

Online Flash Sales Product Pricing Strategy under Time Pressure

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Abstract

Online flash sale means that online retailers provide discounted products for consumers during a limited flash sale time. This paper studies how online retailers in online flash sale can set reasonable product prices for different flash sale times and different quality products to help online Retailers achieve optimal profits. The results of the study found that 1) the impact of flash sale time and product quality on the optimal price setting in online retail is different. For product quality, as the difference in product quality increases, the optimal product price of the company also increases. As for the flash sale time, as the difference in flash sale time increases, the optimal product price of companies that produce high-quality products decreases, and the optimal price of companies that produce low-quality products increases. 2) The optimal market share of online retailers is affected by the difference in flash sale time, product quality and product cost. For high-quality products, the market demand of enterprises increases with the increase in quality difference and the difference in flash sale time Increase and increase, and decrease as the product cost and flash sale time cost increase; for low-quality products, when the product cost is small, the market demand of the company decreases as the quality difference increases, and with the flash sale time The difference increases and decreases. When the product cost is large, the market demand of the enterprise decreases with the increase of the quality difference, and increases with the increase of the flash sale time difference. Research suggests that online retailers can promote products when flash sales are short and time pressure is high, so that consumers can buy products. Through factors that may cause consumer time pressure, online retailers can place information such as promotional deadlines in a more prominent position on the shopping page, which helps to promote consumers' purchases.

Keywords

Online flash sales; Promotion time; Quality differentiation; Time pressure.

1. INTRODUCTION

Online flash sale refers to online retailers providing discounted products to consumers for a limited period of time. Nowadays, e-commerce enterprises have already adopted quite extensively. For example, Vipshop's Vipshop quick grab, Suning Tesco's limited-time flash sale, JD's flash sale on the JD platform, Taobao's Tmall platform's quick flash sale and Pinduoduo's limited-time flash sale, etc. Online flash sale strategy has become a must-have strategy for every e-commerce platform. In the early days, Vipshop achieved a maximum market value of US\$17.879 billion with a limited-time flash sale model. Since then, mainstream e-commerce platforms such as Taobao, Tmall, JD.com, and Pinduoduo have all begun to use online flash sale strategies to attract consumers. When consumers enter the online flash sale page of the e-commerce platform, they can find that the types of promotional products are quite rich, from shoes, hats and apparel to mobile phone digital, from home improvement and home textiles to

household appliances. There are high-quality products and low-quality products, such as digital products. In the flash sale, there are both high-end products from Apple and Huawei, as well as cost-effective (low-end) products from other manufacturers. As consumers browse, click, collect shopping carts and purchase payment on the e-commerce platform, the e-commerce platform gradually grasps the consumer's preference for product quality and purchase records. In the online flash sale mode, how companies can attract consumers by controlling the price of quality differentiated products to win the online flash sale market share has become an important issue.

With the development of social e-commerce, consumers are increasingly sharing their shopping experience with others, and being influenced by online comments by friends and bystanders, information dissemination continues to accelerate. In this case, consumers must process more information, and the emotional experience of purchasing decisions is more complex, and consumers have a stronger perception of time pressure. Therefore, consumers in online flash sales will feel more intense time pressure due to the shorter flash shopping time, prompting consumers to buy products from online retailers. Flash sale time will turn into time pressure for consumer decision-making and affect purchase decision. It mainly creates a sense of purchase urgency and affects the information processing process by shortening the decision time, thereby affecting the effect of promotion. Setting the flash sale time to 1 week can effectively increase consumers' desire for the product, but a flash sale time of 4 weeks will reduce people's desire. It can be seen that the time pressure and emotional intensity caused by different ravine times are different. Generally, the shorter the time, the greater the time pressure induced by the promotion, the stronger the consumer's "regret not buying", the more likely it is to have the impulse to buy. Not only that, a very short time such as a spike promotion (a few minutes or a few hours) will also trigger consumers' favorability of the e-commerce platform.

2. LITERATURE REFERENCES

The literature related to this paper mainly focuses on online flash sales, time pressure.

