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The Influence of Logistics Information Transparency on Impulse Purchase under the Live E-commerce Situation

-- The Intermediary of Perceived Risk

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Abstract

The purpose of this study is to explore the influence of logistics information transparency on impulse purchase in the context of live e-commerce, and to investigate the intermediary role of perceived risk. The basic information and related data of 294 consumers were collected through questionnaire survey, and the path analysis and mediation effect test were carried out by structural equation model. The results show that the transparency of logistics information has a significant negative impact on impulse buying, and also has a significant negative impact on perceived risk. Perceived risk plays a partial intermediary role between logistics information transparency and impulse purchase. The research results provide an empirical basis for the e-commerce platform to reduce consumers' perceived risk and impulsive buying behavior by improving the transparency of logistics information, which is of great significance for optimizing the operation strategy of live e-commerce and improving consumer satisfaction.

Keywords

Live e-commerce; Transparency of logistics information; Impulse purchase; Perceived risk.

1. Introduction

With the rise of live e-commerce, consumers' purchase behavior on live shopping platforms has attracted increasing attention. As one of the important factors influencing consumers' decision-making, the transparency of logistics information has not been fully studied. Impulse purchase behavior not only affects consumers' personal economic situation, but also has an important impact on the operation strategy and market performance of e-commerce platforms. Perceived risk, as a key psychological factor in consumer decision-making, may play an intermediary role between logistics information transparency and impulse purchase. However, the existing literature has not fully explored this mediating effect. The purpose of this study is to explore the impact of logistics information transparency on impulse purchase in the context of live e-commerce, and to investigate the intermediary role of perceived risk, in order to provide strategic guidance for e-commerce platform to optimize logistics information transparency, and provide theoretical basis for consumer education and market supervision. Through empirical research, this study will provide a new perspective for understanding the behavior patterns of consumers in the context of live e-commerce.

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2. Literature Review and Research Hypothesis

2.1. Logistics Information Transparency and Impulse Buying

The research of Cengiz and Şenel focuses on the influence of perceived scarcity on impulse buying tendency in the context of fast fashion [1]. Although it mainly discusses scarcity factors, this research provides ideas for understanding various factors affecting impulse buying in the context of consumption. In the field of fast fashion, consumers are often faced with the situation of rapid information update and rapid product iteration. In this environment, the improvement of logistics information transparency may affect consumers' perception of product scarcity, and then affect their impulsive buying behavior. The research of Utomo et al directly focuses on the trigger factors of impulse purchase on the live shopping platform [2]. In live shopping, the transparency of logistics information is one of the important factors that affect consumers' decision-making. In the process of live broadcast, if consumers can obtain timely and accurate logistics information, such as inventory, delivery time, delivery progress, etc., they may change their impulse purchase will. Transparent logistics information can make consumers evaluate purchasing behavior more rationally and reduce impulse buying caused by information asymmetry. Therefore, this study puts forward the following assumptions:

H1: The transparency of logistics information has a significant negative impact on impulse buying.

2.2. Logistics Information Transparency and Perceived Risk

Dua et al pointed out that in the supply chain, information transparency is one of the key factors affecting perceived risk, and the application of blockchain technology can significantly improve information transparency, thus effectively reducing perceived risk [3]. By ensuring the authenticity and traceability of information, this technology enables all parties in the supply chain to evaluate risks more accurately, thus enhancing their trust and confidence in the supply chain. Similarly, Zhou et al found that consumers' perception of information transparency in e-commerce transactions directly affects their perceived risks. When consumers think that logistics information is transparent, their risk perception of transactions will be reduced, because transparent information can reduce uncertainty and make consumers have a clearer expectation of the delivery time and state of goods [4]. Therefore, this study puts forward the following assumptions:

H2: The transparency of logistics information has a significant negative impact on perceived risk.

2.3. Perceived Risk and Impulse Buying

Abrar et al conducted an empirical study in the consumer market in Pakistan, revealing the impact of perceived risk on online impulse buying tendency. They found that consumers' perception of risk in online shopping will significantly affect their willingness to buy on impulse [5]. Consumers with higher perceived risk will be more cautious in the face of impulse buying opportunities, because they are worried about transaction safety, product quality and after-sales service. Consumers with lower perceived risk are more likely to make impulse purchases driven by emotions. Wu et al further integrated perceived risk, expectation confirmation model and flow theory to define the determinants of online impulse purchase. They pointed out that perceived risk is an important dimension that affects consumers' impulse buying, and consumers' perception of risk will interact with expectation confirmation and flow experience in the shopping process, which will jointly affect impulse buying behavior [6]. When consumers experience a high degree of flow in the shopping process and their expectations for products and services are confirmed, the negative impact of perceived risk will be weakened, thus

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increasing the possibility of impulse buying. Therefore, this study puts forward the following assumptions:

H3: Perceived risk has a significant negative impact on impulse buying.

