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ОЮНДАР ТЕОРИЯСЫНЫН НЕГИЗИНДЕГИ ЭЛЕКТРОНДУК СООДА БААЛАРЫНЫН СОГУШТАРЫНЫН ТАЛДООСУ: КЫТАЙ T-MALL ЖАНА JD.COM МИСАЛДАРЫНДА

Аннотация. Бул макала T-mall жана JD.com, кытайдын эки алдыңкы платформаларынын ортосундагы атаандаштык динамикасына көңүл буруп, электрондук коммерция тармагындагы баа согуштарынын феноменин изилдейт. Оюн теориясын колдонуу менен, изилдөө "Double Eleven" сыяктуу жарнамалык иш-чаралар учурунда дуополиялык баа атаандаштыгын талдайт. Ал мындай баа согуштары көбүнчө туткундардын дилеммасына алып келерин аныктайт, мында эки компания тең жеке кирешелерди максимумдаштыруу үчүн бааларды төмөндөтөт, натыйжада кирешенин азайышы жана рыноктун потенциалдуу бузулушуна алып келет. Макалада каардуу баа согуштарын басаңдатуу үчүн эки стратегия сунушталат: корпоративдик көңүлдүү кирешеден пайдага которуу жана оюн түзүмүн өзгөртүү үчүн жөнгө салуучу органдарды тартуу. Ал андан ары "биринчи кезектеги артыкчылыгын" жана баалар согушунун ишканаларга, керектөөчүлөргө жана социалдык-экономикалык өнүгүүгө кеңири таасирин изилдейт. Изилдөө каршы чараларды сунуштайт, анын ичинде технологиялык инновациялар аркылуу чыгымдарды азайтуу, стратегиялык баа түзүү альянсы жана сергек атаандаштыкты жана рыноктун туруктуу өсүшүн камсыз кылуу үчүн күчөтүлгөн ченемдик базалар.

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АНАЛИЗ ЦЕНОВЫХ ВОЙН В ЭЛЕКТРОННОЙ ТОРГОВЛЕ С ТОЧКИ ЗРЕНИЯ ТЕОРИИ ИГР: НА ПРИМЕРЕ КИТАЙСКИХ T-MALL И JD.COM

Аннотация. В этой статье рассматривается феномен ценовых войн в индустрии электронной коммерции, с упором на конкурентную динамику между T-mall и JD.com, двумя ведущими платформами в Китае. Используя теорию игр, в исследовании анализируется дуополия ценовой конкуренции во время рекламных мероприятий, таких как «Double Eleven». В нем установлено, что такие ценовые войны часто приводят к дилемме заключенного, когда обе компании снижают цены, чтобы максимизировать индивидуальную выгоду, что приводит к уменьшению прибыли и потенциальным сбоям на рынке. В статье предлагаются две стратегии смягчения жестоких ценовых войн: смещение корпоративного фокуса с доходов на прибыль и привлечение регулирующих органов для изменения структуры игры. В нем далее исследуется «преимущество первопроходца» и более широкое влияние ценовых войн на предприятия, потребителей и социально-экономическое развитие. В исследовании предлагаются контрмеры, включая снижение затрат за счет технологических инноваций, стратегических ценовых альянсов и улучшенных нормативных рамок для содействия здоровой конкуренции и устойчивому росту рынка.

Ключевые слова: ценовые войны, электронная коммерция, теория игр, дилемма заключенного, дуополистическая конкуренция.

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ANALYSIS OF E-COMMERCE PRICE WARS FROM A GAME THEORY PERSPECTIVE: TAKING CHINESE T-MALL AND JD.COM AS EXAMPLES

Abstract. This article examines the phenomenon of price wars in the e-commerce industry, focusing on the competitive dynamics between T-mall and JD.com, two leading platforms in China. By employing game theory, the study analyzes the duopoly price competition during promotional events like "Double Eleven." It establishes that such price wars often lead to a prisoner's dilemma, where both companies reduce prices to maximize individual gains, resulting in diminished profits and potential market disruptions. The article proposes two strategies to mitigate vicious price wars: shifting corporate focus from revenue to profit and involving regulatory authorities to alter the game structure. It further explores the "first-mover advantage" and the broader impacts of price wars on enterprises, consumers, and socio-economic development. The study suggests countermeasures, including cost reduction through technological innovation, strategic pricing alliances, and enhanced regulatory frameworks to foster healthy competition and sustainable market growth.

