

Research on Retailer's Ordering Decision Considering Customer's Discount Sensitivity

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Abstract

Under the stimulus of more and more frequent price discount promotions, many customers are becoming more and more sensitive to discounts. This article refers to these customers as discount-sensitive customers. Because this type of customer is sensitive to discounts, so in the case of retailers with high discount frequency, large discount range, low product pricing, etc., this type of customer's psychological expected value of the purchased product will be reduced, and the purchase will be made during the normal sales period of the product. Willingness will diminish. This kind of consumer psychology will greatly affect the retailer's ordering and pricing strategies, and it will also increase the difficulty for retailers to formulate sales strategies to a certain extent. This article considers the retailer's optimal ordering decision when a single retailer sells products with seasonal demand characteristics when there are discount-sensitive customers in the market.

Keywords

Strategic Customers; Discount Sensitivity; Ordering Decisions.

1. Introduction

In order to reduce inventory and increase profits, it has become the norm for retailers to promote sales through discounts and price reductions. In such an environment, customers are getting smarter and more strategic customers, and speculative behavior waiting for discounts is also intensifying, which has a serious impact. Profit of the retailer. In order to weaken the negative impact of strategic customers, scholars at home and abroad have studied the Decision-making optimization of retailers in different situations when facing strategic customers, especially in the study of effective pricing and ordering strategies for strategic customers. Guide, make it reduce the behavior of waiting for discounts, and buy products when they are sold at normal prices, in order to achieve the purpose of maximizing the profit of the retailer.

In real life, different customers have different sensitivities to the event of discounts. Some customers are not sensitive to discounts, and some customers are particularly sensitive to discounts, thinking that discounts are equivalent to not having money. Retailers need to consider the factor of customer discount sensitivity when predicting customer behavior to prevent failure of their own pricing strategy and inventory strategy. This article takes the customer's sensitivity to discounts as an entry point, based on the original strategy of customer behavior, analyzes the impact of customers' discount sensitivity on the retailer's pricing and ordering strategies, and makes the model more practical and reasonable for the retailer. The order quantity provides a reference basis.

2. Literature Review

2.1. Research on Ordering Decision

The basic model for studying the ordering decision problem of perishable products is the newsboy model. The newsboy model is a classic single-period, random demand ordering model, which aims to find the optimal order quantity of goods and maximize the expected return. The newsboy model can reflect many realities and has extremely important application value. It has been applied to many fields such as production, management, finance, and service.

In terms of the expansion of the decision variables of the newsboy model, some literature considers the newsboy model in which non-price strategies such as advertising investment affect demand. In actual production and business activities, in addition to price, advertising is another common strategy to stimulate demand. One of the main aspects of competition. Advertising has the function of information and persuasion. It provides customers with information about product existence, price, quality, etc., reduces customer search costs, guides and persuades customers, builds customer brand loyalty, and ultimately affects customer needs. Khouja [1] extended the newsboy model to the situation where advertising affects demand, assuming that demand is an increasing concave function of advertising investment, and studied the optimal advertising investment and ordering volume, and compared with the newsboy model that does not consider advertising investment as a decision variable. Make a comparison. Zhou Yongwu et al. [2] established a joint Decision-making model of advertising and ordering for a single retailer under uncertain demand by introducing advertising cost into expected demand, and proved that the optimal advertising investment under uncertain demand should be less than that under certain demand.

2.2. Research on Price Discount

The existing literature is mostly based on the supplier-retailer perspective in the supply chain, that is, the supplier gives the retailer a certain discount according to the retailer's order quantity to encourage the retailer to increase the order quantity and at the same time increase the supplier's supply quantity. The greater the retailer's order, the greater the discount rate provided by the supplier.

Chen Meixia et al. [3] studied and explored how manufacturing companies can use price discount strategies to promote sales companies to increase the number of orders in order to maximize profits, regardless of the cost of out-of-stocks under stable market demand. They found that price discount strategies can stimulate supply chain profit growth. Cai G et al. [4] evaluated the impact of price discount contracts and pricing schemes on the competition between dual-channel supply chains, and proved that a consistent discount pricing scheme can bring more profits to retailers and reduce channel conflicts.

