and fair.	3.72	0.84
	RP2	The recycling process is standardized, safe, and reliable.	3.85	0.78
Recycling Policy	RP3	Recycling institutions have formal qualifications and service guarantees.	3.89	0.77
	RP4	The recycling method is environmentally friendly and compliant with regulations.	3.80	0.79

The scales used in this study were primarily adapted from well-established international instruments and tailored to the specific context of appliance trade-in programs in China.

To develop the measurement items presented in Table 2, this study drew upon well-established empirical research on consumer behavior and policy participation. Specifically, measures for perceived value and its influence on purchase intention were informed by recent studies demonstrating the central role of multidimensional value constructs in predicting consumer intention and behavior in sustainability and online shopping contexts [12]. Perceived risk items were adapted from literature examining the effect of perceived uncertainty on purchase intentions in environmental and electronic commerce settings [13]. Social influence was operationalized based on recent consumer behavior research that documents the impact of interpersonal and media influences on individual intentions and decisions [14]. Measures for subsidy policy, after-sales service policy, procedural policy, and recycling policy were designed with reference to studies that integrate policy stimulus factors and consumer participation, including research on incentive mechanisms, service quality, procedural convenience, and recycling engagement in consumption and sustainability programs [15]. Finally, purchase intention items were aligned with established scales frequently used in recent empirical studies of consumer participation and intention formation in both green and general consumption contexts [12]. All items were refined through pre-testing to ensure clarity and contextual relevance for the appliance trade-in policy.

2.4 Data Sources and Sample Characteristics

The data used in this study were obtained from a specialized survey on the "Household Appliance Trade-in Policy" conducted among residents of Guangzhou. As one of China's first national international consumption center cities, Guangzhou demonstrates strong policy implementation and high resident participation, making the sample highly representative. The survey was conducted through a combination of online and offline methods. A total of 1,122 questionnaires were distributed, and 965 valid responses were collected, yielding an effective response rate of 86%. All data passed reliability and validity tests, ensuring a solid foundation for statistical analysis.

Regarding sample composition, 497 respondents were male (51.5%), and 468 were female (48.5%), indicating a balanced gender distribution. In terms of age, the sample was primarily concentrated among 18- to 50-year-olds—an age group with strong purchasing power and high sensitivity to policy initiatives. Respondents aged 17 and below or

above 50 accounted for a relatively small share. With respect to educational background, more than 34% of respondents held a bachelor's degree or above, suggesting a relatively high overall education level.

Monthly income levels were evenly distributed, with nearly 47% of respondents earning between 6,000 and 10,000 yuan. In terms of occupation, employees of enterprises and public institutions accounted for the largest proportion (43.2%), while students, self-employed individuals, and freelancers represented smaller shares. Overall, the sample covers the major socio-demographic groups in Guangzhou.

In summary, the sample distribution is reasonable and exhibits strong representativeness and analytical value. Detailed statistics are presented in Table 3.

Table 3 Demographic Characteristics of the Survey Sample

Attribute	Category	Frequency	Percentage
Gender	Male	497	51.5
	Female	468	48.5
Age	17 years and below	7	0.7
	18–30 years	283	29.3
	31–40 years	373	38.7
	41–50 years	193	20.0
	Above 51 years	109	11.3
Education Level	Junior high school and below	131	13.6
	Senior high school / Technical secondary school	248	25.7
	Associate degree	259	26.8
	Bachelor's degree	299	31.0
	Master's degree and above	37	3.9
Occupation	Student	14	1.4
	Government agency / Civil servant	113	11.7
	Employees of enterprises and institutions	417	43.2
	Self-employed	197	20.4
	Farmer	59	6.1
	Freelancer	65	6.7
	Retired	101	10.5
Monthly Income	Below 4,500 yuan	71	7.3
	4,500–8,000 yuan	374	36.7
	8,000–10,000 yuan	227	23.5
	10,000–15,000 yuan	144	14.9
	15,000–20,000 yuan	170	17.6

2.5 Model Estimation and Validation

2.5.1 Reliability and validity tests

To further examine the construct validity and convergent validity of the measurement scales, this study employed SPSS 26.0 and AMOS 24.0 to analyze the standardized factor loadings, composite reliability (CR), and average variance extracted (AVE) of each latent variable. The results are presented in Table 4. As shown, all standardized factor loadings exceed 0.6 and are statistically significant at the 0.001 level, indicating strong associations between the observed indicators and their corresponding latent constructs. The CR values for all latent variables range from 0.86 to 0.91, and all AVE values are greater than 0.5, demonstrating satisfactory convergent validity and a high level of overall measurement consistency.

