

A Study on Irrational Risk Insights of “Blind Box” Consumption Communities Based on Multimodal Data

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ABSTRACT

In recent years, the blind box consumption pattern has become popular rapidly, especially among our young people. Because of its randomness and sense of surprise, it may make people feel competitive and even addicted, leading to spending money indiscriminately and bringing economic pressure to themselves. This study focuses on this irrational risk that may occur in the blind box consumption circle.

In order to improve the shortcomings of existing research, such as relying only on a single data and lacking quantitative evaluation tools, we propose a multi-modal analysis framework to construct a “blind box irrational index” to evaluate the risks of the whole circle. The research integrates a variety of different data, including user comments, interactive behaviors collected from social media such as Xiaohongshu and Weibo, and second-hand platforms such as Xianyu, as well as second-hand market price information.

In terms of methods, they use special dictionaries and rule-based methods to extract irrational psychological characteristics from text data. The Analytic Hierarchy Process (AHP) and entropy method are combined to determine the index weight, and the multi-modal features are synthesized into a comprehensive index. In addition, it is suggested to use event research method to test whether this index is useful as a risk early warning tool.

The contribution of this study is that it applies multimodal data fusion to the social and psychological risk analysis of consumer communities, which provides methodological reference for future research and practical help for regulators and platforms to monitor irrational consumption trends.

Keywords: Blind box consumption; Irrationality level; Multimodal data; Community risk; Quantitative evaluation

1. INTRODUCTION

In recent years, blind box consumption and its various ways of playing have spread all over the world, from fashion toys to game-related IP. Its randomness and surprise of not knowing what to get before unpacking have attracted many consumers, especially young people. However, in the consumption mechanism of blind box, there are some psychological factors similar to gambling, coupled with its strong social communication effect, which can easily lead to comparison behavior, impulsive purchase and even addiction.

Considering the limited purchasing power of many young consumers, repeated irrational purchases may lead to overdraft of their wallets and greater economic pressure. From the perspective of the whole group, these behaviors may also form a collective risk model, which is not conducive to a healthy consumption concept, but also challenges the stability of the market.

Although the existing research has explored the causes of irrational consumption and revealed psychological factors such as instant satisfaction and gambler’s fallacy, there are still some shortcomings in research methods.

First of all, most studies rely on only one kind of data, mainly questionnaires, so it is difficult to see how the community changes step by step.

Secondly, the angles of analysis are often separated. Few studies can systematically combine consumers’ subjective emotional expressions (such as their posts on social media) with objective market behaviors (such as price changes in the second-hand market).

Third, most of those powerful multimodal data analysis technologies are used in business intelligence, such as precision marketing and recommendation systems, rather than monitoring social risks.

Therefore, we urgently need a dynamic, comprehensive and quantifiable framework to evaluate how high the irrational risk of the blind box consumer community is.

Based on this background, the goal of this review article is to clarify the research context in this field, find out the shortcomings in the current research, and put forward a comprehensive analysis framework for future research.

The next part will systematically look at four aspects:

- (1) the psychological mechanism of irrational behavior in blind box consumption
- (2) The source and quantization path of multimodal data.
- (3) Methods of extracting irrational psychological characteristics
- (4) The method of multi-index fusion and index construction.

On this basis, we put forward an advanced idea about how to construct an irrational index at the community level.

2. BLIND BOX CONSUMPTION AND IRRATIONAL BEHAVIOR: FROM INDIVIDUAL PSYCHOLOGY TO COMMUNITY DYNAMICS

2.1 Uncertainty Consumption: A Behavioral Economics Perspective

Blind box consumption is a typical “uncertain consumption”, and its psychological mechanism is very special. Yu (2025) pointed out that the uncertainty in the consumption process will directly increase users’ emotional investment and purchase intention ^[1]. Xia et al. (2025) further quantified this mechanism, proving that perceived uncertainty will lead to irrational consumption behavior through instant gratification and gambler fallacy, and perceived scarcity will strengthen this effect ^[2].

Therefore, any research on the irrationality of blind box consumption must take “uncertainty” as the core feature. Although recent studies have explained the psychological mechanism at the individual level, few studies have extended to the community level.

