Analysis of Influencing Factors of Rural Residents' Online Consumption under the Major Public Health Emergency

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Abstract: In order to explore what factors affect the consumption behavior of rural residents under the Major public health emergency, especially, whether psychological factors such as psychological needs and anxiety have a significant impact on their online consumption behavior. Questionnaire survey method was used to collect the data. This paper designed questionnaire and collected data of rural residents' online consumption behavior. 543 valid questionnaires were collected. Factor analysis was used to analyze the influencing factors of network consumption. Six common factors were extracted, which were emotion factor, commodity attribute factor, commodity source factor, income factor, post-epidemic behavior expectation factor and channel factor. According to the data analysis results, countermeasures and suggestions were put forward from the perspectives of government, e-commerce industry or enterprises and rural network consumers. Emotional factors such as anxiety significantly affect the online consumption behavior of rural residents. Online shopping makes rural residents happier, more secure and have a sense of gain. These findings reveal the importance of psychological factors. During the epidemic and after the pandemic, we should pay attention to emotional factors and other psychological factors to form a good emotional experience when carrying out Internet marketing.

1. Introduction

In recent years, the Internet popularity rate of China is increasing continuously. The proliferation of web-connected devices such as smartphones has accelerated the process. According to the 51th Statistical Report on the Development of the Internet in China released by the China Internet Network Information Center, the number of Internet users in China is 1.067 billion, and the Internet penetration rate has reached 75.6 percent. Among them, 1.067 billion are mobile Internet users[1]. There were 308 million netizens in rural areas, with 61.9 percent Internet penetration. Since the outbreak of COVID-19 in late 2019, online shopping has increasingly become the primary mode of shopping due to the need for quarantine and people's fears of contracting the virus through person-to-person contact. According to authoritative statistics, the scale of online shopping in China

will reach 42.93 trillion yuan in 2022. The Internet has played a huge role in breaking the urban-rural dual structure and narrowing the gap between urban and rural areas. Under the COVID-19 epidemic, rural residents have more anxiety, fear and other emotions. What are the changes of rural residents' online consumption behavior? What are the factors that affect it? What is the extent of the impact? These questions are worth exploring in depth. Clarify these problems, for the government and enterprises to activate the rural network consumption market, has important decision-making reference significance.

Domestic and foreign researchers have done a lot of research on related issues.

Anan Kang et al. [2] studied factors influencing college students' online consumption behavior and found that college students pay more attention to store reputation and price. Li Guangqin et al. [3] studied the impact of income factors on rural e-commerce. Guo Na et al. [4] built a development level measurement model of rural e-commerce and analyzed the obstacles to high-quality development of rural e-commerce. Ji Xing et al. [5] studied the environmental effects of rural e-commerce, and the research results showed that the policies of rural e-commerce demonstration counties are conducive to reducing fertilizer use and promoting environmental improvement. Feng Gang et al. [6] empirically studied the coupling and collaborative development of rural e-commerce and rural revitalization.

Zhan Jing et al. [7] measured the influence of digital economy on the development of rural e-commerce by using inter-provincial panel data and double fixed effect regression model. Luo Qianfeng [8] analyzed the impact of rural e-commerce on farmers' income based on the survey data of rural revitalization in 2020, and the results showed that participation in e-commerce could significantly improve farmers' income. The research results of Liu Yandong et al. [9] showed that rural e-commerce could promote the expansion of rural residents' consumption scale and the release of rural consumption potential. Xiong Shuncong et al. [10] measured the rural online consumption potential in 30 provinces based on the coefficient of variation method model. The results showed that the potential increased gradually from western, central and eastern China. Li Baoku et al. [11] used factor analysis and regression analysis to study rural residents' willingness to pay for online consumption, and revealed the influencing factors and differences of rural residents' willingness to pay for different products online. Chen Tingxiu, Wang Huan, Guo Junxue et al. [12-14] took different regions as examples to study rural Internet consumption intention and its influencing factors.