(1) Online flash sale As a pricing strategy, online flash sale has been studied by scholars from many aspects. Zhang et al. [1] found that when there are strategic consumers, the profits of companies selling new products using online flash sales pricing strategies will be higher than conventional pricing strategies. Online flash sales reduce the impact caused by strategic consumers. Retailer losses. Further, Zhang et al. [2] studied the reasons why brand owners sell new products on online flash shopping platforms and how to sell new products. Brand owners adopt online flash shopping strategies to promote product promotion and improve product quality through word-of-mouth effects. demand. Brands can adopt product sales quantity restrictions and price discounts for different products to increase retailer profits. Song Zhiping [3] studied the pricing strategy of online retailers based on the high price and out-of-stock regret of consumers in online snap-up, and believed that online snap-up mid-discount products The availability rate has an important impact on retailers. Wu et al. [4] based on real data from online flash shopping e-commerce companies, and found that product pricing and clicks in online flash sales do affect product sales. In online flash sales, consumers will have different regrets depending on whether they purchased the product. Zhao Baoguo [5] uses the Technology Acceptance Model (TAM) to construct a model of the factors that influence consumers' buying intentions during online capping, focusing on the key factors that affect consumers' buying intentions during online capping, and the interrelationship between these factors. The results of the study believe that operators need to pay attention to the high level of consumer perception of the usefulness of consumers, provide certification of authenticity, ensure product quality, and eliminate consumers' worries. Second, we should strengthen the stimulation of consumer perception of pressure. Time and quantity constraints are the key

factors that stimulate consumers to perceive pressure, so it can be achieved by improving the page settings of the website. For example, adding flash sale time and quantity reminders and the setting of the number of competitors, when consumers browse product information, let consumers know clearly the remaining quantity and time of the goods they want to buy, fully feel the pressure of competition, and promote purchase intention.

At present, online flash sales research mainly focuses on product quantity restrictions in online flash sales, such as pre-sales of new products, pricing of products that may be out of stock, and insufficient research on the impact of promotional time in online flash sales on enterprises and consumers. In the research, this paper emphasizes the influence of behavioral pricing in online flash sale on quality differentiated products, and discusses the influence of promotion time in online flash sale on consumer decision-making and corporate profits.

(2) Time pressure Time pressure refers to consumers making consumption decisions within a limited time. Time constraints will cause consumers to feel pressure and anxiety, which affects consumer decisions. Maik et al. [6] studied the factors that constitute effective price discounts in online flash sales, where price discounts and time constraints make price promotions more effective. Lu Changbao [7] studied the cognitive mechanism of consumer purchase decisions in false promotions. There is a significant positive correlation between the time pressure in consumer purchase decisions and the degree of confidence in decision-making; later, Lu Changbao [8] studied In order to account for the influence of time pressure on no-buy regret in the promotion decision-making, the shorter the promotion period, the stronger the “no-buy regret” and the higher the consumer’s cognitive response to the value of the promotion. Huang Jing [9] studied the influence of time and quantity restrictions on consumer purchase behavior in online promotion. The higher the product involvement, the higher the influence of time restriction on purchase behavior. Xi Kaiyuan [10] analyzes the impact of the accuracy of online promotion countdown on consumers’ purchase intention. In limited-time promotions, the higher the accuracy of the countdown, the greater the time pressure, and the stronger the consumer’s willingness to buy.

It can be seen from the above research that the time limit for promotion has a significant impact on consumers’ purchasing decisions. In the online flash sale process, the shorter the promotion time, the greater the objective time pressure of consumers, the higher the consumer’s cognitive response to the promotion value, and the stronger the consumer’s willingness to buy.

3. MODEL

3.1. Problem Description

This paper considers a two-period duopoly market with firm F and firm f in the market. The product characteristics provided by the two companies are reflected in product quality and promotion time. Among them, company F sells high-quality products in a longer promotion time, while company f sells low-quality products in a shorter promotion time.

The utility of consumers is affected by the product quality level and the promotion time level. The higher the product quality, the higher the product quality level. The product quality level is q , $0 \leq q \leq 1$. The higher the quality level, the closer q is to 1. Similarly, the longer the promotion time of a product, the higher the promotion time level, the promotion time level is t , $0 \leq t \leq 1$, the higher the promotion time level, the closer t is to 1. The longer the product promotion time, the less time pressure for consumers, and the shorter the promotion time, the greater the time pressure for consumers.

Among them, company F provides products with high promotion time level t^w and high quality level q^H , while company f provides products with low promotion time level t^s and low

quality q^L . The utility of consumers buying company F's products is $U_F = v + \theta_q q^H - \theta_t t^w - p^F$, and the utility of consumers buying company f's products is $U_f = v + \theta_q q^L - \theta_t t^s - p^f$, where θ_q represents the consumer's perception of the quality level and θ_t represents the consumer's perception of the promotion time level. The perceptions are independent of each other and all follow a 0-1 uniform distribution. Among them, the product valuation v is large enough that all consumers choose to buy products from F or f.

