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Research on Factors Influencing Sales Volume of VR Glasses

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Abstract:

Objective to explore the influence of price discount, comment quantity and free delivery of VR glasses on online purchase of VR glasses by consumers, and provide corresponding guidance for online suppliers of VR glasses. [methods] based on 14,550 valid VR glasses data on taobao.com, the linear regression model and behavioral decision theory were used to verify the impact of price discount, comment quantity and whether including mail or not on consumers' purchase of VR glasses. [Conclusion] the price discount of VR glasses, the number of comments, and whether or not the delivery is included will have a significant impact on consumers' choice to buy VR glasses. Therefore, merchants on taobao.com should try to display such information when displaying VR glasses information to attract consumers to buy VR glasses.

Keywords: Discount, number of comments, whether the delivery is free of charge, linear regression, behavioral decision theory

1. Introduction

After years of incubation, Virtual Reality technology has accumulated and developed in the consumer market and capital market. Consumption and application products of VR technology have emerged frequently, and the value of VR industry has been widely concerned. [1] is referred to as "the first year of VR" in 2016, according to research series, according to a report in China in 2016 VR market size is 3.46 billion yuan, the size of the market growth in 2017 is 5.28 billion yuan, since the VR China is expanding the market, rapid ascension, the industry as a whole as a frontier science and technology, the prospects of VR once favored by the market, VR China market in 2018 is expected to exceed 2018 yuan. Over the next five years, the VR market will grow at a compound annual rate of more than 80 percent. It is expected that by 2021, China will become the world's largest VR market, with the overall industry scale reaching 79.02 billion yuan, including 29.75 billion yuan for VR headset devices and 38.64 billion yuan for VR content market (including user direct consumption, advertising marketing and enterprise-level applications).

The recently mature virtual reality (VR) technology creates highly immersive environments for devices at reasonable prices. Therefore, VR technology has promoted many researches on the application of VR to assist the disabled, such as wheelchairs, training environments for social life, computer aided education (CAE) systems for learning disabilities, and communication AIDS for the deaf and blind. [2] with the continuous development of technology, VR has been applied in education, social networking, business, engineering, video, service, game business and other fields. At the virtual reality partner BBS event, dell announced that it plans to build a "VR joint laboratory" with its partners in the future, showing the "VR Ready" ecosystem. [3]

The mobile VR market has been growing vigorously and occupies an increasingly important position in the whole VR field. Especially with the development of VR technology, the market of mobile VR virtual glasses is expanding rapidly and gaining popularity. According to statistics, China's e-commerce channels sales of VR mobile phone glasses as many as hundreds of types, jingdong mall alone has more than 280 brands, more than 1000 yuan of products due to the restrictions of technological development, experience effect is not very prominent, cost-effective, few people ask. Low-end products within 99 yuan can be seen everywhere on taobao.com [4]. However, according to the price tendency chart of users for ideal VR devices, only 7.6% and 9.8% of users have the price tendency range below 200 yuan and 200-500 yuan respectively. The price tendency of most users is 1000-3000 yuan. VR as a whole perspective, interactive technology, the pursuit of users for its considerable experience, domestic VR user groups younger, when VR, they are not only new entertainment of consumers, more satisfy their curiosity about the heart of the long-awaited VR concept [5], and therefore most users are not satisfied with a simple VR glass. Ordinary VR glasses while 360 ° visual impacts, but there is no ideal immersion, most users would rather spend some cost, in order to obtain better visual services.

Although VR technology is not mature yet and the popularity of VR equipment has not yet restricted the profitability of VR industry, VR industry still has broad prospects and potential for development. [6] as an important part of China's VR product market, VR virtual glasses can provide some useful guidance for the research on the impact of VR glasses sales. Based on the behavioral decision theory, this paper will deeply explore the factors affecting VR sales in

consumers' decisions and conduct an empirical analysis by using regression analysis, so as to propose a reasonable sales plan of VR glasses and make customers satisfied with the purchase.

2. Relevant Theories and Hypotheses

Through reviewing and sorting through a large number of literatures, it is found that China's VR market is currently in a stage of rapid development, and there are few studies on the influence of consumers' VR glasses purchasing behavior. Secondly, VR products are being used in more and more fields. As a new technology-oriented marketing method developed after native advertising and digital marketing, VR marketing has brought new impacts to the marketing field. [7] so the online information for consumers to purchase VR glasses is necessary choice behavior, this paper will combine the existing related literature, on the basis of analyzing the current situation of the development of VR market, from the discount, the number of buyers comments and trust between the seller and the buyer (i.e., whether to belong to the mall), consider whether or not the discounted price and at the same time package mail etc., study the factors affecting consumer buying VR glasses online.