2.2 Emotional Drivers: From Cognitive Trust to Affective Trust

Those seemingly irrational phenomena in consumer behavior are often caused by emotions and the influence of people around them. Han et al. (2021) found that on those social media with videos, emotional trust has a great influence on people’s decision to buy things, which is much more important than rational trust, which shows that shopping is often based on temporary feelings ^[3].

The current research says that people buy blind boxes mainly for that kind of excitement. However, in this kind of blind box consumption, how emotional trust actually works has not been well studied.

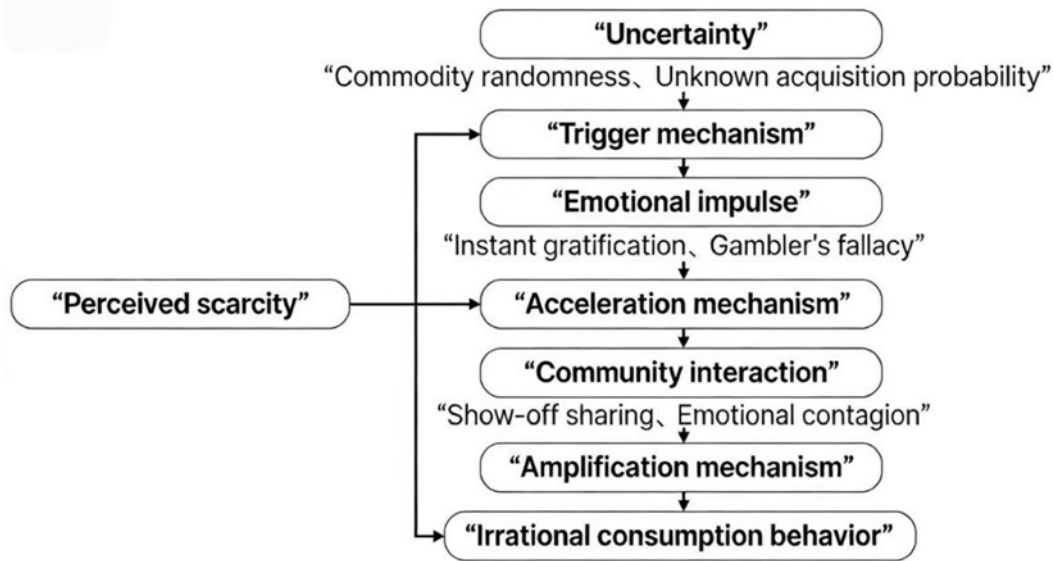
2.3 Community Dynamics: Trust Economy and Social Identity

From the perspective of community, Wang (2025) believes that in social e-commerce, user-generated content (UGC) and online celebrity have built a “trust economy”, which greatly shortens the time for us to make decisions. Community interaction and identity have become the key mechanisms to stimulate impulsive consumption ^[4].

These studies provide a theoretical basis for us to define the psychological and social dimensions of irrationality in this study. They mean that the comparison behavior and addiction in blind box consumption may stem from similar emotional-community coupling mechanism.

2.4 Integration of The Conceptual Framework In This Study

Figure 1. Integration of The Conceptual Framework



3. MULTIMODAL DATA: FROM DATA SOURCES TO FEATURE EXTRACTION AND FUSION METHODS

This part reviews the progress of existing research methods from three aspects: data source, feature extraction, and index weight and fusion.

In the fusion evaluation of multi-source heterogeneous data, how to scientifically determine the weight of each dimension index is the core step to determine the effectiveness of the comprehensive index. Xia et al. (2025) pointed out in their systematic review of the methods for determining the weights of multi-factor evaluation indicators that the choice of weighting methods directly affects the scientificity and rationality of evaluation results; Researchers need to carefully consider data characteristics, problem complexity and decision-making objectives to carefully choose methods [2]. Liu and Wu (2017) also pointed out that up to now, there is not a completely universal and good method to determine the index weight, and the principles and guiding ideology of different methods are different, which determines where they are suitable for use [5]. At present, in the field of multi-index fusion, there are three main methods: subjective weighting method, objective weighting method and combination weighting method. Let's talk about it in detail below.