In addition, discriminant validity was assessed using Pearson correlation analysis by comparing the inter-construct correlation coefficients with the corresponding AVE values. The results, reported in Table 5, show that the square root of the AVE for each latent variable exceeds the absolute value of its correlations with other constructs, and that none of the inter-construct correlation coefficients exceed 0.8. These findings indicate the absence of serious multicollinearity and confirm adequate discriminant validity among the latent variables. Overall, the measurement scales exhibit satisfactory convergent and discriminant validity, effectively capturing consumers' perceptions and behavioral responses toward the appliance trade-in policy, and providing a solid foundation for subsequent model fit assessment and structural path analysis.

Table 4 Reliability and Convergent Validity Test Results of the Measurement Model

Latent Variable	Item Code	Cronbach's α	CR	Standardized Factor Loading	AVE	KMO Value
Purchase Intention(PI)	PI1	0.904	0.913	0.871	0.645	0.868
	PI2			0.856		
	PI3			0.778		
	PI4			0.791		
Perceived Value (PV)	PV1	0.889	0.893	0.812	0.625	0.846
	PV2			0.768		
	PV3			0.724		
	PV4			0.861		
Perceived Risk(PR)	PR1	0.842	0.857	0.764	0.550	0.797
	PR2			0.732		
	PR3			0.681		
	PR4			0.820		
Social Influence(SI)	SI1	0.874	0.886	0.715	0.611	0.830
	SI2			0.821		
	SI3			0.862		
	SI4			0.751		
Subsidy Policy (BP)	BP1	0.903	0.912	0.883	0.632	0.862
	BP2			0.864		
	BP3			0.781		
	BP4			0.712		
	BP5			0.736		
	BP6			0.803		
After-sales Policy(AP)	AP1	0.872	0.881	0.698	0.597	0.823
	AP2			0.734		
	AP3			0.854		
	AP4			0.736		
Process Policy(PP)	PP1	0.868	0.877	0.703	0.589	0.812
	PP2			0.783		
	PP3			0.836		
	PP4			0.729		
Recycling Policy (RP)	RP1	0.851	0.861	0.821	0.572	0.805
	RP2			0.764		
	RP3			0.681		
	RP4			0.832		

Table 5 Discriminant Validity Test Results

Latent Variable	BP	AP	PP	RP	PV	PR	SI	PI
BP	0.795							
AP	0.512	0.773						
PP	0.498	0.537	0.767					
RP	0.456	0.472	0.518	0.757				
PV	0.602	0.584	0.565	0.492	0.790			
PR	-0.364	-0.338	-0.356	-0.315	-0.471	0.742		
SI	0.428	0.446	0.473	0.401	0.518	-0.342	0.782	
PI	0.567	0.523	0.539	0.478	0.661	-0.414	0.592	0.803

Note: The values on the diagonal represent the AVE values.

2.5.2 Model fit assessment

The results of the reliability and validity tests indicate that the scale exhibits good internal consistency and construct validity, making it suitable for subsequent structural equation modeling (SEM) analysis. After conducting the initial

model fit test using AMOS 24.0, multiple modification indices were considered to adjust and refine the model. Due to space limitations, only the final model fit results are presented, as shown in Table 6.

As illustrated in Table 6, the ratio of chi-square to degrees of freedom (χ^2/df) is 2.431, which falls within the acceptable range of 1–3, indicating a good overall model fit. The root mean square residual (RMR) is 0.038, and the root mean square error of approximation (RMSEA) is 0.054. Both values are below the standard threshold of 0.08, suggesting small residuals and well-controlled model error. The goodness-of-fit index (GFI) and adjusted goodness-of-fit index (AGFI) are 0.925 and 0.901, respectively, both exceeding 0.90, demonstrating satisfactory model fit to the observed data.

With respect to incremental fit indices, the normed fit index (NFI) is 0.928, the incremental fit index (IFI) is 0.951, the Tucker–Lewis's index (TLI) is 0.943, and the comparative fit index (CFI) is 0.949. All values exceed the commonly accepted threshold of 0.90, indicating the model's strong explanatory power and reasonable structural relationships among the latent variables. For the parsimonious fit indices, the parsimonious normed fit index (PNFI) and parsimonious comparative fit index (PCFI) are 0.713 and 0.736, respectively, both exceeding 0.50, which demonstrates good parsimony and stability of the model.

In summary, the model exhibits satisfactory goodness of fit and can be regarded as the final model, as shown in Figure 2.

Table 6 Model Fit Indices

Statistical Test Index	Criterion	Model Parameter	Model Fit
CMIN/DF	<3	2.431	good
RMR	<0.05	0.038	good
NFI	>0.9	0.928	good
IFI	>0.9	0.951	good
TLI	>0.9	0.943	good
CFI	>0.9	0.949	good
RMSEA	<0.08 (Acceptable Fit) <0.05 (Excellent)	0.054	Acceptable

3 RESULTS AND ANALYSIS

3.1 Model Estimation Results

Using AMOS 24.0, a structural equation modeling (SEM) analysis was conducted to examine consumers' purchase intention under the "trade-in" policy. The estimated path results are presented in Table 7 and Figure 2 (all non-significant paths have been removed). The findings indicate that the overall model exhibits good fit, demonstrating a high level of consistency between the empirical data and the theoretical framework. Therefore, the model is suitable for subsequent hypothesis testing and mechanism analysis.