2.4. The Intermediary Role of Perceived Risk between Logistics Information Transparency and Impulse Purchase

Hussain and Farea focused on the influencing factors of online consumers' impulsive buying behavior, especially on the mediating role of perceived trust. Perceived trust is closely related to perceived risk, and transparent logistics information can enhance consumers' trust and reduce perceived risk. This increase in trust may make consumers more inclined to buy on impulse [7]. On the other hand, Shahzad et al studied how blockchain technology can promote consumers' impulsive buying behavior by enhancing the transparency of logistics information. They pointed out that the application of blockchain technology not only improves the transparency of logistics information, but also significantly reduces the perceived risk of consumers [8]. This reduction in risk perception makes consumers more relaxed in the shopping process, thus increasing the possibility of impulse buying. The above studies all emphasize the direct influence of logistics information transparency on perceived risk and the indirect influence of perceived risk on impulse buying behavior. Transparent logistics information can effectively reduce consumers' perceived risk, and the reduction of perceived risk is an important intermediary factor to promote impulse buying behavior. Therefore, this study puts forward the following assumptions:

H4: Perceived risk plays a significant mediating role between transparency of logistics information and impulse purchase.

To sum up, this study puts forward a conceptual framework of logistics information transparency affecting impulse purchase with perceived risk as the intermediary, as shown in Figure 1.

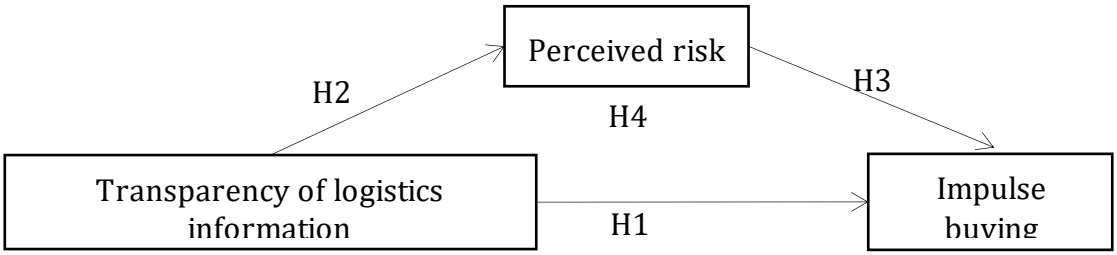

Figure 1. Conceptual Framework

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3. Research Design and Methods

3.1. Questionnaire Design

Table 1. Questionnaire Scale

Variable	Item	References
Transparency of logistics information	I can easily get the real-time status of logistics orders.	Qiao [9]
	The logistics company will inform me of any changes in the logistics process in time.	
	The updating of logistics information is accurate and reliable.	
	I can clearly understand all aspects of logistics, such as delivery, transportation and distribution.	
Perceived risk	Live broadcast of group-purchased goods may not guarantee the quality of the goods.	Zhang [10]
	I'm worried about paying first and not getting the goods.	
	I'm worried that the goods didn't arrive at the scheduled time, which caused me to wait too long.	
	After placing an order, the process of waiting for the goods to arrive often makes people feel nervous, anxious and worried.	
Impulse buying	During the live broadcast of e-commerce, if I fail to buy the goods I like, I will feel an indescribable sense of loss.	Ma [11]
	During the live broadcast of e-commerce, the display of some goods made me have a strong desire to buy immediately.	
	During the live broadcast of e-commerce, I met some products that I didn't consider buying originally, but these products inspired me to buy strongly.	
	During the live broadcast of e-commerce, I will involuntarily have a strong desire to buy my favorite goods.	

The purpose of this research questionnaire is to explore the influence of logistics information transparency on impulse buying behavior and the intermediary role of perceived risk in the context of live e-commerce. The questionnaire is divided into two parts. The first part collects the basic information of the respondents, including age, gender, occupation, education level, average monthly income, and the frequency of watching live shopping every week, so as to classify and analyze the samples. The second part is the core content, involving three variables of logistics information transparency, perceived risk and impulse purchase. These questions are adjusted based on the maturity scale of previous scholars to ensure the scientificity and effectiveness of the questionnaire. The questionnaire uses Richter scale 5, ranging from "very different" to "very agree". See Table 1 for specific topics. Through this design, this study can fully understand how the transparency of logistics information affects consumers' impulsive buying behavior through perceived risk, and provide valuable reference for the operation and management of live broadcast e-commerce.