3.1 Data Sources: From Single Questionnaires to Multimodal Data

When studying irrational risks in consumer communities, how to select data and how to extract features is the basis of the evaluation system. In this chapter, we should systematically look at the method progress and research gaps of three core parts: data source, feature extraction and model construction. First of all, it will evaluate the source characteristics and application status of multimodal data from three aspects: community sentiment, personal behavior and market price. Secondly, it focuses on the difficult problem of quantifying unstructured text data, and compares the advantages and disadvantages of dictionary-based method and deep learning method in extracting irrational psychological characteristics. Finally, the development of multi-modal index fusion and index synthesis methods is discussed, which provides a literature basis for constructing the index combining subjective and objective.

3.1.1 Text Data: Data Sources for Community Sentiment

Existing research mainly uses written data as sources, such as posts and comments on social platforms such as Weibo and Xiaohongshu. The advantage of literal data is that it is faster and more. However, these unorganized words on the Internet often have complicated meanings and a lot of messy information.

3.1.2 Interactive data: the data source of personal behavior.

In the community, everyone's interaction traces-such as likes, collections, reposts and comments-are also important data sources. Ch'ng et al. (2019) emphasized the importance of finding useful information from data by using multimodal methods when studying social media big data analysis, and they showed the whole process from collecting data to seeing results almost in real time [6]. Behavioral data can reflect what everyone is concerned about and the intensity of emotional contagion in the community, which provides us with a very representative view.

3.1.3 Consumption Data: Data Sources for Market Price

From the perspective of market price, consumption data usually comes from platforms such as Xianyu, eBay and Dewu, including price tag, transaction price and premium rate. Xia et al. (2025) found through questionnaire survey and partial least squares structural equation model that perceived uncertainty can push up people's premium expectation and significantly promote irrational consumption behavior through psychological mechanisms such as instant satisfaction and gambler's fallacy, and perceived scarcity will make this effect stronger [2]. However, in most of the current studies, price data is still far from being used enough in consumer risk research, which is a big gap.

3.1.4 Problems existing in current data application

Generally speaking, there are three main problems in current data application. First, dimensions are fragmented, because most studies only rely on a single questionnaire dimension. Second, most studies use cross-sectional data, lacking real-time longitudinal tracking. Thirdly, the platform limitation brings challenges, and the research focuses on a few platforms, which makes the universal applicability of the results a problem.

3.2 Feature Extraction: Quantifying Irrational Psychology from Text

After finding the relevant data sources, the next step is to extract those observable features that can reflect irrational psychological tendencies. In the field of blind box consumption, feature extraction is mainly to turn words without fixed format into measurable indicators. The existing research usually uses two methods: dictionary-based and rule-based methods and deep learning methods.

3.2.1 Method based on dictionaries and rules

It is very complicated to extract features from multimodal data, and the method based on dictionaries or rules is a typical practice. These methods rely on expert-defined vocabularies to calculate word frequency or co-occurrence relations, including high-frequency words unique to the community. Their advantages include strong explanatory power, low computational cost, and being suitable for dealing with community-specific keywords. The limitations are that it is difficult to capture complex semantic and contextual meanings, and updating dictionaries is very labor-intensive. For example, words with strong irrational colors such as "guaranteed reward", "forced spending" or "one-shot success" can be included in the dictionary.

3.2.2 Deep Learning and Pretrained Models

The other method combines deep learning with pre-training model. Huang (2025) reviewed the frontier of multimodal fusion and emotion analysis technology in order to better find out the deep meaning from those words with no fixed format. He found that using pre-training models like BERT together with knowledge maps can more accurately grasp the complex emotional and psychological characteristics in words, which provides technical reference for us to extract "irrational" characteristics from community discussions [7]. Its advantage is that it can deeply understand semantics and identify complex emotions, but its disadvantage is that it needs a lot of computing resources, operates like an opaque "black box" and needs a large number of labeled corpora.

3.2.3 Commentary: The Specific Challenges of Blind Box Consumption

In the current research environment, general sentiment lexicons (e.g., BosonNLP, Dalian University of Technology sentiment lexicon) perform poorly in detecting domain-specific irrational features such as "gambling mentality" or "status anxiety", reflecting a research gap in domain-specific dictionaries and the resulting challenge of scenario-specific feature extraction.

3.3 Indicator Weighting and Multimodal Fusion

In the fusion evaluation of multi-source heterogeneous data, how to scientifically determine the weights of each

dimensional indicator is a core step that decides the validity of the composite index. Xia et al. (2025) noted in their systematic review of multi-factor weight determination methods that the choice of weighting method directly affects the scientific rigor and rationality of evaluation outcomes; researchers should select methods based on data characteristics, problem complexity, and decision-making objectives [2]. Liu and Wu (2017) similarly emphasized that no universally applicable weighting method exists; differences in underlying principles and guidance determine each method's scope [5]. Three main approaches exist in multimodal indicator fusion: subjective weighting, objective weighting, and combined weighting, which are discussed below.

