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# The Impact of Filtering Experience on Shopping Cart Abandonment: A Study on the Chain Mediation of Cognition and Affect

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**Abstract.** As information complexity in e-commerce environments grows, shopping cart abandonment(CAB) is a core constraint on platform conversion rates. Based on data from 355 questionnaires, this study employs Exploratory Factor Analysis(EFA), Confirmatory Factor Analysis(CFA), and Structural Equation Modeling (SEM) to investigate how filtering experience influences shopping cart abandonment (CAB) through a chain of cognitive and affective responses. The findings reveal that: (1) In the information filtering stage, Perceived Flexibility(PF), Perceived Adaptability (PA), and Perceived Cost(PC) significantly impact Cognitive Efficiency(CE) and Cognitive Load(CL), while the effects of Perceived Novelty(PN) and Perceived Value(PV) during the exploration stage are limited.(2) Cognitive Load(CL) is a primary driver of negative affect, significantly inducing Situational Anxiety(SA) and Decision Fatigue(DF).(3) Positive Affect(PAf) significantly reduces CAB, while SA increases the tendency to abandon. Conversely, DF was found to decrease abandonment behavior.(4) Security and pressure contexts show significant moderating effects on certain paths of the mediation model. These conclusions offer empirical evidence for optimizing e-commerce filtering tools and user experience management.

**Keywords:** Shopping Cart Abandonment; Filtering Experience; Chain Mediation; Cognition-Affect-Behavior(C-A-B) Theory.

## 1. Introduction

Amidst the continuous expansion of the global e-commerce market, a significant "efficiency paradox" has emerged. While transaction volumes consistently reach new highs, consumer decision-making efficiency has steadily declined. Shopping Cart Abandonment(CAB) has become a core impediment constraining platform conversion rates. Despite continuous optimization of payment processes, the global average cart abandonment rate still exceeds 75%[1].This contradiction indicates that the root of the problem has shifted from technical barriers in the transaction phase to an information processing crisis at the forefront of decision-making.

Current academic explanations for CAB often fall into a static attribution trap. They predominantly focus on transactional costs like price and shipping fees, or on complex checkout procedures[2]. When interface interaction is considered, research tends to concentrate on functional usability metrics, such as task-technology fit[3]. These approaches often fail to delve into the resulting user cognitive load and affective fluctuations. Clearly, there is an urgent need to construct a dynamic model that can reveal the underlying psychological processes of users.

Therefore, this study aims to fill this theoretical gap. Adopting a cognitive psychology perspective, it focuses on "filtering experience" as the core precedent variable. We will construct and test a chain mediation model based on the Cognition-Affect-Behavior(C-A-B) theory. This model will systematically investigate how filtering experience ultimately influences CAB by affecting users' cognitive responses(e.g., Cognitive Efficiency, Cognitive Load) and affective responses(e.g., Positive Affect, Situational Anxiety, Decision Fatigue). To achieve this, the study will conduct an empirical analysis of survey data using Structural Equation Modeling(SEM). The goal is to provide deeper

theoretical insights and practical guidance for e-commerce platforms to optimize user experience and reduce abandonment rates.

## 2. Theory and Hypothesis

### 2.1. Filtering Experience and Hypothesis Development

Filtering experience refers to the consumer's subjective perception and evaluation during the interactive process of information filtering. It is a dynamic and contextual process of subjective evaluation that spans the forefront of the consumer decision-making process. This experience can be divided into two core stages, each with distinct perceptual focuses and psychological mechanisms.
In the initial information exploration stage, the consumer's shopping objective is often not yet defined, and the experience is centered on content discovery. According to Uses and Gratifications Theory, Perceived Value(PV)—the consumer's subjective assessment of the potential satisfaction a product may offer—and Perceived Novelty(PN)—the consumer's perception of the uniqueness and innovation of the information encountered—are hypothesized to positively influence the user's Cognitive Satisfaction(CS)[4]、[5](H1a, H1b). However, based on Information Overload Theory, Perceived Overload(PO) at this stage is expected to negatively impact Cognitive Efficiency(CE)(H1c) and positively impact Cognitive Load(CL)[6](H1d).

