

Analysis of the "Prisoner's Dilemma" Model in the Application of Price-Matching Dilemma: Taking MeiTuan and Everything 30min as Example

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Abstract: One of the most well-known examples of game theory and a significant element of economic theory is The Prisoner's Dilemma. The Prisoner's Dilemma is one of the best instances of the conventional non-zero-sum game in game theory, which demonstrates that the group does not always represent the best option for individuals. When major brands and companies are engaged in competition, the Prisoner's Dilemma model is used to examine strategic choices and price setting. Everything 30min and MeiTuan, the two major participants in the takeaway market, would be excellent instances for using the Prisoner's Dilemma model. This paper analyzed the two companies in a similar prisoner's dilemma in the price war, how MeiTuan is a newcomer to the industry is how to break the everything 30min monopoly and enter the market with its share of the market. Finally, this paper integrated the dynamics of the price-matching war between the two big competitors with the prisoner's dilemma to come up with three suggestions. Additionally, these three suggestions can further help them out of the prisoner's dilemma like the price-matching war.

Keywords: Prisoner's Dilemma, price-matching dilemma, game theory

1. Introduction

With the trend of increasing competition in price, industries are constantly introducing new approaches to attract consumers and generate higher turnover. Therefore, major companies and brands have unique insights into the sale of their own products, whether it is continuous innovation to overcome technical difficulties or to promote the product concept so as to shape the personality of a part of the sales strategy, the seller has been in pursuit of low cost and high profitability to maximize profits. During this period, we combined the behavior of peers closely monitoring each other's price adjustment and making the best response plan with the prisoner's dilemma and found that the only way for companies to keep themselves in a healthy development stage is to choose mutually beneficial cooperation, while the behavior of price war in order to seize market share push both sides in a price dilemma [1].

2. The Price-matching War Conundrum

When sellers encounter price provocation, they need to analyze several situations. The first is to consider the other party's share of the market with their own, if rashly starting the endless price war, it will be easy for new manufacturers to take advantage and lead to the situation of two quarrel and a third profits. And in their own game model with the competition for the duopoly, the two are very easy to seize the market in order to play a fierce price war. But the comprehensive market characteristics and industry development prospects, in fact, more variables. Secondly, whether it is a large manufacturer or a small manufacturer, in the face of the price dilemma problem, there are two choices: the first one should be closely following another's price which means when there is a price reduction, they also reduce their own price to reach the equilibrium. Another is kept quiet, stick to the price bottom line and take advantage of higher quality products, better user experience to improve customer stickiness so as to fight the other side of the price. As a highly price-sensitive group, consumers are more likely to react to prices in a short period of time. Those consumers who have their own product preferences will not invest in another product as the price changes. The main reason for the price difference is that mutually reduction to alter the price of the Nash equilibrium does not allow them to obtain the maximum benefit, this phenomenon occurs due to the rational man assumption state that the manufacturer occupying a monopoly position in the market, in order to maximize their own interests must accompany a desire on remaining in a monopoly position as well as to prevent involvement from other manufacturers [1]. The manufacturers who want to enter the market strongly because of the good prospects of the industry make it profitable, and their own economic strength is enough to compete and use the price difference to attract target customers continuously [2].

3. Prisoner's Dilemma Model

The Prisoner's Dilemma model is a classic example of a non-zero-sum game in game theory, which states that a self-interested choice may not necessarily benefit the group as a whole. It comes from a real-life case in which two criminals are arrested and the police are unable to prosecute them because they have confirmed their guilt but are unable to find sufficient evidence to convict them [3]. Thus, the police took advantage of their inability to communicate with each other and develop a set of rewards and punishments which gain the purpose of encouraging the two criminals to betray each other at the same time to identify each other's crimes. If they both chose to confess, they were sentenced to six years each. If both remain silent, then due to lack of evidence can only be sentenced to two years each. If one of them exposes the other and the other remains silent and refuses to cooperate, the exposor will be released from prison immediately for merit, but the silent one will be sentenced to ten years for non-cooperation and overwhelming evidence. In this model, it is assumed that the two participants satisfy the basic principles of game theory- remain rational think. Because they do not confirm each other's behavioral considerations, and they both conclude that it is in their interest to confess [4,5]. If the prisoner's dilemma is introduced into the price war between enterprises, we need to consider that most of the vendors belong to the repetitive nature of the complete information game, both sides firmly control the price difference which is completely different than the closed information in prisoner's dilemma [6].

4. Prisoner's Dilemma Model Application Analysis

The Prisoner's Dilemma model can be used to apply and analyze the major participants in the food and beverage industry, such as MeiTuan and Everything 30min. They are two businesses that offer services for internet delivery. Both industries are in their infancy and share three fundamental traits. First off, despite the fact that their sector is still in its infancy and has promising growth potential,

they still need to create their own market because there is no established structure, and everything is created from scratch [1]. Second, because their markets and goods are similar, they are simpler to imitate and replace. Third, because their industry's costs and starting point are so low that they naturally create a monopoly, which means that when a portion of the business wishes to join, the monopoly situation will be readily destroyed [7]. But those monopolies also have a means of addressing their fatal flaws, which is the employment of price wars to keep new competitors away.