It has become an effective marketing strategy for retailers to sell their products through discount promotion. Under the stimulation of price discount, customers are more and more sensitive to discount and become more and more rational. This has caused many scholars to study price discount from the perspective of retailer customer.

Monahan [5] proposed that retailers can attract more customers through personalized price discount promotion, to increase the order quantity of products and create more sales volume and profits for retailers. By comparing and analyzing the dynamic pricing strategy and price commitment strategy of online retailers, Li Juan et al. [6] found that the price commitment strategy is optimal in the case of online shopping, and obtained the optimal discount level of online retailers.

2.3. Research on Customer Strategic Behavior

2.3.1. Retailer's Pricing Decision Considering Customer's Strategic Behavior

The classic newsboy model usually assumes that customers are short-sighted customers. Such customers only consider their current utility. As long as their retention value is higher than the current price of the product, customers will buy the product immediately, and the effect of such customers on the retailer's sales profit is very small. The classic newsboy model does not consider other behaviors of customers. For example, some smart customers will choose to buy when the product is lowered in the future to obtain greater utility. This is a strategic customer. Such customers will compare the effects they have obtained in the current purchase and future purchase to make purchase decisions. Their purpose is to maximize their expected utility, and at the same time, such customers will make decisions the expected price of the product in the future and the possibility of purchasing the product will also be considered, which will have a significant impact on the retailer's earnings.

The existing domestic and foreign literature on customer strategic behavior mainly focuses on dynamic pricing. Besanko and Winston [7] introduced the utility discount factor to establish the intertemporal pricing problem of new products. They found that the demand of strategic customers for price elasticity is greater than that of short-sighted customers, and the initial pricing of products considering strategic customers is less than that only considering short-sighted customers. In addition, the numerical simulation shows that underestimating the strategic behavior of customers will damage the efficiency of enterprises. Su [8] discussed the influence of customer's strategic behavior on dynamic pricing decision when the future price of product freely rises or falls.

2.3.2. Retailer's Inventory Decision Considering Customer's Strategic Behavior

Product inventory is an important reference for enterprises to price products. Similarly, the order quantity has an important impact on the market demand of products. Especially in the face of strategic customers, reasonable and effective inventory control can increase the risk of customers losing the opportunity to buy because of blindly waiting for the discount price, so as to force customers to buy products as soon as possible, so as to increase the income of the enterprise. Therefore, it has become an important research topic to discuss how retailers reduce the negative impact of strategic customers through ordering decisions. Cachon and Swinney [9] studied the dynamic pricing and inventory decision under uncertain demand, and established a two cycle game model between retailers and customers. By analyzing and solving the model, they point out that when there are strategic customers in the market, retailers should control the initial inventory and take dynamic pricing decisions to maximize their profits. Liu Xiaofeng and Huang Pei found that manufacturers can increase the risk that customers can't buy products through appropriate inventory quantity, so as to reduce customers' waiting behavior.

2.3.3. Mitigation of the Negative Impact of Customer Strategic Behavior

Although customer strategic behavior is beneficial to customers themselves, it will force enterprises to continuously lower prices and reduce profits. At the same time, it will also lead to the decline of the quality of products and services, too much inventory of products cannot be sold, product supply and demand cannot match and other problems, which will reduce the overall social economic efficiency. Therefore, a large number of researches on strategic customers focus on how to alleviate or even eliminate their negative effects. In the existing literature, we mainly propose price commitment, quantity commitment, availability guarantee, flexibility policy, quick response and posterior price matching policy to alleviate and eliminate the negative impact of customer strategic behavior. Cachon and Swinney [9] studied the optimal discount price and initial order quantity of retailers when there are short-sighted, strategic and discount seeking customers in the market. They found that ignoring the strategic

behavior of customers will lead to the increase of retailer's order quantity, and it will also make the retailer have to provide greater discounts to clear the inventory during the discount period. In addition, they also proved that the quick response strategy is superior to the price commitment strategy. Chen Wen et al. [10] analyzed the relationship between product quality design and rapid response from two dimensions of customer type and ordering strategy.

3. Strategic Customer Behavior Model Considering Discount Sensitivity

Based on existing research, this chapter explores strategic customer behaviors sensitive to discounts and promotions through model research methods. In this study, all customers are strategic customers, and the strategic customers are divided into discount-sensitive strategic customers and ordinary strategic customers based on whether the customers are sensitive to discounts. The following newsboy model based on strategic customers assumes that a retailer sells a product in the market within a certain period (divided into two stages). In this section, the normal sales phase is defined as the first phase, and the discount clearance phase is defined as the second phase.