3.2. Online Flash Sales Product Pricing Model

Assume that customers are more sensitive to product quality levels compared to product promotion time levels, $\Delta q = q^H - q^L, \Delta t = t^s - t^w, \Delta q \geq |\Delta t| \geq 0$. The product quality cost and product promotion cost are $c, 0 < c < 1$. The utility functions of consumers buying product F and product f are:

$$U_F = v + \theta_q q^H - \theta_t t^w - p^F$$

$$U_f = v + \theta_q q^L - \theta_t t^s - p^f$$

Let $U_F = U_f$, we can get Undifferentiated customers are distributed on this straight line, close to customers with low sensitivity to purchase product f, and close to customers with high sensitivity to purchase product F. When $\theta_q = 0$, all customers buy product f, when $\theta_q = 1$, all customers buy product F, $0 \leq p^F - p^f \leq \Delta q + \Delta t$. Let $\theta_t = 1$, we can get $\theta_q = (p^F - p^f) / \Delta q - \Delta t / \Delta q$. The market share of customers buying products is shown in Figure 1.

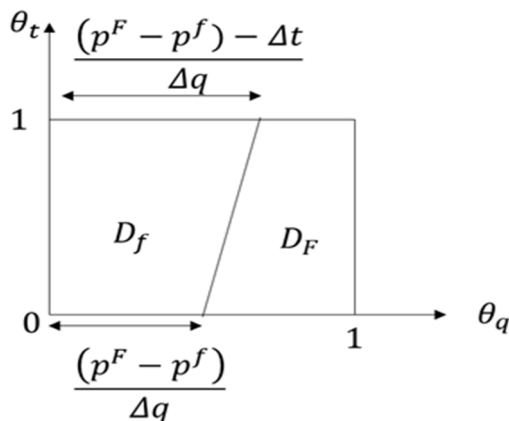


Figure 1. The market share of customers

The market demand of firm F is:

$$D_F = 1 - (p^F - p^f) / \Delta q + 1/2 \Delta t / \Delta q$$

The profit of firm F is:

$$\pi_F = D_F (p^F - c(q^H + t^w))$$

The market demand of firm f is:

$$D_f = (p^F - p^f) / \Delta q - 1/2 \Delta t / \Delta q$$

The profit of firm f is:

$$\pi_f = D_f (p^f - c(q^L + t^s))$$

Standard first-order conditions we can reveal that optimal pricing for firm F and firm f is

$$p_F^* = \frac{(2-c)\Delta q + (\frac{1}{2}+c)\Delta t}{3} + c(q^H + t^w), p_f^* = \frac{(1+c)\Delta q - (c+1/2)\Delta t}{3} + c(q^L + t^s)$$

Proposition 1: The optimal pricing of firms F and f under online flash sale are $p_F^* = \frac{(2-c)\Delta q + (\frac{1}{2}+c)\Delta t}{3} + c(q^H + t^w)$, $p_f^* = \frac{(1+c)\Delta q - (c+1/2)\Delta t}{3} + c(q^l + t^s)$. The optimal price of enterprise F increases as the quality difference between enterprise F and enterprise f increases, and as the promotion time difference decreases; the optimal price of enterprise f increases with the quality difference between enterprise F and enterprise f, As the promotion time difference decreases, it decreases.

In online flash sales, product quality and flash sales time have different effects on corporate pricing decisions. In terms of quality, as the quality of enterprise products becomes more divergent, whether it is an enterprise producing high-quality products or an enterprise producing low-quality products, the optimal pricing of enterprises is increasing. This is because with the increase in product quality differentiation, different types of consumers will choose products that are more suitable for them, and the intensity of price competition among enterprises will decrease. To a certain extent, companies do not need to lower prices to acquire more consumers. Therefore, when the product quality differentiation of different enterprises increases, the optimal pricing of enterprises increases.

As for the flash sale time, as the difference in the flash sale time of enterprises becomes larger, the optimal price of enterprises that produce high-quality products becomes smaller, and the optimal price of enterprises that produce low-quality products becomes larger. When the difference in the flash sale time of enterprises becomes larger, consumers who buy high-quality products will have more time to decide whether to buy this product, and consumers feel less time pressure. In this case, consumers' decision-making will be more based on the quality of the product. In order to obtain these consumers, companies that produce high-quality products will adopt lower product prices to attract consumers. Therefore, companies that produce high-quality products will lower their optimal prices when the flash sale time difference becomes larger. For companies that produce low-quality products, as the difference in flash sales time becomes larger, consumers will experience a shorter flash sales time when buying low-quality products than when buying high-quality products, which will lead to consumers feel greater time pressure when buying low-quality products. In this case, consumers' decision-making will choose to buy low-quality products due to time pressure, so that companies that produce low-quality products can set the best price for their products. higher. This kind of situation does exist in actual online flash sales. We can find that regardless of high-quality products or low-quality products, we should try our best to keep the difference in flash sales time between each other not too big. In online flash sales, we can find high quality and low quality products. Quality digital products promote products in the same flash sale time to attract consumers.