Table 7 The Recommended Fonts

Hypothesis	Standardized Coefficient	CR	P	Conclusion
H1a：Subsidy Policy→Perceived Value	0.338	6.36	***	Supported
H1b：Subsidy Policy→Perceived Risk	-0.241	-3.61	***	Supported
H1c：Subsidy Policy→Social Influence	0.415	7.02	***	Supported
H1d：Subsidy Policy→Purchase Intention	0.208	2.92	***	Supported
H2a：After-sales Policy→Perceived Value	0.182	2.93	***	Supported
H2c：After-sales Policy→Social Influence	0.312	4.05	***	Supported
H2d：After-sales Policy→Purchase Intention	0.148	2.47	***	Supported
H3a：Process Policy→Perceived Value	0.224	3.87	***	Supported
H3b：Process Policy→Perceived Risk	-0.171	-2.52	***	Supported
H4a：Recycling Policy→Perceived Value	0.309	5.12	***	Supported
H4c：Recycling Policy→Social Influence	0.283	4.93	***	Supported
H5a：Perceived Value→Purchase Intention	0.468	8.36	***	Supported
H5b：Perceived Risk→Purchase Intention	-0.183	-2.65	***	Supported
H5c：Social Influence→Purchase Intention	0.261	4.14	***	Supported

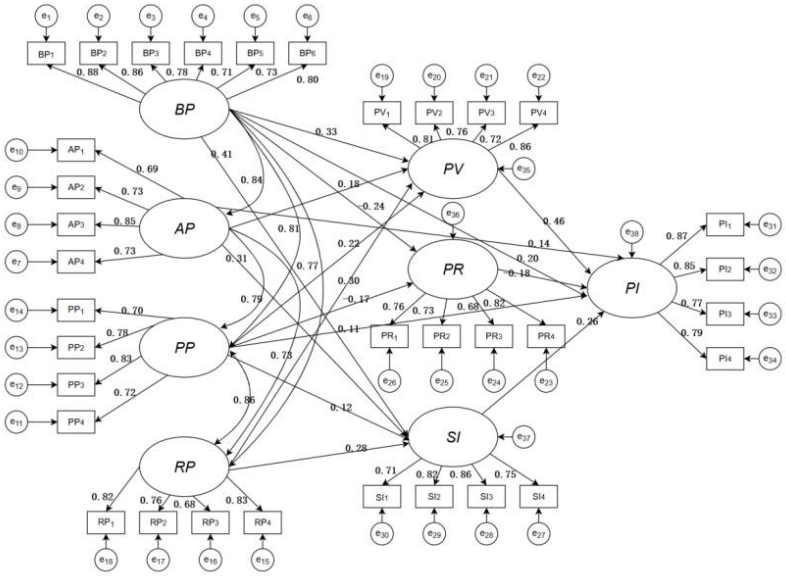

Figure 2 Structural Model Path Diagram and Parameter Estimates
Note: Only statistically significant paths are reported.

3.2 Analysis

This section analyzes the estimation results of the proposed model, focusing on both the mechanism through which policy instruments affect consumers' purchase intention and the relative magnitude of their impacts. While Sections 3.2.1–3.2.5 discuss the effects of policy variables and psychological factors based on path coefficients, Table 8 provides a further decomposition of direct and indirect effects, facilitating a clearer comparison of the overall influence of different policies.

3.2.1 Effects on perceived value

Subsidy policy, process policy, and recycling policy all exert significant positive effects on perceived value, with standardized coefficients of 0.326, 0.216, and 0.302, respectively. This indicates that stronger economic incentives, greater procedural convenience, and a more complete recycling system can meaningfully enhance consumers' value perceptions regarding both the policy and the products. Among these factors, subsidy policy has the strongest influence, suggesting that consumers are most sensitive to subsidy levels and economic benefits. By contrast, the effect of after-sales policy (coefficient = 0.173) on perceived value, although positive, is relatively weak in significance, indicating that after-sales services play a limited role in shaping value perception. Overall, economic incentives and process optimization are the key drivers of perceived value.