Through the review of relevant literature, it is found that relevant researchers have carried out abundant research on online consumption behavior, rural e-commerce and rural online consumption, which provides an important reference for the writing of this paper. However, there are still challenges in the following three aspects: (1) The majority of rural e-commerce studies on the upward pattern of agricultural products by taking rural areas as the supplier, while the majority of rural e-commerce studies on the online consumption behavior of rural residents by taking rural areas as the consumer market are still not sufficient. (2) Since the outbreak of COVID-19, there have been many observable changes in consumer behavior. In this particular context, there are few literatures on the online consumption behavior of rural residents. (3) The pertinence and applicability of the countermeasures and suggestions put forward in the previous relevant studies need to be verified in the new situation. To address the above challenges, a questionnaire was designed based on the specific background of the novel coronavirus epidemic, and statistical data were processed and analyzed using SPSS and other statistical data. Based on the analysis results. Put forward specific suggestions and countermeasures. In theory, this paper can enrich the rural E-commerce and rural online consumption related research theories, expand the research perspective and scope. In practice, it measures and explores the factors influencing rural residents' online consumption under the COVID-19 epidemic, and puts forward targeted suggestions and

countermeasures, which can provide support for the government and relevant enterprises to make decisions on the development of rural online consumption market.

2. Methods and Data Collection

2.1. Methods

Questionnaire survey method was used to design questionnaires and collect data. SPSS 25.0 was used to process the data and factor analysis was used to analyze the influencing factors of rural residents' online consumption.

2.2. Data Collection

In order to obtain first-hand data, based on the research on Internet consumption by Huang Wenyan et al.[15-17] and taking the actual situation into full consideration, the first draft of the questionnaire was designed, and marketing researchers and teachers were invited to revise the questionnaire. The questionnaire is divided into three parts. The first part is the basic information of the sample, including 7 questions. The second part is the network consumption behavior variables, a total of 3 items; The third part is the influencing factors of network consumption variables, a total of 21 questions. The basic information of the first part of the sample is in the form of English letter multiple choice questions, including single choice and multiple choice. The second and third parts used a 5-point Likert scale, from 1 to 5, indicating completely disagree, disagree, general, agree and completely agree. Questionnaires are issued and recovered mainly by questionnaire star. In order to ensure that the survey subjects met the requirements, the questionnaire was distributed mainly through the wechat group of online shopping in rural areas to forward links, and the questionnaire was accurately filled out in the form of red envelopes. A total of 543 valid questionnaires were received.

3. Data Processing and Result Analysis

3.1. Sample Basic Information

The basic information of the sample is shown in Table 1:

Table 1: Basic information of samples

Item	Option	Proportion (%)
gender	male	29.28
	female	70.72
age	<18	6.26
	18-30	76.98
	31-45	14.55
	>45	2.21
internet access equipment	smartphone	94.66
	PC	4.05
	tablet computer	0.92
	other equipment	0.37
total average monthly consumption	<1000yuan	45.3
	1001-2000yuan	29.65
	2001-3000yuan	12.52
	>3000yuan	12.52
the proportion of online consumption	<10%	29.28

	11%-30%	27.99
	31%-50%	14.55
	>50%	28.18
main products of network consumption	food	37.38
	health protection materials	10.68
	entertainment network service	7.37
	clothing, household appliances, household goods	27.62
	others	16.94
main mode of network consumption	Taobao, Jingdong and other e-commerce platforms	77.9
	local wechat shopping group	8.66
	offline delivery of online orders provided by supermarkets	9.39
	others	4.05

3.1.1. Gender Characteristics

Women accounted for 70.72% of the total sample, more than men. This situation is basically consistent with the fact that there are more women than men online consumers. Especially in household consumption, women are the main implementers of online purchases. Rural residents of the network consumers, also basically accord with this feature.

3.1.2. Age characteristics

Young people between 18 and 30 years old account for 76.98%, indicating that rural residents online consumers are mainly young people. It could also be that the pandemic has caused more young people to return to the countryside.

3.1.3. Internet Access Equipment

94.66% of respondents use smartphones to surf the Internet. With the popularity of smartphones in rural areas, their more convenient network access and lower threshold of use make it more common and convenient for rural residents to use the network.

3.1.4. Total Average Monthly Consumption during the COVID-19 Pandemic

45.3% were within 1,000 yuan, and 29.65 were between 1,001 and 2,000 yuan. This indicates that the consumption level of most rural residents is still low, which is related to the relatively low income of rural residents. It may also be related to the low expectation of security (such as pension, etc.) and the low perception of future stability of rural residents, which leads to higher willingness to save.

3.1.5. The Proportion of Online Consumption

During the COVID-19 pandemic, online consumption accounted for more than 50 percent of total consumption, reaching nearly 30 percent. Nearly half are above 30%, and less than 30% are below 10%. It shows that network consumption has become one of the most important consumption modes of rural residents.