Proposition 2: The optimal market share of firms F and f under online flash sale are $D_F^* = 1/3(c\Delta t/\Delta q - \Delta t/\Delta q + 4 - c)$, $D_f^* = 1/3(-c\Delta t/\Delta q + 1/2\Delta t/\Delta q + 1 - c)$. The market demand of enterprise F in online flash sale increases with the increase in quality difference, increases with the increase in flash sale time difference, and decreases with the increase in product cost and flash sale time cost; when the product cost is small, enterprise f The market demand of company f decreases with the increase in quality difference, and decreases with the increase in flash sale time difference. When the product cost is large, the market demand of enterprise f decreases with the increase in quality difference. The time difference increases and increases.

In online flash sales, product quality and flash sales time have different effects on the company's final market share. In terms of product quality, the market demand for high-quality products in online flash sales increases with the increase in quality differences; when product costs and flash sales time costs are relatively low, the market share of low-quality products increases with the difference in quality Increase and decrease. When the product cost and flash

sale time cost are relatively high, the market share of low-quality products increases as the quality difference increases. When the product cost is relatively low, the optimal pricing for producing high-quality and low-quality products increases with the increase in quality differentiation. Consumers are more inclined to choose products with low cost and high quality, so the market for low-quality products The share has declined. When the product cost is relatively high, the greater the product quality differentiation, the higher the company's pricing. Consumers tend to choose low-quality products, so the market share of low-quality products has risen.

For the flash sale time, when the product cost is small, the optimal pricing of low-quality products increases with the increase in the flash sale time difference, and the market share decreases with the increase in the flash sale time difference; when the product cost is high, The optimal pricing of low-quality products increases with the increase in the flash sale time difference, and the market share increases with the increase in the flash sale time difference. When the product cost is low, consumers have similar preferences for low-quality products and high-quality products. At this time, the pressure of flash sale time does not significantly affect consumers' purchase decisions on products. On the contrary, as the difference in flash purchase time increases, Consumers are more inclined to buy high-quality products at a reasonable price, which in turn leads to a decline in the market share of low-quality products. When the product cost is high, as the difference in flash purchase time becomes larger, consumers will experience a shorter flash purchase time when buying low-quality products than when buying high-quality products, which will cause consumers to buy low-quality products. Feel greater time pressure when quality products, in this case consumers will choose to buy low-quality products due to time pressure. This has prompted an increase in the market share of low-quality products.

Proposition 3: The optimal profit of firms F and f under online flash sale are

$\pi_F^* = 1/(36\Delta q)(2c(\Delta q - \Delta t) - 4\Delta q - \Delta t)^2$, $\pi_f^* = 1/(36\Delta q)(2c(-\Delta q + \Delta t) - 2\Delta q + \Delta t)^2$ The profits of companies in online flash sales are affected by product quality differences, flash sales time differences, product costs, and flash sales time costs.

Online retailers can set the product promotion method to directly cut prices and discounts to stimulate consumers' impulsive purchases. The effect is more obvious when the promotion time is short and time pressure is high. By paying attention to and managing the factors that may cause consumer time pressure, online retailers can place information such as promotional deadlines in a more prominent position on the shopping page, which helps to promote consumers' purchases. Online retailers can adopt different strategies for different target groups. For consumers who are sensitive to the time of flash sale, the company should highlight the promotion deadline and the attractiveness of the product during online flash sales, while for consumers who are sensitive to product quality, the company should highlight the product pricing and the small negative impact of the product.

4. SUMMARY

This paper studies the pricing strategies of online retailers for different quality and different flash sale times under the online flash sale model. This paper finds that the flash sale time and product quality have different effects on the optimal price setting in online retail. For product quality, as the difference in product quality increases, the optimal product price of the enterprise also increases; for flash In terms of purchase time, as the difference in flash purchase time increases, the optimal product price of companies that produce high-quality products decreases, and the optimal price of companies that produce low-quality products increases. The optimal market share of online retailers is affected by differences in flash sale time, product quality and product costs. This paper suggests that online retailers can promote products when flash sales are short and time pressure is high to encourage consumers to buy products.

Promote consumer purchases through factors that may cause consumer time pressure. Issues worthy of in-depth study in the future include: the behavior-based pricing of companies in the online flash sale model and the unfair feelings that it may cause consumers. It is meaningful to consider the impact of consumer fairness concerns on companies' behavior-based pricing strategy choices.

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