3.3.1 Subjective Weighting

Subjective weighting method relies on experts' knowledge and value judgment, and turns those "sensory" opinions into calculable weights through a set of orderly steps. The most representative method is Analytic Hierarchy Process, also called AHP, which was put forward by Saaty in 1970s. This method will first establish a hierarchical structure, then guide the experts to compare the indicators, generate a judgment matrix, and finally calculate the weight vector from this matrix, and check its consistency. Its advantages are clear logic, convenient use and strong theoretical explanatory power, and it is especially suitable for those complex indicators containing social and psychological factors.

In consumer research, Zhang et al. (2023) applied Decision Lab-Analytic Network Process to build a multi-modal model to evaluate the consumption potential in digital economy [8]. This method extends the traditional AHP, adds the mutual influence among indicators, and successfully turns the vague concept of "potential" into a comprehensive index that can be calculated, which proves that the subjective weighting method can be used in multi-dimensional things.

However, the subjective empowerment method also has obvious shortcomings. Xia et al. (2025) pointed out that the subjectivity of experts may lead to cognitive bias, and when the number of indicators increases, it is more difficult to maintain consistency, and it is often necessary to repeatedly adjust or find more experts to help [2]. Liu and Wu (2017) also mentioned that AHP requires high domain knowledge of experts, and different opinions of different expert groups will affect the stability of weights [5].

3.3.2 Objective Weighting

The objective weighting method determines the weight of indicators completely according to the statistical characteristics of data, without human intervention, and it is mathematically rigorous. Commonly used methods include entropy weight method, principal component analysis (PCA), coefficient of variation method and factor analysis method.

Entropy weight method comes from information theory, which calculates the entropy value of each index to measure the change: the lower the entropy value, the greater the information, and the higher the weight should be given. PCA can reduce dimensions. It finds several comprehensive variables, which can explain the changes of most data, and the weight is determined by the variance contribution rate of each principal component.

Although Xia et al. (2025) emphasized that objective weighting method is data-driven, objective and repeatable [2], it also has some disadvantages: it relies on high-quality data, is sensitive to outliers, and sometimes the results may be different from theoretical expectations, and its results may be difficult to explain in situations that require theoretical basis (such as social and psychological risk assessment) (Liu&Wu, 2017).

3.3.3 Combined Weighting

In order to make the subjective weight easy to understand and the objective weight sensitive, comprehensive weighting combines the two methods, usually using multiplicative synthesis or linear weighting. Xia et al. (2025) pointed out that this strategy can absorb the advantages of the two methods: subjective weight ensures the theoretical basis and expert consensus, while objective weight uses actual data to calibrate judgments [2]. This "subjective and objective combination" method has been successfully applied in financial risk assessment, environmental assessment and urban competitiveness measurement.

However, Liu and Wu (2017) reminded that the scientific effectiveness of comprehensive weighting depends on the reasonable design of synthesis strategy, and it is necessary to carefully select the synthesis method and weight distribution [5].

At present, comprehensive weighting is rarely used in the study of social psychological risk. Most existing studies focus on physically measurable indicators (such as environmental quality and economic performance), but its application in social and psychological dimensions such as community sentiment and consumer psychology is still extremely rare, which

is a core methodological gap.

3.3.4 Commentary: Goal Shift in Method Application

A noteworthy phenomenon is that although multimodal fusion model and multi-index weighting method have matured in the field of business value, they have not been systematically introduced into the study of social risk early warning. In the field of business intelligence, Zhang et al. (2023) proved the value of multimodal model in predicting consumption potential [8], while Huang (2025) explored the progress of multimodal fusion in social media sentiment analysis and recommendation system [7]. These studies have confirmed the maturity and effectiveness of these methods. However, their application goal is always focused on enhancing business value. Whether predicting consumption potential or providing personalized recommendation, the ultimate goal is to optimize marketing effect and increase income.