3.1.6. Main Products of Network Consumption

Food, clothing, household goods are the main online consumer products, accounting for 65 percent. Health protection materials accounted for 10.68%. Due to the popularization of land transfer, cooperatives and other forms, the food storage of rural residents has been greatly reduced,

and the demand for food and vegetables has been greatly increased. As a result of the COVID-19 pandemic, rural residents perceive an increased risk of gathering shopping, and more and more people buy food online. Health protection materials should be a specific demand in special times, but it may lead to regular stockpiling of protective materials by rural residents.

3.2. Reliability and Validity Test

In this paper, SPSS25.0 was used to calculate the data. Cronbach α coefficient is used to test the reliability of the questionnaire. Generally speaking, in social science studies, Cronbach α coefficient is greater than 0.8, indicating that the scale has good reliability. Through calculation, the Cronbach α coefficient of the questionnaire was 0.879, indicating that the questionnaire had good reliability.

KMO test and Bartlett's sphericity test are mainly used for validity, and the results are shown in Table 2:

Table 2: KMO and Bartlett test

Sample enough Kaiser-Meyer-Olkin	Measurement	.864
	Approximate chi-square	5571.532
Bartlett's sphericity test	df	276
	Sig.	.000

It is generally believed that KMO greater than 0.7 and Sig. Less than 0.05 are suitable for factor analysis. The KMO of this questionnaire is 0.864 and Sig. 000, which meets the standards and has good validity.

3.3. Common Factor Extraction

Table 3: Total variance interpretation

	Percent variance of initial eigenvalue	Cumulative %	Extract the load squared and percentage variance	Cumulative %	Rotational load squared and percent variance	Cumulative %
1	28.162	28.162	28.162	28.162	16.573	16.573
2	9.980	38.142	9.980	38.142	11.738	28.311
3	9.164	47.306	9.164	47.306	11.085	39.395
4	7.454	54.760	7.454	54.760	10.323	49.719
5	5.202	59.962	5.202	59.962	8.171	57.889
6	4.795	64.757	4.795	64.757	6.868	64.757
7	4.081	68.838				
8	3.986	72.824				
9	3.428	76.251				
10	2.972	79.224				
11	2.740	81.964				
12	2.719	84.684				
13	2.376	87.059				
14	2.351	89.410				
15	2.036	91.446				
16	1.848	93.294				
17	1.688	94.982				
18	1.536	96.517				
19	1.394	97.912				
20	1.351	99.263				
21	.737	100.000				

SPSS25.0 was used for principal component analysis. The feature root greater than 1 was considered as the data extraction standard, and the maximum variance method was used for rotation. The calculation results are shown in Table 3, Figure 1 and Table 4.

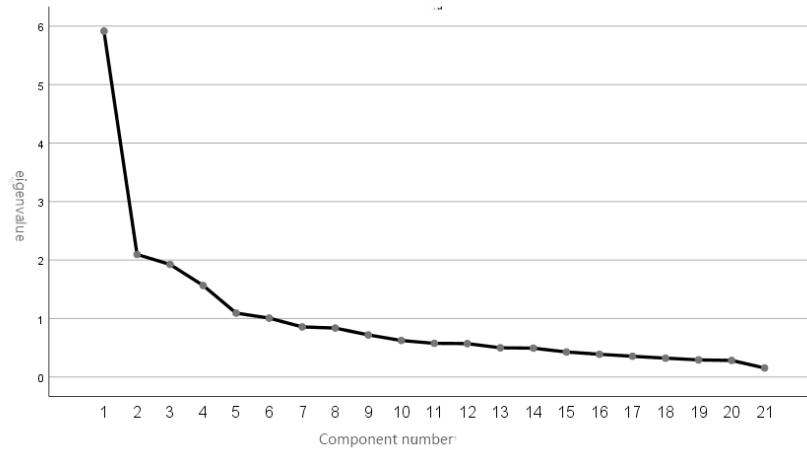Extraction method: principal component analysis.