3.2. Data Collection

In order to more accurately grasp the internal mechanism of consumer behavior in the context of live e-commerce, this study focuses on the interaction among logistics information transparency, perceived risk and impulse purchase. The respondents are consumers who have had shopping experience on e-commerce platform, and their experience and feelings about live shopping can provide rich empirical basis for the study. A total of 300 questionnaires were distributed through the questionnaire platform. With the convenience of the network platform, the questionnaires can reach the target group quickly. In the process of collection, consumers

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responded positively, and finally 294 valid questionnaires were collected, with an effective recovery rate of 98%, which provided a strong guarantee for the reliability of the research. These questionnaires cover consumers of different ages, genders, occupations and consumption habits, ensuring the universality and representativeness of the samples, and can comprehensively reflect the general psychological and behavioral characteristics of consumers in the live e-commerce situation.

4. Data Analysis and Results

4.1. Reliability and Validity Analysis

(1) Reliability analysis

Reliability analysis is an important step to ensure the reliability of research results. According to the questionnaire reliability analysis results in Table 2, Cronbach's Alpha values of logistics information transparency, perceived risk and impulse purchase are 0.745, 0.799 and 0.721, respectively. These values are higher than 0.7, indicating that the questionnaire has good internal consistency, indicating that the scale design is reasonable and can effectively measure these three variables. In particular, Cronbach's Alpha value of perceived risk is the highest, reaching 0.799, which shows that the scale has high reliability in measuring perceived risk. These results provide a solid foundation for subsequent data analysis and research conclusions, and ensure the scientific and effective research.

Table 2. Reliability Analysis of Questionnaire

Variable	Cronbach's Alpha
Transparency of logistics information	0.745
Perceived risk	0.799
Impulse buying	0.721

(2) Validity analysis

Validity analysis is an important step to verify whether research tools can accurately measure research construct. The data in Table 3 shows the validity analysis results of the questionnaire, in which the KMO sampling suitability metric value is 0.733, which exceeds the standard threshold of 0.7, indicating that the data is suitable for factor analysis. In addition, the approximate chi-square value of Bartlett's sphericity test is 1456.455, the degree of freedom is 489, and the significance level is 0.000, far less than 0.05, which further confirms the significant correlation between variables. These results show that the questionnaire has good structural validity and can effectively reflect the three constructs of logistics information transparency, perceived risk and impulse purchase. This provides a solid foundation for subsequent data analysis and research conclusions, and ensures the scientificity and reliability of the research results.

Table 3. Validity Analysis of Questionnaire

KMO sampling suitability quantity		0.733
Bartlett sphericity test	Approximate chi-square	1456.455
	freedom	489
	Significance	0.000

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4.2. Descriptive Statistical Analysis

In this survey, the basic information of 294 respondents was collected in order to understand the influence of logistics information transparency on impulse buying and the intermediary role of perceived risk in the live e-commerce situation. The age distribution of the respondents is extensive, with young people aged 18-35 as the main group, accounting for 70%, followed by middle-aged people aged 36-50, accounting for 20%, while the respondents under 18 and over 50 are relatively few, accounting for 5% respectively. In terms of gender, women were slightly more than men, accounting for 55% and 45% respectively. Occupation distribution covers students, office workers, freelancers and other groups, among which office workers account for the highest proportion, reaching 40%. In terms of education level, more than half of the respondents have bachelor degree or above, reaching 55%, followed by senior high school and junior college education, accounting for 30%, while fewer respondents have junior high school education or below, accounting for 15%. The average monthly income distribution shows that most of the respondents' monthly income is between 3,000 and 8,000 yuan, accounting for about 60%, while those with monthly income below 3,000 yuan and above 8,000 yuan each account for 20%. As for the frequency of watching live shopping every week, the data shows that 50% of the respondents watch it 1-3 times a week, 25% watch it 4 times or more a week, and 12.5% watch it less than once a week or never watch it.

4.3. Correlation Analysis

The data in Table 4 shows the correlation between impulse purchase and logistics information transparency and perceived risk. The correlation coefficient between impulse purchase and logistics information transparency is -0.718, which indicates that there is a significant negative correlation between them. This means that with the improvement of the transparency of logistics information, consumers' impulsive buying behavior may decrease. This may be because when consumers can get more information about logistics, they may evaluate the purchase decision more rationally, thus reducing the possibility of impulse purchase. At the same time, the correlation coefficient between impulse buying and perceived risk is -0.792, which shows that there is a very strong negative correlation between them. This shows that the increase of perceived risk will significantly reduce consumers' impulsive buying behavior. This may be because in the live e-commerce environment, consumers may be more cautious because of their perception of purchase risks, thus reducing impulse purchases. By improving the transparency of logistics information, e-commerce platform may help to reduce consumers' perceived risk, thus reducing impulse buying behavior, which has a potential positive impact on improving consumer satisfaction and loyalty.