However, there are few studies on applying these methods to social risk early-warning. Irrational risks caused by blind box consumption, collective impulse caused by community sentiment, and early warning of secondary market bubble are actually particularly suitable for analysis by multimodal data fusion techniques, but they have not been paid much attention to. Xia et al. (2025) proposed that future research should combine dynamic adjustment and machine learning to promote the establishment of a more intelligent and interdisciplinary evaluation system [2]. This view gives us an important inspiration: the goal change of method application is not that technology can't keep up, but that of research direction.

In other words, the problem is not that we lack the technical tools to quantify social risks, but that we lack the research awareness to apply these tools to social risk applications. This is the core criticism of this review: it calls on the academic circles to transfer the mature multimodal fusion and multi-indicator weighting methods from the scene of "commercial value extraction" to the scene of "social risk early-warning". This can not only change the research focus, but also expand the application scope of the method.

4. IRRATIONAL RISK INDEX: THEORETICAL CONCEPT AND RESEARCH PROSPECTS

In the previous part, we systematically reviewed how the research on irrational risk in blind box consumption developed, and what other places were not thoroughly studied. We look at it from four angles: the tracking of psychological mechanism, multi-modal data sources, feature extraction methods, and index synthesis technology. Literature tells us that solid progress has been made in individual psychological mechanism (such as feeling irrational from uncertainty), the driving role of emotion and community, and multimodal data analysis technology. However, the core problems still exist, including the coverage of the research scene is not wide enough, the application objects of the method are not aligned, and there is a lack of verification of the effectiveness of the indicators. Based on the above situation, this chapter puts forward a comprehensive theoretical concept-irrational index, outlines the method path for future research in dimension construction, index synthesis and validity verification, and points out four key future research directions.

4.1 Dimension Construction: Community Sentiment, Individual Behavior, Market Price

Looking at the previous research, we find that although we use different methods, we still have the same views on some core issues. Our research believes that to build an index of "blind box irrational risk", we should mainly look at three key aspects.

Community sentiment is the main entrance to understand our irrational consumption psychology. Han et al.'s research (2021) points out that emotional trust has a great influence on our purchase decision; Wang (2025) also believes that the UGC content sent by users themselves and the "trust economy" brought by KOL/KOC will push us to buy things [3][7]. All these studies show that consumers' emotional expression and tendency are the key signals to understand our irrational psychology. In the case of buying a blind box, these signals become: I especially want to "hide the money", I will regret if I draw something I don't like, and I envy others for being "lucky" and so on. These emotions can be found in the words on social media.

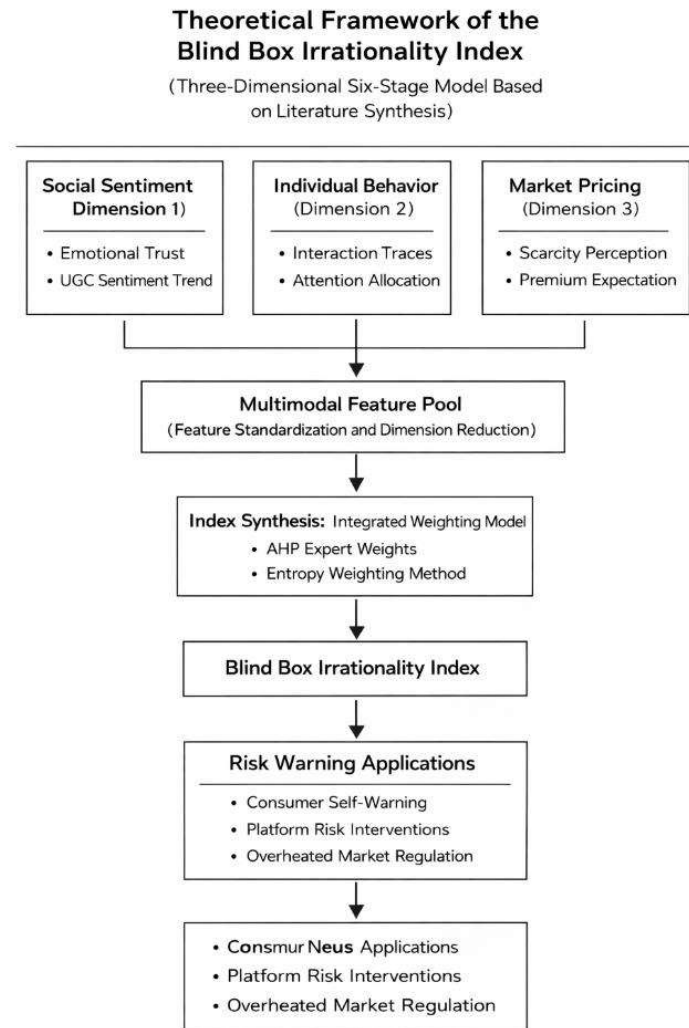
The dimension of individual behavior reflects the distribution of collective attention and the intensity of emotional contagion in the community. Ch'ng et al. (2019) systematically pointed out that interactive traces such as likes, favorites, shares and comments are very valuable for building social significance [6]. These behavioral data can not only measure users' participation, but also directly prove how irrational emotions spread and amplify. The high-density interaction with some "show off" content often indicates that irrational emotions at the community level are rising.