Figure 1: Screen plot

Table 4: Common factor extraction

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor F
X1	.826					
X2	.778					
X3	.864					
X4	.852					
X5	.559					
X7		.544				
X8		.676				
X9		.807				
X10		.785				
X11			.762			
X12			.793			
X13			.707			
X14			.494			
X15				.790		
X16				.503		
X17				.717		
X18				.752		
X20					.803	
X21					.598	
X6						.515
X19						.725
contribution rate (%)	16.573	11.738	11.085	10.323	8.171	6.868
Cumulative contribution rate (%)	16.573	28.311	39.395	49.719	57.889	64.757

X1, X2, X3, X4 and X5 had a high load on the first factor, which were all related to online shopping emotions, defined as "emotional factors" and marked as F1; X7, X8, X9 and X10 had a high load on the second factor, which was related to online shopping goods, defined as "commodity

attribute factor" and marked as F2. X11, X12, X13 and X14 had a high load on the third factor and were all related to the source of goods, which was defined as "commodity source factor" and marked as F3; X15, X16, X17 and X18 had a high load on the fourth factor and were all related to income, which was defined as "income factor" and labeled as F4. X20 and X21 had a high load on the fifth factor, and both were related to post-epidemic behavior, which was defined as "expected factor of post-epidemic behavior" and labeled as F5. X6 and X19 had a high load on the sixth factor, which was related to channels, defined as "channel factor" and labeled as F6.

3.4. Factor Score Calculation

In order to more accurately reflect the influence degree of 6 common factors on rural residents' online consumption, the score of common factors was calculated. Firstly, SPSS 25.0 statistical software was used to calculate the component score coefficient matrix, and the results were shown in Table 5:

Table 5: Component score coefficient matrix

Variable	F1	F2	F3	F4	F5	F6
X1	.305	-.116	-.012	.018	-.076	-.045
X2	.259	-.062	-.035	-.045	-.063	.128
X3	.287	-.032	-.024	-.022	-.035	-.057
X4	.283	-.015	-.015	.011	-.074	-.078
X5	.163	-.026	.005	-.017	.186	-.266
X6	.036	.035	-.013	-.120	.099	.356
X7	-.080	.181	.032	-.105	.244	-.096
X8	-.086	.298	-.070	-.030	.155	-.061
X9	-.052	.433	-.047	.040	-.176	-.009
X10	-.030	.453	-.113	.000	-.209	.153
X11	-.046	-.056	.385	.005	.000	-.086
X12	-.002	-.095	.433	-.006	-.089	-.096
X13	-.032	-.108	.373	-.040	-.013	.016
X14	-.022	.098	.192	-.035	-.200	.285
X15	.004	-.050	.009	.396	-.044	-.096
X16	.058	-.125	.180	.260	-.026	-.322
X17	-.038	-.021	-.079	.342	.081	.013
X18	-.065	.096	-.078	.363	-.133	.165
X19	-.041	-.100	-.017	.036	.072	.512
X20	-.066	-.151	-.047	-.023	.605	.035
X21	-.022	-.008	-.105	.047	.379	.140

Extraction method: principal component analysis
Rotation method: Caesar's normal maximum variance method
The score of each common factor can be calculated by the following formula:

$$F_i = a_{i1}X_1 + a_{i2}X_2 + \cdots a_{i21}X_{21} \tag{1}$$

Fi represents the score of the "i"th common factor, where $i = 1,2\ldots 6$, $a_{i1}, a_{i2} \ldots a_{i21}$ is the load of 21 variables respectively on the ith common factor, that is, the value of column i in the factor score coefficient matrix.

According to Table 4 component score coefficient matrix, it can be obtained:

$$F_1 = 0.305X_1 + 0.259X_2 + 0.287X_3 + 0.283X_4 + 0.163X_5 + 0.036X_6 - 0.080X_7 - 0.086X_8 - 0.052X_9 - 0.030X_{10} - 0.046X_{11} - 0.002X_{12} - 0.032X_{13} - 0.022X_{14} + 0.004X_{15} + 0.058X_{16} - 0.038X_{17} - 0.065X_{18} - 0.041X_{19} - 0.066X_{20} - 0.022X_{21} \tag{2}$$

The values of X_1-X_{21} are obtained by averaging the original data after standardization. According to the formula and scoring coefficient matrix, it can be calculated as follows:

$$F_1 = 1.628843 \tag{3}$$

$$F_2 = 1.805309 \tag{4}$$

$$F_3 = 3.585468 \tag{5}$$

$$F_4 = 2.771851 \tag{6}$$

$$F_5 = 2.744101 \tag{7}$$

$$F_6 = 1.775803 \tag{8}$$

The contribution rate of the six factors (the square of the rotating load and the percentage of variance) was taken as the weight to calculate the comprehensive score:

$$F = 0.16573F_1 + 0.11738F_2 + 0.11085F_3 + 0.10323F_4 + 0.08171F_5 + 0.06868F_6 \tag{9}$$