As a result, the addition of the MeiTuan takeaway will put pressure on its business as a former monopoly venture eager from rivalry with businesses of a similar nature. After opening a very competitive price war with MeiTuan, a young company with a robust economy, in order to capture the market and harvest more customers. The fact that these two significant businesses are engaged in a lose-lose price competition is eye-opening. In this price war, hunger had subsidized more than 3 billion yuan while the MeiTuan, a formidable upstart, had subsidized more than 4.2 billion [8].

Even though these two businesses have very strong foundations, a strong business against the price war's massive expenditures might be draining. Overall, the price conflict between Everything 30min and MeiTuan is comparable to the conundrum game of the prisoner's dilemma. They are in a prisoner's dilemma since they need to win over more hearts and minds in order to gain market share. The prisoner's dilemma price war between them can be expressed as shown in Table 1[9].

Table 1: The prisoner's dilemma of MeiTuan and Everything 30min.

		Everything 30min	
		Change price	Stick the price floor
MeiTuan	Change price	(3, 3)	(6, 1)
	Stick the price floor	(1, 6)	(5, 5)

In this game theory model, there are two options available to players when faced with price provocations from rivals, whether they are Everything 30min or MeiTuan. The first is price parity, or the agreement that if one side cuts prices, the other side must do the same. However, as demonstrated by the application of the prisoner's dilemma, which is equal to treachery, this will result in a decrease in their own net income [10]. The other is to maintain their price point, which entails offering superior customer service and product quality. Additionally, even if clients are aiming for better value for money, give them the impression that they are receiving it by selecting a better alternative. This choice is the equivalent of cooperation in a prisoner's dilemma, although it will lead to a lack of advantage in the competition. However, for most consumers, better service and user experience compared to a slightly lower price will make them more motivated. Over time, consumers will respond to this price. make them more motivated. Over time, consumers will respond to this price.

From this game model, this article can clearly see that when one side chooses to change the price and the other side chooses to stick to the price floor, the firm that chooses to change the price will benefit by 6, while the firm that sticks to the price floor will only gain 1. Therefore, as long as both parties are wise, they will not choose this strategy to capture the market share [9]. However, the Nash equilibrium only occurs when both Everything 30min and MeiTuan choose to stick to the price floor, when they both benefits. The Nash equilibrium only occurs when both Everything 30min and MeiTuan choose to change their prices, when they both benefits. Even though they are both in Nash equilibrium, it does not result in the greatest benefit for both. The reason this occurs is the assumption of rationality. It is well known that a monopoly in an industry must find ways to prevent other firms from entering to undermine its position in the industry. The companies that want

to enter the industry will see the prospect of monopolies and think that the industry is profitable and worth investing in, so they will enter the industry with a lot of money to get a share of the pie with the monopolies.

5. Suggestions

Based on the above analysis, the article makes a few suggestions as follows. The first is to provide a better user experience and improve the quality of products. To be honest, although price wars between companies may lower prices, companies will not lower prices significantly to ensure their profits, perhaps only a little. Most consumers do not care about reducing the price of that little bit; they prefer to enjoy the services brought by the enterprise and the value of its goods. So, even if they do not lower their prices, as long as there is a better user experience and high product quality, companies will not lose in the price war.

Second, the enterprise itself is technological innovation. Many companies have been using a set of technologies to make ends meet, and this is far from enough, because in the face of new technology from other companies, they are completely unable to cope. New technologies may reduce costs even further and prevent price wars from erupting when the cost is no greater burden.

Finally, it is enriching the characteristics of the product, which is also a very good way to avoid price wars such as the war of consumer companies. because consumers are more attracted by the characteristics of the product than by the price. Companies can beautify the product packaging and set up co-branded models to attract more user groups. You can also bundle sales to sell some unsold products and best-selling product combinations so that the enterprise's old inventory is sold out, so as to maximize the benefits of the enterprise.

6. Conclusion

In the context of the rapid rise of the e-commerce industry, MeiTuan and Everything 30 min, as two representative industry monopolists, own highly research value. E-commerce industry has the characteristics of rapid upgrading, and none cost investment trial which attracting a large number of entrepreneurs. The research motivation of this paper is to sort out the strategic responses of both sides in the price war and find how to generate different benefits and losses under separated choices. After taking MeiTuan and Everything in 30 min as examples to set up a basic game model and discuss the dilemma of the two sides in the price war to draw a conclusion that only when both sides stick to the bottom line of the price or raise the price at the same time can Nash equilibrium be formed lead to the optimal solution in the price dilemma. In addition, this paper also has many shortcomings. The first point is that the model of the paper is too simple, only using MeiTuan and everything 30min to set up a most basic prisoner's dilemma model. This model, which evaluates solely how MeiTuan and everything 30min can enter the market and gain market share in the prisoner's dilemma in the face of an industry monopoly like Everything 30min, is a static model with complete information. In the future, we consider how new vendors are financing monopoly interference as it pertains to the dynamic game between MeiTuan and Everything 30min. Finally, according to the repeated game of the two to find out the Nash equilibrium to help them out of this prisoner's dilemma like the price-matching war. This paper provides businesses with better market competition ideas and a deeper understanding of the price dilemma.

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