The dimension of market price measures how irrational risks are objectively transferred from the psychological level to the economic level. The empirical study of Xia et al. (2025) confirms that the uncertainty people feel will push up their

expectation of premium through such mechanisms as instant satisfaction and gambler's fallacy, and this effect will be even stronger if they still feel that things are scarce ^[2]. The price fluctuation in the second-hand market, especially the abnormal soaring premium rate, directly reflects speculative enthusiasm and irrational bubble expansion. Yu (2025) also pointed out that the uncertainty of blind box consumption will greatly increase emotional investment, which will eventually be reflected in market trading behavior ^[1].

Based on the above analysis, this study puts forward a theoretical framework of blind box irrational index, which integrates community sentiment, personal behavior and market price as input dimensions. These features are standardized and synthesized by multi-modal fusion model, and finally a composite index is generated for risk early warning application. This framework is conceptual and comes from literature review, aiming at providing methodological reference for subsequent empirical research.

Figure 2. The Theoretical Framework of the Blind Box Irrationality Index



4.2 Index Synthesis: Conceptualization of Combined Weighting

When evaluating various types of data, it is very important to determine the scientific weight for each aspect for the effectiveness of indicators. According to the method review in Section 3.3, this study suggests adopting the combined weighting strategy of “AHP+entropy weight method” in the future index construction. It is reasonable to use Analytic Hierarchy Process (AHP) as a subjective empowerment tool, because irrational risk itself is multidimensional and highly

theoretical. As mentioned earlier, the irrationality in blind box consumption is the result of “uncertainty × emotional impulse × community interaction”. Therefore, the construction of indicators can not only rely on data-driven methods, but also need a theoretical framework to guide the distribution of weights to ensure the interpretability and theoretical effectiveness of indicators.

Zhang et al. (2023) first used Apriori association rule mining method to find out the strong relationship between indicators. Then they use D-ANP method to assign weights to these indicators, thus forming a two-stage “association mining-weight determination” modeling strategy^[8]. The AHP method allows experts to compare the importance of indicators in pairs, and puts the theories of consumer psychology and behavioral economics into the weight design, which is an advantage that pure objective methods can’t compare (Xu et al., 2025).

Entropy weighting is introduced for objective calibration because actual data reflect community attention disparities. Subjective weights indicate theoretically important dimensions, while objective weights reveal those truly important in observed data. Discrepancies may exist; for example, “gambling psychology” may theoretically hold high weight, but if community focus is on “show-off behavior,” the latter dominates in actual data. Entropy weighting calibrates subjective weights to dynamically balance theoretical framework and empirical reality.

It should be emphasized that this is a methodological recommendation based on literature, not an empirical design. Combined weighting has been successfully applied in financial risk assessment and environmental evaluation (Xu et al., 2025; Liu & Wu, 2017). Its transfer to social-psychological risk scenarios depends on careful design of weight synthesis strategy, including the proportion of subjective/objective weights, choice of synthesis method (multiplicative or linear), and dynamic update mechanism.

4.3 Validity Verification: Prospects for Event Study Application

Making a comprehensive index is not the end; Its effectiveness as a risk monitoring tool must be strictly tested in practice. Event study methodology has been used for a long time in financial, accounting and crisis research to test the sensitivity and predictive ability of indicators (MacKinlay, 1997). The reason is this: an effective index should show statistically obvious abnormal fluctuations during the occurrence of key events.