Plug in the data:

$$F = 1.511625 \tag{10}$$

4. Conclusion and Discussion

4.1. The Consumption Behavior of Rural Residents after the COVID-19 Outbreak Is Mainly Affected by Six Factors

The online consumption behavior of rural residents after COVID-19 is mainly affected by six factors, namely emotional factor, commodity attribute factor, commodity source factor, income factor, post-COVID-19 behavior expectation factor, and channel factor. Through factor analysis, a total of 6 common factors were proposed for 21 variables, which could explain 16.573%, 11.738%, 11.085%, 10.323%, 8.171% and 6.868% of the dependent variables respectively, and could explain 64.757% of the consumption behavior information in total.

Emotional factors have become important factors affecting rural residents' online consumption. The uncertainty of the COVID-19 epidemic and the huge perceived risk make rural residents' online consumption affected by negative emotions such as anxiety, but online consumption alleviates negative emotions to a certain extent and produces positive emotional experience. The characteristics of Internet across time and space make it more convenient for consumers to find their own satisfactory products online. With the help of the Internet, businesses unable to carry out sales in physical stores can also timely release product sales information online. However, rich and high-quality products are the key factors that rural residents pay attention to online consumption. The COVID-19 has prompted online consumers to pay more attention to the source of goods. Non-epidemic areas, familiar shops and local O2O have become important sources of goods for online consumption. Income factors, such as savings, income expectation and current income status, are important factors affecting online consumption. But it accounts for only about 10 percent of consumption behavior. Before the COVID-19 pandemic, China's economy was developing rapidly and rural residents' incomes were rising steadily. Compared with urban residents, rural residents tend to save more, and rural residents do not have credit pressure such as mortgage. These factors may have combined to lead to the results presented in this study. After the epidemic, some online consumption may shift to offline consumption, and there may be retaliatory and compensatory consumption, which will provide consumption impetus for China's economic development after the epidemic.

4.2. Evaluation Index System of Factors Influencing Rural Residents' Consumption Behavior after the Novel Coronavirus Epidemic

Dimension reduction was carried out through factor analysis, and six influencing factors were extracted from 21 variables. Therefore, a three-level index system can be built for the evaluation of rural residents' online consumption behavior after the novel coronavirus epidemic. The specific day is shown in Table 6:

Table 6: Evaluation index system of rural residents' online consumption behavior

First-level index	Second-level index	Third-level index
Rural residents' online consumption behavior after the	Emotion	Online shopping because of more anxiety, do not know when the epidemic will end, Online shopping can relieve anxiety, Online shopping makes you feel confident, online shopping makes people happy
	commodity attribute	There is a greater variety of goods available online, they are cheaper, they are of better quality, and they are fresher
	commodity source	Buy familiar brands, buy familiar stores or familiar people's goods, The place of shipment is non-epidemic areas, local O2O
	income	Have income during the epidemic, limited impact of the epidemic on income, income will quickly return to the pre-epidemic level after the epidemic, a certain amount of savings enough to ensure normal life for at least 1 year
	post-pandemic behavior expectations	After the epidemic, I will have dinner with my relatives and friends. After the epidemic, I will trust the shops and wechat groups where I bought goods online during the epidemic.
	channel	buying online because most off-line stores are closed. I will return more to offline consumption after the pandemic

4.3. An Evaluation Model of Rural Residents' Online Consumption Behavior under the COVID-19 Pandemic

Using the common factor extracted by factor analysis method and the variance contribution rate of the common factor as the weight, the evaluation model of rural residents' online consumption behavior under the COVID-19 pandemic was constructed:

$$F = 0.16573F_1 + 0.11738F_2 + 0.11085F_3 + 0.10323F_4 + 0.08171F_5 + 0.06868F_6 \quad (11)$$

According to the model, the surveyed data can be used to calculate the measurement value of rural residents' online consumption behavior under the COVID-19 pandemic, and make judgment and evaluation according to the measurement value. The larger the F value is, the stronger the

willingness of rural residents to consume online and the more obvious the characteristics of online consumption behavior. Through calculation, the F value is 1.511625, which is greater than 1, indicating that the intention of network consumption is very strong and the characteristics of network consumption behavior are obvious.