As consumer intent becomes clear, their behavior transitions to the task-oriented information filtering stage, where the effectiveness of the experience can be explained by Task-Technology Fit(TTF) Theory.[7] Within this framework, Perceived Flexibility(PF)—the freedom and adaptability of filtering tools in handling complex needs—and Perceived Adaptability(PA)—the consumer's perceived congruence between filter results and their requirements—are considered manifestations of TTF and are hypothesized to positively influence Cognitive Satisfaction(CS)[8](H2a, H2b) and Cognitive Efficiency(CE)(H2d, H2c). Additionally, Perceived Adaptability(PA) is also expected to effectively reduce unnecessary mental consumption, thereby negatively impacting Cognitive Load(CL)(H2g). Conversely, Perceived Cost(PC)—the time and effort required to use the filtering tools—is expected to negatively affect Cognitive Efficiency(CE)(H2e) and positively affect Cognitive Load(CL)[9](H2f).

### 2.2. Cognitive and Affective Responses and Hypothesis Development

According to Cognitive Appraisal Theory, external experiences trigger internal affect through cognitive evaluations. Positive cognitive states, such as Cognitive Efficiency(CE) and Cognitive Satisfaction(CS)—which reflect a user's sense of efficacy and control, as well as an overall positive assessment of the filtering process[11]—are hypothesized to foster Positive Affect(PAf)(H3, H4). Conversely, according to Cognitive Load Theory, when the complexity of information or tasks leads to Cognitive Load(CL)[12], defined as an excessive consumption of mental resources, this state of resource depletion becomes a direct antecedent of negative affect. It is expected to induce Situational Anxiety(SA) due to uncertainty[13](H5) and lead to Decision Fatigue(DF) from sustained mental exertion [14](H6).

These affective responses are the direct drivers of the final behavior. Positive Affect(PAf) enhances a user's approach motivation, thereby negatively influencing Shopping Cart Abandonment (CAB) (H7). In contrast, negative affect activates avoidance behavior. Specifically, Situational Anxiety(SA), triggered by the shopping context, heightens risk perception and prompts users to terminate the purchase [15](H8). Similarly, Decision Fatigue(DF), resulting from sustained cognitive processing, depletes the self-regulatory resources necessary to complete the transaction, making abandonment a more likely default option[16](H9).

## 2.3. Mediation, Moderation, and Hypothesis Development

The core of this study lies in uncovering the psychological pathways among these variables. Based on the C-A-B framework, we hypothesize that cognitive responses mediate the relationship between filtering experience and affective responses(H10), and that affective responses, in turn, mediate the relationship between cognition and behavior(H11), thereby forming a complete chain mediation pathway(H12). Finally, we posit that the strength of this psychological pathway is conditional, leading us to propose a moderated mediation model(H13). Specifically, we expect that platform-provided 'security contexts'(e.g., money-back guarantees) and 'pressure contexts'(e.g., limited-time promotions) will act as external interventions to moderate the indirect effect of Cognitive Load(CL) on Shopping Cart Abandonment(CAB) through Situational Anxiety(SA) and Decision Fatigue(DF).

# 3. Research Design

## 3.1. Research Framework

Based on the preceding theory and hypotheses, this study constructs a chain mediation model, as illustrated in Figure1 The model comprises core latent variables, including information exploration and filtering experience, cognitive responses, affective responses, and Shopping Cart Abandonment. It systematically delineates the consumer's internal psychological decision-making pathways within the e-commerce environment.

