Empirical Study on Mystery Box Consumption from a Behavioral Economics Perspective

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Abstract: This paper is an empirical study on the hot sales of mystery boxes under the framework of behavioral economics theory, which shows that "endowment effect, loss aversion, sunk cost, and uncertainty incentives" are the core factors of frequent purchase and addiction, which makes marketing change from traditional "persuasion" to "emotion-driven", and thus provides insight into the future that goods with higher emotional value are more likely to sell well.

***Keywords*:** mystery boxes, consumer behavior, behavioral economics, operant conditioning, loss aversion, cognitive biases, empirical study, market strategies

1. Introduction

With the development of social economy and technological advancements, consumer behavior and market demand are also constantly evolving. In recent years, the mystery box craze has become a prominent consumer phenomenon and has attracted widespread attention on social media. Mystery boxes have inherent unpredictability, and the hot sales of mystery boxes reflect consumers' preference for unpredictable and high-risk goods, which challenges the assumption of "rational people" in traditional economics and shakes the most important cornerstone of traditional economics.

This research will be conducted from the perspective of behavioral economics, using a combination of literature research and empirical research, aiming to provide new perspectives and economic explanations for consumers' motivations and behaviors in purchasing mystery boxes. Firstly, through a systematic review and analysis of relevant literature, gain a thorough understanding of the origin and development of mystery boxes, and explore the related concepts of psychology and behavioral economics involved. Secondly, conduct empirical research through both online and offline surveys. By collecting and analyzing relevant data and applying behavioral economics models and methods, an in-depth analysis of the key issues in mystery box consumption is conducted. Finally, based on the research results, optimization paths and policy suggestions are proposed to provide references for promoting the standardized management and sustainable development of the mystery box market.

2. The explanation of consumers' mystery box purchase behavior by behavioral economics theory

Overconfidence bias in behavioral economics includes overestimating abilities, illusion of control, and optimism bias. In the mystery box market, such overconfidence distorts judgments, as optimistic consumers tend to underestimate risks and focus excessively on potential gains.

Consumption expectations based on loss aversion: The loss aversion theory was proposed by Kahneman and Tversky (1979), suggesting that individuals often experience greater pain from loss than pleasure from the same gain[1]. In the mystery box market, consumers often exhibit two typical behaviors: one is the "collection effect", that is, after purchasing some mystery boxes, to avoid missing out, they continue to purchase the completed series (Yu, 2022)[3]; The second is the "reversal effect". Driven by loss aversion, consumers are willing to take greater risks to avoid potential losses.

Operant conditioning: The theory of operant conditioning was proposed by B.F. Skinner, which states that individual behavior can be adjusted through reinforcement or punishment in the environment. Xia (2021) pointed out that in mystery box purchases, obtaining rare items or special rewards would serve as a positive reinforcement, enhancing the willingness to make repeat purchases[2]. Conversely, an unsatisfactory unboxing experience may serve as a punishment, reducing the possibility of future purchases.

3. Emprical research

To ensure the reliability and validity of the questionnaire, this study conducted KMO and Bartlett tests as well as reliability analysis prior to the formal survey, supplemented by descriptive statistics and cluster analysis. The results indicate

that the questionnaire demonstrates strong applicability and stability. Due to space limitations, the detailed statistical procedures and results are not further elaborated here.

3.1 Experimental hypothesis

In this study, we conducted two experiments to explore the psychological and behavioral mechanisms underlying mystery box purchases. Experiment 1 investigated the variables affecting purchase addiction, with "addiction" as the dependent variable and 14 independent variables hypothesized to have potential influence (H1). Experiment 2 aimed to validate the roles of operant conditioning and loss aversion in consumer behavior. Specifically, H2 posits that operant conditioning — through positive and negative reinforcement — serves as the primary psychological mechanism driving consumers to continue purchasing mystery boxes after their initial buy, while H3 suggests that loss aversion motivates consumers to persist in purchases after investing money without obtaining desired items. In both cases, the term "primary" is operationally defined as being selected by more than 70% of participants.