2.1. Behavioral Decision Theory

Behavioral decision theory started from the proposal of allais' paradox and Edwards' paradox [8], which was developed in a new way to solve the problems difficult to be solved by rational decision theory. In 1961, professor Edwards [9] put forward the idea of "decision weight", which has been widely used in the analysis of consumer behavior. This theoretical research also has three characteristics [10]: (1) the starting point is the decision behavior of the decision maker; (2) the research focuses on the cognitive and subjective mental processes of decision makers, focusing on the psychological explanation behind the decision-making behaviors rather than the evaluation of the right and wrong decisions; (3) from the perspective of cognitive psychology, this paper studies the information processing mechanism of decision makers in judgment and selection and the influence of their internal and external environment, and then extracts the behavioral variables not taken into account by rational decision-making theory to modify and improve the rational decision-making model. At present, the theory of decision-making behavior has been widely used in the stock market, marketing and management.

When consumers need buy VR glasses, will be before buying a lot of to gather information about VR glasses online to support their decision making, and the information processing in addition to the basic price discount, will also consider whether or not the comment number of consumers and buyers and sellers trust and bag mail, thus using behavioral decision theory can better research the influence factors of consumers to purchase VR glasses.

2.2. Price Discount

Price discount refers to the discount on the basis of the original price by the marketer in order to encourage consumers to buy in large quantities or in the off-season of sales. It is also called discount. In addition to the price of the product itself, the discount of the product and the difference between the selling price of the product and the original price also have an impact on the decision of consumers. Often, the greater the discount of the product, the stronger the purchase intention of consumers. Therefore, the hypothesis is proposed:

- H1: price discount has a significant positive impact on VR glasses sales.

2.3. Number of Comments

When buying a product or service, consumers always want to learn from others' evaluation. [14] as a new way of word-of-mouth communication, online product reviews have become the most important source of information for consumers and merchants to understand product quality and service. Some scholars think that the total number of online comments on sales of production have a significant impact, such as Forman, Ghose [15] and others point out that many aspects of online product reviews have a significant impact on product sales, on the other hand, online product reviews and influence customer purchase decision for the enterprise, improve enterprise product sales provides an important way of Chrysanthos Dellarocas [16] and Yubo Chen [17] et al. The study found that online product reviews has become a new marketing means, In the process of enterprise sales as the "sales assistant" of the enterprise, its sales to the enterprise has obvious leverage, this is because the number of online reviews the more the more the number of people who purchase this product, customers have a herd mentality and the risk consciousness, the more purchase quantity that product is recognised by the public, buy the uncertainty risk is lower, lower transaction costs, the more purchase intention. Therefore, the hypothesis is proposed:

- H2: the number of comments has a significant positive impact on VR glasses sales.

2.4. Whether Free of Mail

With the rapid development of Internet consumption, as well as express service throughout the country gradually, the network consumer when making purchase decisions, in addition to get through from the shopping website to the quality of the filtered information and price, the selected product is "bag mail" has become a consumer measure of commodity value, and the important factors that affect consumer purchase intention. [18] under the same competitive conditions such as quality and reputation, the free delivery of goods will increase consumers' purchasing desire and increase their purchasing possibilities. Existing studies have pointed out that the usefulness and ease of use of parcel post have a significant positive impact on the purchase intention of online consumers. [18] for low-priced products, the negative promotion framework can better promote the purchase intention of consumers than the positive promotion

framework, while for high-priced products, the online promotion framework effect is not significant. [19] Therefore, the following hypothesis was proposed:

- H3: whether free shipping has a significant positive impact on VR glasses sales.

3. Empirical Analyses

3.1. Data Source and Variable Description

Data from taobao mall, climbed 17594 VR glasses product information, including glasses brand, discount, sales, shipping, whether belonging to the mall (and trust between the seller and the buyer), etc., to eliminate duplicate records and invalid information, effectively record 14550 article, research field is defined, number of comments, whether discount package mail.

Variable Categories	The Variable Name	Variable Description
The independent variables	The sales amount	Actual sales of VR glasses
The independent variables	discount	The discount of VR glasses, that is, the difference between the original price and the selling price
	Comment number	The number of reviews posted on the site by buyers of VR glasses
	Whether the package mailed	Whether the product is free of charge, 0 means free of charge, 1 means not free of charge
Control variables	Whether the mall	If the product is sold by the mall, 0 means it belongs to the mall and 1 means it does not belong to the mall
	After the discount price	The original price of the product minus the discount

Table 1: Variable Description

Variable	Observations	The Average	The Standard Deviation	The Minimum Value	The Maximum
discount	14550	0.2997	0.3046	0	0.99
comment	14550	0.0017	0.0255	0	1
postage	14550	0.51	0.5000	0	1
Mall	14550	0.0031	0.5000	0	1
price	14550	0.50	0.0143	0	1