3.2.2 Effects on perceived risk

Subsidy policy and process policy both have significant negative effects on perceived risk, with coefficients of –0.242 and –0.175, respectively. This suggests that higher subsidies and simplified procedures can effectively reduce consumers' concerns regarding financial costs, time costs, and transaction uncertainties during the trade-in process. Meanwhile, the impacts of after-sales policy and recycling policy (coefficients = –0.092 and –0.134) are not significant, indicating that although consumers care about after-sales and recycling arrangements, their risk perception is primarily shaped by economic and procedural factors rather than service-related aspects.

3.2.3 Effects on social influence

Subsidy policy, after-sales policy, and recycling policy all show significant positive impacts on social influence, with coefficients of 0.418, 0.298, and 0.276, respectively. This suggests that economic incentives and service experience can enhance discussions and recognition within consumers' social networks, thereby generating favorable social diffusion effects. In contrast, the influence of process policy (coefficient = 0.132) is not significant, indicating that although greater procedural convenience enhances individual experience, it has not yet translated into broader social demonstration effects.

3.2.4 Direct effects on purchase intention

Among external policy factors, subsidy policy, after-sales policy, and process policy have significant positive effects on purchase intention, with coefficients of 0.211, 0.145, and 0.118, respectively. This demonstrates that economic incentives, convenient procedures, and service assurance function as direct drivers of consumer decision-making. Conversely, the direct impact of recycling policy (coefficient = 0.098) is not significant, indicating that its influence on purchase intention occurs mainly through mediating variables such as perceived value and social influence.

3.2.5 Effects of psychological factors on purchase intention

Perceived value, perceived risk, and social influence all exert significant effects on purchase intention, with coefficients of 0.463, –0.191, and 0.254, respectively. The magnitude of effects follows the order: perceived value > social influence > perceived risk. This indicates that consumers' perceptions of "economic attractiveness" and "social approval" serve as

the main psychological mechanisms driving participation in the trade-in program, whereas perceived risk exerts an inhibitory effect on purchase intention.

Table 8 Direct, Indirect, and Total Effects of Each Policy on Purchase Intention

Hypothesis	Direct Effect	Indirect Effect	Total Effect
Subsidy Policy→Purchase Intention	0.208	0.164	0.372
After-sales Policy→Purchase Intention	0.148	0.126	0.274
Process Policy→Purchase Intention	0	0.188	0.188
Recycling Policy→Purchase Intention	0	0.217	0.217

Note: Total effect = direct effect + indirect effect

4 CONCLUSIONS AND OUTLOOKS

4.1 Conclusions

This study investigates the effects of China's household appliance trade-in policy on consumers' purchase intention from a sustainability-oriented behavioral perspective. Drawing on the Howard–Sheth consumer behavior model, an integrated analytical framework is constructed to examine how multiple policy instruments—namely, subsidy policy, after-sales policy, process policy, and recycling policy—influence purchase intention through consumers' internal cognitive mechanisms, including perceived value, perceived risk, and social influence. Based on survey data collected from Guangzhou residents and analyzed using structural equation modeling (SEM), this study provides empirical evidence on the micro-level pathways through which policy stimuli shape consumer decision-making.

The results indicate that subsidy policy exerts the strongest overall effect on purchase intention, primarily by enhancing perceived value, reducing perceived risk, and reinforcing social influence. Process convenience and recycling systems also play important roles by improving value perception and strengthening social identification, while after-sales services mainly contribute through social influence and trust-building effects. Among internal cognitive factors, perceived value emerges as the most influential driver of purchase intention, whereas perceived risk significantly suppresses consumers' willingness to participate. These findings highlight that consumers' responses to the trade-in policy are shaped not only by economic incentives but also by psychological and social mechanisms.

This study contributes to the existing literature by moving beyond a single-instrument or macro-level perspective and proposing a unified framework that integrates multiple policy tools with consumer cognitive processes. From a practical perspective, the results suggest that optimizing the trade-in policy requires a shift from a subsidy-centered approach toward a more comprehensive strategy that emphasizes user experience, service quality, recycling integration, and social communication. By enhancing consumers' perceived value and social approval, the proposed framework provides actionable insights for improving policy effectiveness, promoting sustainable consumption, and supporting China's long-term green and low-carbon transition.

4.2 Outlooks

Despite its contributions, this study has several limitations that warrant further research. First, the empirical analysis relies on cross-sectional survey data from a single city, which may limit the generalizability of the findings. Future studies could employ multi-region or nationwide datasets to examine regional heterogeneity and enhance external validity. Second, although this study focuses on key cognitive mechanisms such as perceived value, perceived risk, and social influence, other relevant behavioral factors, including environmental attitudes and institutional trust, are not explicitly incorporated. Extending the model to include additional psychological variables or adopting longitudinal research designs would provide a more comprehensive understanding of consumer responses. Finally, this study examines purchase intention rather than actual purchasing behavior. Future research could integrate behavioral data or experimental approaches and apply the framework to other product categories or policy contexts to further test its robustness and applicability.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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