Table 4. Correlation Analysis of Variables

	Transparency of logistics information		
Transparency of logistics information	1		
Perceived risk	-0.364**	1	
Impulse buying	-0.718**	-0.792**	1
*P<0.05,**P<0.01			

4.4. Structural Equation Model Analysis

(1) Path analysis

Through the path coefficient test results of structural equation model, the correlation among logistics information transparency, perceived risk and impulse purchase is revealed. According to the data in Table 5, the transparency of logistics information has a significant negative impact on impulse buying, with a standardized coefficient of -0.258 and a non-standardized coefficient

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of -0.268, indicating that the improvement of transparency helps to reduce impulse buying behavior. At the same time, the transparency of logistics information has a significant negative impact on perceived risk, with a standardized coefficient of -0.384 and a non-standardized coefficient of -0.263, indicating that the improvement of transparency can effectively reduce consumers' perceived risk. In addition, perceived risk also has a significant negative impact on impulse buying, with a standardized coefficient of -0.264 and a non-standardized coefficient of -0.364, which further confirms the role of perceived risk in restraining impulse buying. The critical ratio (C.R.) of all related paths is over 1.96, and the p value is less than 0.05, which shows that these path coefficients are statistically significant. These findings support the hypotheses H1, H2 and H3, that is, the transparency of logistics information not only directly affects impulse buying, but also indirectly affects impulse buying by reducing perceived risk.

Table 5. Path Coefficient Test of Structural Equation Model

Suppose	path			Standardization coefficient	Non-standardized coefficient	S.E.	C.R.	P	Conclusion
H1	Transparency of logistics information	-->	Impulse buying	-0.258	-0.268	0.048	2.163	0.000	support
H2	Transparency of logistics information	-->	Perceived risk	-0.384	-0.263	0.063	2.715	0.000	support
H3	Perceived risk	-->	Impulse buying	-0.264	-0.364	0.058	2.694	0.002	support
***p<0.001; S.e.: standard error; C.R.: critical ratio.									

(2) Intermediary effect

The results of intermediary effect analysis reveal the complex relationship among logistics information transparency, perceived risk and impulse purchase. In Table 6, the direct effect of logistics information transparency on impulse purchase is -0.145, the 95% confidence interval is [0.054, 0.267], and the p value is 0.000, indicating that the improvement of logistics information transparency significantly reduces the possibility of impulse purchase. Perceived risk plays a partial intermediary role between transparency of logistics information and impulse purchase, and its indirect effect is -0.175, 95% confidence interval is [0.035, 0.354], and P value is 0.004, which shows that transparency of logistics information indirectly reduces impulse purchase behavior by reducing perceived risk. The total effect value is -0.184, the 95% confidence interval is [0.063, 0.284], and the P value is 0.000, which further proves that the transparency of logistics information has a significant impact on impulse buying behavior. These results show that perceived risk plays an important intermediary role between logistics information transparency and impulse purchase, which supports hypothesis H4 that perceived risk not only directly affects impulse purchase, but also plays an intermediary role between logistics information transparency and impulse purchase.

Table 6. Test Results of Intermediary Effect

Path	Effect type	Effect value	Bootstrapping 1,000 times 95% CI		p
			Lower	Uper	
Transparency of logistics information---> perceived risk---> impulse purchase.	Direct effect 1	-0.145	0.054	0.267	0.000
	Indirect effect 1	-0.175	0.035	0.354	0.004
	Total effect 1	-0.184	0.063	0.284	0.000

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5. Conclusion

This study analyzes the influence of logistics information transparency on impulse purchase under the situation of live e-commerce through structural equation model, and discusses the intermediary role of perceived risk. The results show that the transparency of logistics information has a significant negative impact on impulse buying, that is, with the improvement of logistics information transparency, consumers' impulse buying behavior decreases. In addition, the transparency of logistics information also has a significant negative impact on perceived risk, indicating that the improvement of transparency is helpful to reduce consumers' perceived risk. Perceived risk also has a significant negative impact on impulse buying, indicating that the increase of perceived risk will significantly reduce consumers' impulse buying behavior. The analysis of intermediary effect further confirms the intermediary role of perceived risk between logistics information transparency and impulse purchase, that is, logistics information transparency indirectly reduces impulse purchase behavior by reducing perceived risk. These findings are of great significance for understanding consumers' behavior patterns in the context of live e-commerce, and provide an empirical basis for how e-commerce platforms can influence consumers' decisions by improving the transparency of logistics information. By improving the transparency of logistics information, e-commerce platform may help to reduce consumers' perceived risk, thus reducing impulse buying behavior, which has a potential positive impact on improving consumer satisfaction and loyalty. The research results provide strategic guidance for the e-commerce platform to optimize the transparency of logistics information, and help to build a healthier and more sustainable live e-commerce ecosystem.

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