3.2 Hypothesis testing in experiment one

A logistic regression analysis was conducted using Stata 26 to assess factors potentially affecting consumer behavior and addiction. The dependent variable is 'whether consumers are addicted to purchasing mystery boxes'. A 95% confidence interval was applied. The regression results are shown in Figure 1:

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Logistic regression                                     Number of obs =    486
                                                        Wald chi2(15) =  69.11
                                                        Prob > chi2   = 0.0000
Log pseudolikelihood = -221.78851                       Pseudo R2     = 0.2674
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pol	Coefficient	Robust std. err.	z	P>|z|	[95% conf.	interval]
age	-.5160621	.1533823	-3.36	0.001	-.8166858	-.2154384
gender	-.1889916	.2401739	-0.79	0.431	-.6597238	.2817407
monthlyincome	.3441692	.1610944	2.14	0.033	.02843	.6599084
highestdegree	-.3696612	.2086238	-1.77	0.076	-.7785564	.039234
riskattitude	.4451149	.1835679	2.42	0.015	.0853285	.8049013
knowledge	.3524187	.1850456	1.90	0.057	-.010264	.7151015
howoften	.2576874	.2455492	1.05	0.294	-.2235802	.7389551
howmany	.3614378	.2494277	1.45	0.147	-.1274314	.8503071
brands	.0884636	.1413333	0.63	0.531	-.1885446	.3654719
purpose	.0632459	.0757953	0.83	0.404	-.08531	.2118019
averageexpe~e	.4438551	.1968692	2.25	0.024	.0579985	.8297117
Disposalmet~d	.0376102	.0794873	0.47	0.636	-.118182	.1934024
feel	.0100908	.0972812	0.10	0.917	-.1805769	.2007585
keepbuying1	.2107809	.2798628	0.75	0.451	-.33774	.7593018
luckylevel	.8405746	.198173	4.24	0.000	.4521627	1.228986
_cons	-6.858474	1.169113	-5.87	0.000	-9.149893	-4.567056

Figure 1. Logistic Regression Analysis

(1) Age: The coefficient is -0.5160621 with a significance level (p-value) of 0.001, leading to the rejection of the null hypothesis. The negative coefficient indicates that the likelihood of addiction to purchasing mystery boxes decreases with age. This may be due to older consumers having different consumption priorities or being less influenced by the novelty and collectible value of mystery boxes.

(2) Monthly Income: The coefficient is 0.3441692, with a p-value of 0.033, suggesting a slight increase in the probability of addiction to mystery box purchases as monthly income rises, likely due to an increase in disposable income.

(3) Risk Attitude: The coefficient is 0.4451149, significant with a p-value of 0.015. This indicates that individuals more willing to take risks are more likely to become addicted to purchasing mystery boxes, possibly due to the uncertainty inherent in mystery boxes.

(4) Knowledge: The coefficient is 0.3524187, approaching significance (p-value = 0.057). This may suggest that individuals more knowledgeable about mystery boxes are more prone to addiction, possibly because they can better appreciate the items within the boxes.

(5) Average Expenditure: The coefficient is 0.4438551, with a significance level (p-value) of 0.024. This suggests that higher average spending on mystery boxes is associated with an increased probability of addiction.

(6) Perceived Luckiness: The coefficient is 0.8405746, very significant (p-value < 0.001). This indicates that individuals

who feel luckier are much more likely to become addicted to purchasing mystery boxes. This scenario may be due to the gambling-like nature of mystery box purchases, where the uncertainty and surprise elements can be particularly appealing to those who believe they have a higher chance of receiving rare or valuable items.

(7) Gender: The coefficient is -0.1889916, but it is not statistically significant (p-value = 0.431). This means that in this model, gender does not significantly affect the likelihood of becoming addicted to purchasing mystery boxes.

(8) Highest Degree: The coefficient is -0.3966612, with a p-value of 0.076, insignificantly indicating that a higher education level might negatively correlate with addiction, possibly due to a more critical view of consumerism.

(9) Purchase Frequency and Number of Brands Considered: The coefficients for these variables are 0.2567874 and 0.3614378 respectively, but both are not significant (p-values of 0.294 and 0.147). This indicates that in this model, neither the frequency of purchase nor the number of brands considered are significant predictors of addiction.

(10) Purchase Purpose and Most Common Disposal Method: Both have insignificant p-values, indicating no significant relationship with addiction behavior in the sample.

(11) Number of Brands: The coefficient is 0.0884636, but it is not statistically significant (p-value = 0.531). This means that in this model, the number of brands considered by consumers does not significantly impact their likelihood of addiction to mystery box purchases.

(12) Emotions: The coefficient is -0.0100908, and it is not statistically significant (p-value = 0.917). The null hypothesis cannot be rejected, and negative emotions caused by purchasing mystery boxes do not have a significant relationship with addiction. Although some individuals may experience negative emotions and engage in irrational spending, sporadic impulsive behaviors do not lead them to addiction to the toys.

3.3 Hypothesis testing in experiment two

(1) Question One: "Would you keep buying until you get the style you like?"

No: 75.87% of participants expressed negative emotions and did not want to buy anymore (operant conditioning); 67.82% felt the novelty wore off after one purchase.

Yes: 83.18% enjoyed the surprise of opening mystery boxes; 73.45% wanted to collect a complete set of products. Only 29.20% hoped to reduce their previous losses by purchasing more (loss aversion theory).