5. Countermeasures and Suggestions

Since the founding of the People's Republic of China, the COVID-19 is a major public health emergency that has spread most rapidly, affected most widely, and proved to be the most difficult to control. Although it has been down-grade to Class B, it is still of great significance to study consumer behavior in this context. It can provide important reference for subsequent similar events and also provide reference for normal network marketing. Through data analysis, this paper puts forward targeted suggestions from government functional departments, merchants (or relevant e-commerce enterprises) and other aspects.

5.1. Pay Attention to Emotional Factors to Ensure a Good Experience of Online Consumption

Anxiety and happiness are both important factors promoting rural residents' online consumption. Online shopping platforms or merchants should pay careful attention to consumers' emotions, make full use of pre-sale, in-sale and after-sale services, and reduce consumers' perception of purchase uncertainty and risk through product and service commitment. The government and relevant regulatory departments should strengthen supervision to prevent merchants from excessively selling anxiety or taking advantage of consumers' anxiety and other negative emotions to raise commodity prices and infringe consumers' interests, so as to ensure consumers' good online consumption experience, establish online consumption information and further strengthen their online consumption intentions. Online consumers and online merchants should also pay attention to communication and complaint handling to ensure a good experience of online consumption. Online consumers can take the initiative to communicate with merchants and find out problems, so as to ensure a good experience of online consumption. Merchants should strengthen complaint handling, timely feedback processing results, to ensure customer satisfaction, to ensure a good experience of online consumption.

5.2. Ensure Product Quality and Low Price, Cultivate Rural Online Consumer Trust and Loyalty

In China, there is such a thing as "omnipotent Taobao", which speaks volumes about the wealth of products available online. However, counterfeiting and other low quality products have been affecting consumers' confidence in online consumption. The prevention and control of the COVID-19 pandemic has led to a large number of offline businesses turning to online, bringing better opportunities for all kinds of enterprises to carry out online sales, which may become another important turning point in the development of e-commerce in China. All kinds of platform enterprises and relevant government departments should strengthen product quality management and smooth the feedback channels of users. Industry associations strengthen enterprise self-discipline guidance to ensure product quality. Through the concerted efforts of various parties, the satisfaction of online consumption can be improved, so as to cultivate the trust and loyalty of consumers in online consumption.

5.3. Improve the Income Level of Rural Residents, Release and Enhance Rural Internet Consumption Demand and Capacity

With the continuous development of urban and rural economy, the income level of rural residents continues to improve, and the demand for rural Internet consumption is also growing rapidly. China still has urban-rural dual structure, rural residents' income is relatively low and the stability of income is limited, which makes rural residents' consumption more conservative. The government should try every means to improve the income level of rural residents, ensure the stability of their income, and release the online consumption demand and ability of rural residents. Through strengthening agricultural industrialization support, improve agricultural production capacity and production efficiency. We will create rural and agricultural jobs and increase employment for rural residents. We will further standardize and strengthen the transfer of rural land, promote agricultural insurance and old-age care for rural residents, and improve the income stability and livelihood security of rural residents.

5.4. Further Strengthen the Integration of Online and Offline Channels, Focusing on Local Online Community Marketing

All kinds of enterprises should strengthen the deep integration of online and offline channels. First of all, enterprises should strengthen the awareness of local community marketing, develop local community marketing strategies, and enhance the ability of local community marketing. Enterprises should identify the influence of local communities and seek effective sources of investment from the activities of local communities, so as to change their marketing strategies and realize the integration of online and offline channels. Secondly, enterprises should pay attention to the increase of community participation, improve the participation of the local community, encourage users to participate in marketing activities, which can promote the brand exposure of enterprises, win the trust and support of consumers, and increase the customer stickiness of enterprises. In addition, enterprises should strengthen the monitoring and feedback of the local community, establish an effective feedback mechanism, grasp the development status of the local community in real time, timely feedback the changes of the community, timely response to the needs of the community, improve the enterprise's market strategy, and realize the integration of online and offline channels. At the same time, enterprises also need to attach importance to the connection of community groups, and use community marketing technology to organically integrate community groups with the online and offline channels of enterprises, so as to realize the connection between online and offline customers. For example, through community marketing, inviting local community users to participate in offline activities can increase the number of offline fans, enhance the visibility of enterprises, and realize the integration of online and offline channels. Finally, on the basis of continuous improvement and optimization of local community marketing, enterprises need to grasp the development trend of community market, enhance the ability of local community marketing, constantly develop new community activities, continue to stimulate community participation, so as to achieve the integration of enterprise online and offline channels.

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