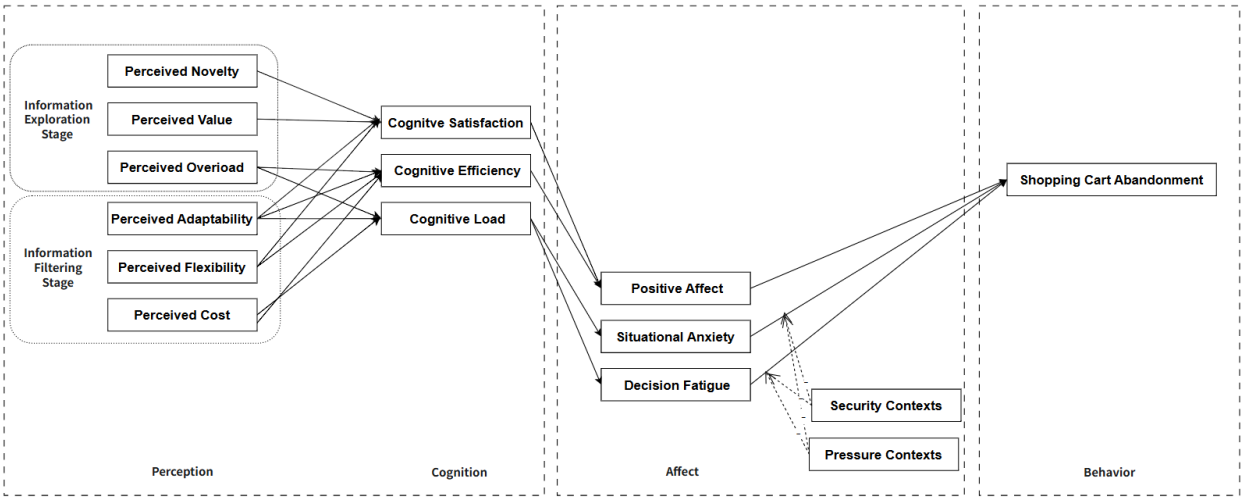


**Figure 1.** Research Model

## 3.2. Variable Measurement and Data Collection

Data for this study were collected by a survey method. To ensure reliability and validity, all measurement items for the core constructs were adapted from established scales and subsequently refined through expert review and a pilot study. A 5-point Likert scale was used for all measurements. The survey was distributed through online channels, and screening questions were employed to select target participants with relevant shopping experience(i.e., having initiated but not completed a purchase). A total of 355 valid questionnaires were ultimately collected.

The sample exhibited typical characteristics of a young, online consumer demographic. Participants were predominantly female(64.5%), with over 90%(93.0%) aged between 18 and 30. In terms of behavioral characteristics, the sample demonstrated high engagement and relevance. Over 80%(81.7%) of users placed more than nine orders per month on average. Furthermore, all respondents had prior experience with shopping cart abandonment, and 62.5% reported abandoning a cart 'multiple times'. Overall, the sample composition is well-defined and exhibits good representativeness, providing a reliable data foundation for the subsequent model testing.

## 4. Data Analysis and Results

### 4.1. Reliability and Validity Test

A rigorous reliability and validity analysis was performed on the data from 355 valid questionnaires. First, a test for data adequacy for factor analysis was conducted. The results showed a Kaiser-Meyer-Olkin(KMO) value of 0.837 and a significant Bartlett's Test of Sphericity($p < 0.001$), indicating that the data were highly suitable for factor analysis. Subsequently, the measurement model was assessed using Confirmatory Factor Analysis(CFA), and the results indicated that the model possessed good reliability and validity.

Specifically, the Cronbach's alpha(α) coefficients for all latent variables(ranging from 0.793 to 0.936) and the Composite Reliability(CR) values(ranging from 0.792 to 0.937) were well above the recommended threshold of 0.7, demonstrating high internal consistency of the scales. Regarding convergent validity, the Average Variance Extracted(AVE) for all constructs, except for Positive Affect(PAf) and Perceived Flexibility(PF), met the standard of 0.5 or higher. Given the robust performance of the overall reliability indicators, the convergent validity was considered acceptable. Furthermore, the square root of the AVE for each latent variable was greater than its correlation coefficients with all other variables, confirming the model's good discriminant validity. Finally, to address the potential risk of Common Method Bias(CMB), Harman's Single-Factor Test was conducted. The results showed that the first common factor explained only 15.179% of the variance, which is well below the 40% threshold. This suggests that common method bias is not a significant concern in this study.