3.1. Model Description and Assumptions

This study considers a simple market model composed of a single retailer and customer groups. First, assume that customers are homogeneous (this assumption will be relaxed in the future), that is, all customers have discount-sensitive psychology, and they are all discount-sensitive strategic customers. On the one hand, they hope that they can buy products during the discounted clearance stage to obtain higher residual value; on the other hand, they believe that after purchasing the product in the normal sales stage, it is possible to buy the product at a lower price in the discounted clearance stage, Customers' sensitivity to discounts may reduce the value of their purchase experience during the normal sales phase. Therefore, customers' sensitivity to discounts will affect their choice of purchase time to a certain extent. This research is based on the assumption of rational expectations equilibrium.

3.1.1. Retailer's Decision-making Problem

Consider a retailer who orders a product of q before the beginning of the sales period, and then sells it through two stages. Suppose the order cost of a unit product is c , and the first stage price of the product is p . If the products are all sold out in the first stage, then customers will not buy the products in the second stage. If the product is not sold out in the first stage, the retailer will decide to carry out discount clearance to clear the inventory, and then enter the second stage. The discounted clearance price in the second stage is s , and it is assumed that $s < c$. At the same time, this article assumes that the retailer will announce the retail price p and the discount price s to the customer before the beginning of the sales period.

3.1.2. Customer's Decision Problem

After observing the retailer's pricing p and discounted price s , the strategic customer will value the product. It is assumed that the customer's valuation of the product is homogeneous, both of which are v . In addition, suppose that such customers do not know the inventory q of the product, so they are not sure whether they can buy the product in the second stage, and they expect the possibility that they can buy the product in the second stage. If the number of customers D is random and obeys the distribution F , the density function is f . Without loss of generality, assume that $s < c < v$.

3.2. Model Establishment and Analysis

Strategic customers will compare the residual effect of products purchased at different stages to choose the purchase period. If customers choose to buy products in the second stage, they

need to bear the risk of out of stock. For discount sensitive strategy customers, the more likely the products are out of stock, the less likely they are to expect to buy products in the second stage, and the lower their residual utility in the second stage, the more likely they are to buy products in the first stage. On the contrary, based on the sensitivity of customers to discount, if customers find that the discount frequency and discount range of products are very large, then customers' surplus utility of buying products in the first stage will be reduced, which will weaken their willingness to buy products in the first stage and urge them to wait until the second stage to buy products.

By solving and analyzing the model, the following conclusions can be obtained:

- (1) When customers are strategic customers with discount sensitivity, the retailer's optimal order quantity must be less than that in the classical newsboy model, no matter how the retailer's discount possibility and customer's discount sensitivity change.
- (2) When the discount probability is constant, the optimal order quantity decreases with the increase of discount sensitivity.
- (3) When the product must be discounted, the retailer's optimal order policy is less than the optimal order quantity under the newsboy model based on policy customers.
- (4) If the retailer must discount, but at the same time, the customer is not sensitive to discounts, the retailer's optimal order strategy is equivalent to the optimal order quantity under the classic strategic customer model.

4. Conclusion

Different customers have different sensitivities to the event of discounts. Some customers are not sensitive to discounts, and some customers are particularly sensitive to discounts, thinking that discounts are equivalent to not having money. Retailers need to consider the factor of customer discount sensitivity when predicting customer behavior to prevent failure of their own pricing strategy and inventory strategy. Therefore, this article considers the retailer's optimal ordering decision when a single retailer sells goods with seasonal demand characteristics when there are discount-sensitive customers in the market.

Firstly, this paper summarizes the current research status by studying the literature on Retailer's ordering decision, discount strategy and customer's strategic behavior. In the model building and solving part, through the study of the classic newsboy model and the newsboy model based on strategic customers, based on the strategic customer behavior model, taking discount sensitivity as the starting point of the model, this paper constructs a strategic customer behavior model considering customer discount sensitivity. Through the discussion of discount sensitivity, discount probability and other parameters, this paper analyzes the impact on Retailer's optimal order quantity and optimal pricing.

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