(2) Question Two: "Do you keep buying mystery boxes because you found something you liked in a previous box?"

No: 80.16% stopped buying once the novelty wore off; 58.71% already felt satisfied; 39.14% had no special motive to buy.

Yes: 81.41% wanted to purchase again because they liked the product they received last time (operant conditioning), 64.60% felt it was like gambling.

4. Research conclusion

For Hypothesis H1, the variables rejecting the null hypothesis indicate that certain consumer characteristics are particularly pronounced in the addiction to purchasing mystery boxes. Specifically, younger individuals, those with higher incomes, risk-seeking consumers, and those with a strong belief in their own luck are more likely to develop an addiction to mystery box purchases and tend to engage in repeated buying.

The data indicate that operant conditioning significantly influences consumer behavior in mystery box purchases. Consumers tend to repeat purchases when they receive favored items, motivated by positive reinforcement, and stop purchasing when they do not receive desired items, reflecting avoidance of negative outcomes. In both cases, over 75% of participants reported making decisions based on prior experiences, and more than 80% acknowledged that previous outcomes influenced their purchasing behavior. These results support Hypothesis H2, suggesting that operant conditioning is a primary psychological mechanism determining whether consumers continue to purchase mystery boxes after their initial purchase.

In contrast, evidence for loss aversion as a motivator for continued mystery box purchases is not significant. Although some consumers buy in hopes of reducing losses, the majority of data suggest that decisions to continue purchasing after failing to obtain desired items are likely driven by other psychological mechanisms. Factors such as the randomness of mystery box contents and gamification elements may play a more prominent role, continuously resetting novelty and expectations. Consequently, Hypothesis H3 is rejected, indicating that loss aversion does not serve as a primary driver of ongoing purchasing behavior in the mystery box market.

5. Strategic recommendations for mystery box market

5.1 Recommendations for government

Tiered Regulation and Risk Warning Mechanism: Drawing on the age-rating system in gaming, mystery boxes should

be subject to tiered regulation according to price, probability design, and rarity. For high-risk categories, merchants should be required to include prominent risk warnings on packaging and advertisements to help consumers identify potential risks and reduce excessive purchasing.

Unified Probability Disclosure Platform: Governments are advised to establish a unified disclosure platform requiring merchants to regularly release sales data, hit rates of rare items, and circulation statistics. This transparency mechanism can effectively prevent false advertising, enhance consumer rights to information, and promote market fairness.

Consumer Behavior Alert System: Collaboration with payment platforms is recommended to implement an alert system for consumers with high-frequency or large-amount mystery box purchases. For instance, when spending exceeds a certain threshold within a short period, the system could send reminders to encourage rational consumption and mitigate addictive behavior.

5.2 Recommendations for merchants

Data-Driven Personalized Design: By leveraging big data analytics and machine learning, businesses can tailor the contents of mystery boxes based on consumers' purchase history, preferences, and social behaviors. Unlike traditional one-size-fits-all designs, this personalized approach enhances user satisfaction and increases repurchase rates. Personalization can also integrate with virtual reality (VR) or augmented reality (AR) experiences, allowing users to preview box storylines or product interactions before unboxing.

Dynamic Scarcity and Reward Mechanism: Beyond traditional guarantee mechanisms, a "dynamic scarcity" strategy can adjust the probability of limited-edition items appearing based on inventory, user engagement, and community activity. Coupled with a chain reward system — such as linked points or collaborative tasks — this mechanism incentivizes sustained user participation. It enhances anticipation and leverages social sharing to increase brand exposure.

Transmedia Storytelling and Interaction: Embed mystery boxes into a transmedia storytelling system, integrating comics, short videos, mini-games, or social media plotlines, making each box part of a larger narrative. Consumers are not just purchasing items but "experiencing a story." This narrative strategy increases collectible value, enhances user engagement, and encourages user-generated content (UGC), fostering secondary promotion.

6. Research limitations and future prospects

This study highlights the effect of perceived value on mystery box purchases but is limited by sample age gaps, the narrow focus on perceived value while neglecting other influences, and potential self-report bias, especially on sensitive issues like addiction.

In today's world, change is the only constant. Mystery boxes may not remain perpetually popular, just as luxury goods have lost their appeal to young consumers who increasingly seek novelty and rebellion. Their demands are gradually shifting from material to spiritual dimensions, and products with distinctive aesthetics and emotional value are more likely to attract them. Traditional "persuasion-based" marketing has been supplanted by "emotion-driven" strategies. Capturing and keeping pace with these changes has become a common aspiration, and quantitative research within the behavioral economics framework offers an effective approach for understanding trends and supporting decision-making. Such methods are poised to see increasingly widespread application in the field of artificial intelligence.

References

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