### 4.2. Structural Model Testing

The data analysis was conducted in two stages. In the first stage, Structural Equation Modeling(SEM) was employed to test the path relationships among the latent variables, control for measurement error, and assess the overall fit of the theoretical model. In the second stage, to specifically investigate the chain mediation and moderated mediation effects, a regression-based moderated mediation analysis was conducted using the PROCESS macro(Model 14).To results, each latent variable was represented by the mean score of its measurement items(an alternative approach using factor scores was also tested and yielded consistent results), and control variables were included in the analysis. This two-stage strategy was adopted due to certain limitations in current SEM software for implementing complex moderated chain mediation models(e.g., the Latent Moderated Structural Equations(LMS) method is computationally complex and requires a large sample size). This procedure facilitates a comprehensive examination of the overall model's integrity while also allowing for a detailed test of specific path effects.

The model fit indices for this study were acceptable($\chi^2/df = 1.686$, CFI = 0.909, RMSEA = 0.044), indicating a good fit between the theoretical model and the sample data. The key results from the path analysis(as shown in Figure 2) and hypothesis testing are presented below:

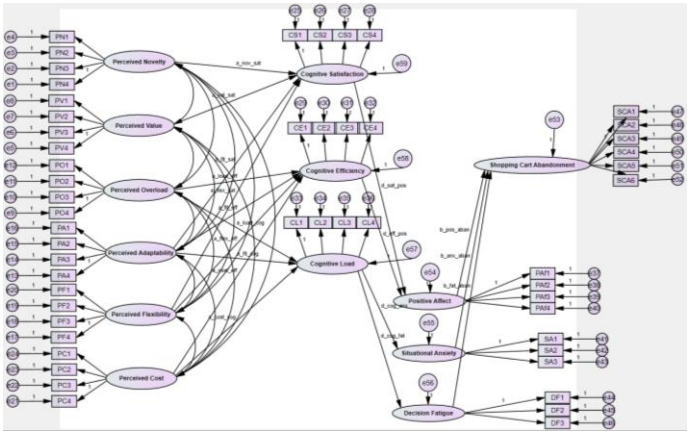


**Figure 2.** Structural Equation Model and Standardized Path Coefficients

As illustrated in Figure 2, experiences during the information filtering stage—specifically Perceived Flexibility(PF), Perceived Adaptability(PA), and Perceived Cost(PC)—had significant effects on cognitive responses. Cognitive Load(CL) had a significant positive effect on both Situational Anxiety(SA)(β = 0.457***) and Decision Fatigue(DF)(β = 0.514***). Positive Affect(PAf) had a significant negative effect on Shopping Cart Abandonment(CAB)(β = -0.393***), while Situational Anxiety(SA) had a significant positive effect on CAB(β = 0.201***). Notably, Decision Fatigue(DF) was found to have a significant negative effect on Shopping Cart Abandonment(CAB)(β = -0.192***), a direction contrary to Hypothesis H9. Therefore, H9 was not supported.

### 4.3. Test for Mediation and Moderated Mediation Effects

To further investigate the mediating role of cognition and affect and their contextual boundary conditions, this study employed the SPSS PROCESS macro(Model 14) with 5,000 bootstrap resamples to conduct a chain mediation and moderated mediation analysis. The analysis first confirmed that cognitive responses played a key mediating role in the relationship between filtering experience and affective responses, and that affective responses, in turn, played a key mediating role between cognitive responses and the final behavior(H10 was partially supported; H11 was supported). Building on this, the test for chain mediation effects(see Table1) further revealed the complete 'experience → cognition → affect → behavior' transmission pathway(H12 was partially supported), uncovering two core pathways. The first is a positive 'empowering pathway,' whereby a good filtering experience(e.g., high Perceived Flexibility) significantly reduces Shopping Cart Abandonment by enhancing Cognitive Efficiency and fostering Positive Affect. The second is a negative 'depletion pathway,' whereby a negative experience(e.g., high Perceived Cost) drives negative affect by increasing Cognitive Load. This latter pathway exhibited two distinct effects: Cognitive Load significantly increased the user's tendency to abandon by inducing Situational Anxiety. However, counter-intuitively, Cognitive Load also significantly reduced abandonment by inducing Decision Fatigue, a phenomenon likely driven by the 'sunk cost effect'.