Table 2: Data Characteristics

variable	discount	comment	postage	mall	price
discount	1	0.091	0.013	-0.017	-0.109
comment	0.091	1	0.003	0.01	-0.011
postage	0.013	0.003	1	0.012	0.015
mall	-0.017	0.01	0.012	1	0.011
price	-0.109	-0.011	0.015	0.011	1

Table 3 Correlation Test of Variables

3.2. Model Estimation

Changes in the sales volume of VR glasses are often affected by multiple factors. Therefore, the multiple linear regression model is used to test the impact of price discount, number of reviews and whether including mail or not on the sales volume of VR glasses. In this study, VR glasses sales volume was taken as the dependent variable. The independent variables are the discount of VR glasses, the number of buyer's comments, and whether or not the delivery is included in the package, while whether or not VR glasses are sold in the mall, the brand of glasses and the sales amount are included in the model as control variables for analysis. In order to avoid multicollinearity among the data and facilitate the analysis, we normalized the number of comments and the discounted price.

$$amounts = \beta_0 + \beta_1(discout) + \beta_2(comment) + \beta_3(postage) + \beta_4(mall) + \beta_5(price) + \varepsilon_i$$

Amount

s indicates the amount of VR glasses sold, which can reflect customer acceptance. Discount represents the discount of VR glasses, which is used to reflect the difference between the original price and the selling price; Comment refers to the normalized value of the number of comments of VR glasses from the buyer, which is used to reflect the attitude of the buyer towards the product; Whether or not the VR glasses are free of postage, 0 means free, 1 means not free; Mall means whether VR glasses are sold in a mall, which is used to reflect the trust between buyers and sellers. 0 means they are sold in a mall, while 1 means they are not sold in a mall. Price represents the normalized value of the discounted price of VR glasses. These data are displayed on the detail page of taobao VR glasses.

4. Research Conclusions

In this paper, stepwise regression is used to test the possible multicollinearity in the regression model because of the possible correlation between variables in the regression model. The SPSS statistical software was used to analyze the regression model. The price discount, the number of buyers' comments and the free shipping of merchants in the sales data of VR glasses were calculated, and the final and t test all met the requirements. The specific results are shown in the figure below:

Variable	Model 1	Model 2
Constant term	78.475***	0.931*
	(5.892)	(0.077)
comment		33698.085***
		(142.514)
discount		72.712***
		(3.656)
postage		6.063*
		(0.505)
price	-947.448***	-106.091*
	(-1.455)	(-0.252)
mall	24.049***	6.503*
	(1.290)	(0.542)

Table 4: Correlation Test of Variables

*** Represents the Significant Level of 1%, ** Represents the Significant Level of 5%, and

* Represents the Significant Level of 10%

As shown in table 4, the regression coefficient of price discount size ($B=0.931$, $T=0.077$, $P<0.01$) is significant by integrating the sales data of all VR glasses, and H1 is verified, that is, price discount has a significant positive impact on the sales of VR glasses. At the same time, by integrating all the sales data of VR glasses, the regression coefficient of the number of comments ($B=33698.085$, $T=142.514$, $P<0.01$) was significant, and H2 was verified, that is, the number of comments had a significant positive impact on the sales of VR glasses. The sales of VR glasses are also significantly affected by whether free shipping is available ($B=6.063$, $T=0.505$, $P<0.01$), which also indicates that whether free shipping is available has a positive impact on the sales of VR glasses. In addition, whether products are sold in stores has a positive impact on the sales of glasses, and the discounted price of products has a negative impact on the sales of VR glasses.

5. Discussion and Suggestions

Based on the analysis and arrangement of relevant literature, this paper starts from the online display information of VR glasses and integrates relevant data to study the sales volume of VR glasses. It also focuses on the existing discounts, the number of reviews, and the effect of whether or not the delivery is included in the online VR glasses marketing process. At the same time, this paper puts forward a hypothetical model to explain the sales volume of VR glasses by combining the attributes of whether it is a shopping mall and discounted price, and finds that discounts, comments and whether free shipping have an important impact on online marketing. It is showed that buyers are more willing to choose the discount greater comment number more VR glasses, therefore VR glasses seller in time to seize the consumer's network marketing this kind of psychology, such as in the past consumer behavior information can be put in prominent position, so that is good to attract the attention of consumers, Then it can be further transformed into trading behavior.

6. Conclusions

Based on the existing studies, this paper explores the factors affecting the sales volume of VR glasses. Currently, there are few relevant studies. Through the establishment of a multiple linear regression model, empirical studies verify that purchase reviews, price discounts, and whether or not free shipping will have a significant impact on consumers' choice of VR glasses. At the same time, this paper also has some shortcomings. For example, the information of VR glasses not only includes text information, but also includes picture information, which will also affect consumers' choice to a large extent. In addition, the data of this time are all sampled from taobao, and can be compared with other VR glasses sales websites, so that the results are more accurate.

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