Under the background of irrational risks in consumer communities, the index validity test is basically blank. Most of the existing studies rely on descriptive statistics or are verified by questionnaires at the individual level, lacking systematic evidence at the group level. This blank limits the practical application of the research results.

We suggest that future research can actually test the effectiveness of the indicators through the following methods:

- (1) Use new product release and hidden money release as event windows to test risk sensitivity. These events usually lead to community attention, heated discussion, and a sharp rise in price fluctuations in the second-hand market. An effective irrational index should show an obvious upward trend, and it is best to have a predictable coincidence with the time of the event.
- (2) Take the “rollover” incident of the head KOL as a negative benchmark. KOL plays a key role in triggering impulsive consumption. When they fall into crisis because of product quality, false propaganda or moral problems, the community sentiment often reverses quickly, and the consumption fever also cools down. An effective indicator should be able to catch these reversals in time.
- (3) Using the second-hand market price collapse as an extreme scenario to test the potential of crisis early warning. The premium level reflects market speculation and bubble risk. The collapse cases of blind box goods from high-priced purchase to low-priced resale in history can be used as the verification benchmark for testing the early warning ability of indicators.
- (4) Take the introduction of regulatory policies as an external shock to test how sensitive the policies are. When blind box consumption causes social concern, regulatory actions will affect everyone’s expectations. We can compare the changes of the index before and after the release of the policy to see how quickly everyone reacts to the change of the rules.

These inspection methods are some research ideas, not specific experimental design. Event study methodology itself has a very mature statistical tool (such as market model, mean-adjusted model, cumulative abnormal return), and we only need to replace the “abnormal returns” with “abnormal exponential fluctuations”. This is actually a change in research focus, not a technological innovation-that is, the mature tools originally used in “business value evaluation” are moved to the new field of “social risk early warning” for use.

4.4 Future Research Directions

Future research should focus on four directions:

- (1) **The construction of specialized domain dictionaries:** nowadays, those common emotional dictionaries are hard to grasp the irrational features unique to the blind box (such as gambling psychology, showing off anxiety, and buying mentality). Future research should systematically collect online jargon and emotional expressions to build a dictionary in a special field, so as to analyze the text more accurately and better.
- (2) **Multi-modal integration of words and pictures:** the ostentation behavior in blind box consumption often appears together with “photos+words”. Future research can explore how to combine computer vision with NLP to find hidden items, unpacking scenes and collections, and realize multi-modal feature extraction.
- (3) **Development of dynamic risk early warning system:** The ultimate value of index construction lies in its application. Future research should develop dashboards for consumers, platforms and regulatory agencies, monitor irrational risks in real time and make dynamic early warning, so as to turn academic research into practical tools.
- (4) **Scenario generalization:** Blind box consumption is a typical form of “uncertain consumption”. The framework can be applied to live reward, in-game purchase, gacha mechanism and impulsive e-commerce consumption, so as to test the applicability of the three-dimensional framework and combination empowerment strategy and promote the theoretical accumulation of cross-scene dialogue and irrational risk quantification.

5. CONCLUSION

This study systematically reviews the research progress and shortcomings of irrational risk of blind box consumption in four fields: psychological mechanism tracking, multimodal data source, feature extraction and index synthesis technology.

First of all, research has confirmed that uncertainty, emotional impulse and community interaction are the core driving forces of irrational consumption, but there is a serious lack of quantitative research on blind box scenarios, and most of the findings focus on traditional e-commerce and tourism consumption.

Secondly, multimodal data analysis technology has matured, and dictionary-based methods and deep learning methods have their own advantages, but their applications are still business-oriented (such as precision marketing and recommendation system), ignoring their potential in social risk early warning.

At present, there is no quantitative index that can dynamically and comprehensively measure the irrationality of blind box consumers, which makes the related risk discussion mostly stay at the descriptive level. Based on this, this study puts forward a theoretical conception of irrational index, which integrates three dimensions-community sentiment, individual behavior and market price, and adopts the combination weight strategy of “AHP+entropy weight method”. We systematically expound the method path of constructing this index, including feature extraction, weight synthesis and validity verification. The purpose of this study is to provide a clear theoretical map and methodological reference for future empirical research, to promote the study of blind box risk from “qualitative diagnosis” to “quantitative early warning”, and to contribute academic strength to the healthy consumption of generation Z and the sustainable governance of digital market.

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