**Table 1.** Standardized Bootstrap Test for Chain Mediation Effects(H12)

| Path | Effect | SE | Bias-corrected 95% CI | | | Mediation Effect |
|---|---|---|---|---|---|---|
| | | | Lower | Upper | P | |
| PV → CS → PAf → CAB | -0.06 | 0.051 | -0.182 | 0.022 | 0.159 | Not Supported |
| PN → CS → PAf → CAB | -0.043 | 0.04 | -0.14 | 0.019 | 0.167 | Not Supported |
| PF → CE → PAf → CAB | -0.046 | 0.024 | -0.106 | -0.011 | 0.007 | Supported |
| PA → CE → PAf → CAB | -0.032 | 0.017 | -0.076 | -0.007 | 0.005 | Supported |
| PO → CL → SA → CAB | 0.043 | 0.023 | 0.012 | 0.11 | 0.003 | Supported |
| PC → CL → DF → CAB | -0.051 | 0.026 | -0.12 | -0.014 | 0.003 | Supported |
| PO → CL → DF → CAB | -0.046 | 0.021 | -0.105 | -0.014 | 0.003 | Supported |
| PC → CL → SA → CAB | 0.048 | 0.025 | 0.013 | 0.113 | 0.003 | Supported |

Finally, the test for moderated mediation revealed the boundary conditions of the aforementioned 'depletion pathway'. The results showed that both 'security contexts'(e.g., price guarantees) and 'pressure contexts'(e.g., limited-time promotions) had a significant negative moderating effect on the mediation pathway from Cognitive Load(CL) through Situational Anxiety(SA) to Shopping Cart Abandonment(CAB)(Index = -0.103 and -0.115, respectively; 95% CIs did not contain zero). This suggests that both types of contexts can effectively buffer the abandonment tendency driven by anxiety.

Furthermore, 'security contexts' also significantly and negatively moderated the mediation pathway from Cognitive Load(CL) through Decision Fatigue(DF) to Shopping Cart Abandonment(CAB)(Index = -0.096). This implies that security guarantees can reinforce the 'sunk cost effect,' whereby decision fatigue promotes purchase completion. However, the moderating effect of 'pressure contexts' on this pathway was not significant.

## 5. Conclusion

Through empirical analysis, this study systematically reveals the 'experience-cognition-affect' psychological pathway underlying consumer shopping cart abandonment. The findings indicate that the tool experience during the information filtering stage—particularly Perceived Flexibility(PF) and Perceived Cost(PC)—is a key antecedent of user Cognitive Load(CL). This cognitive burden, in turn, becomes the primary driver for inducing negative affect such as Situational Anxiety(SA) and Decision Fatigue(DF).

The study's most significant finding is the discovery of the inverse effect of decision fatigue: contrary to conventional wisdom, cognitively exhausted consumers, driven by the 'sunk cost effect,' show a greater tendency to complete a purchase rather than abandon it. Furthermore, the research confirms that the complete chain mediation pathway is effectively moderated by contextual strategies, such as platform security guarantees or limited-time promotions.

These conclusions provide a significant theoretical basis and practical implications for e-commerce platforms. They can optimize filtering tools to reduce user cognitive load and implement contextual intervention strategies, such as alleviating anxiety through service commitments and leveraging decision fatigue to promote purchase completion.

While this study yields several key findings, it is not without limitations. First, the study relies on a retrospective survey method, which may introduce a bias between self-reported perceptions and actual behavior. Second, the sample is primarily composed of young consumers, limiting the external validity of the conclusions and necessitating further validation.Therefore, future research could employ methods such as scenario-based experiments or neuroscientific approaches (e.g., eye-tracking) to more precisely measure real-time user responses. Additionally, expanding the sample to include participants of varying ages and digital literacy levels would be crucial. This would allow for comparative analyses and an investigation into the model's generalizability across a broader population.

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