Keywords: price wars, e-commerce, game theory, prisoner's dilemma, duopolistic competition.

INTRODUCTION. Price war generally refers to a commercial competition behavior among enterprises in which they compete to lower the market price of goods, with the purpose of suppressing competitors, grabbing market share, digesting inventory, etc. This behavior can reduce inventory and promote enterprises to improve efficiency in the short term, but in the long term, it will reduce corporate profits, increase corporate costs, and reduce product quality. In recent years, with the rapid development of the Internet, many e-commerce companies have risen rapidly, including Taobao, JD.com and T-mall.com. These e-commerce companies are in fierce competition, and price wars often break out in order to compete for the market. As early as 2012, JD.com CEO Liu Qiangdong announced through Weibo that all large home appliances on JD.com will maintain zero gross profit in the next three years and "guarantee to be at least 10% cheaper than Gome T-mall chain stores." This statement immediately attracted a counterattack from competitors. T-mall.com announced through its Weibo that the prices of all products, including home appliances, must be lower than those of JD.com, and an e-commerce price war kicked off. In addition, every year on Double Eleven, these e-commerce companies will attract consumers by reducing prices and promoting sales. A reasonable price war can help stimulate the development of enterprises, but the negative impact of a vicious price war will be immeasurable, and e-commerce giants T-mall and JD.com will be the first to bear the brunt of it. Fighting for the market through price wars will put JD.com and T-mall into a prisoner's dilemma, causing huge losses to the profits of enterprises and industries. Regardless of whether JD.com or T-mall wins in the end, the situation of both parties will be worse than before the price war. Such a vicious price war is not beneficial to the entire industry. This article attempts to establish a game model, taking the price war between T-mall and JD.com on "Double Eleven" as an example, to

construct a duopoly price competition game model for analysis and find the possibility of a win-win situation for both parties.

1. CASE INTRODUCTION

T-mall and JD.com are the two largest e-commerce platforms in my country. In 2019, they accounted for 74.6% of the B2C online transaction share and are two oligopolistic companies in the e-commerce market. T-mall and JD.com have created online promotion day activities by learning from the online shopping Monday of e-commerce platforms such as Amazon and eBay, and have successively created e-commerce exclusive promotion festivals such as "Double 11" and "618". These festivals have become an important means for e-commerce platforms to impact sales. The promotion strategies of the two e-commerce platforms will seriously affect each other's sales and market share, which has led to the competition phenomenon of JD.com's lower prices on Double 11. In fact, this is a game of succession. JD.com can copy Taobao's promotion methods and launch a brutal competition, but the facts are not that simple.

Specifically, T-mall adopts the price reduction strategy of subsidies, pre-sales (deposit + final payment), timeline and hot sale. The purpose of setting subsidies, pre-orders and timelines is to capture users in advance, create a consumption atmosphere, and increase sales on the promotion day; "hot sale" is to maintain the exposure rate of the previous one. During the "618" period, in order to block JD.com, T-mall adopted the "two-choice one-size-fits-all" strategy, that is, brands that exclusively supply T-mall are more likely to obtain free advertising space on the event page. It can be expected that this behavior suppressed market sales for a period of time before the festival. This prompted JD.com to launch a strategy to fight back, by urgently contacting merchants and making strategic deployments, such as:

1. Product adjustment. Products must be listed on JD.com and T-mall at the same time, including T-mall exclusives. If they cannot be listed simultaneously, at least they must be AB models. JD.com will not give any advertising space to brands that do well in T-mall pre-sales, limiting exposure traffic.
2. Reduce prices of advantageous categories. JD.com's flagship products come with free gifts to lower prices (e.g. JD.com's electrical appliances).

2. Problem Analysis

2.1. Analysis of Duopoly Price Competition

Through the analysis of the above problems, we will establish a game theory model with the price war problem between JD.com and T-mall (as shown in the following table 1). When both JD.com and T-mall do not reduce prices, both parties can obtain a profit of 20 million yuan; when both JD.com and T-mall choose to reduce prices, both parties can obtain a profit of 6 million yuan; when one party chooses to reduce prices and the other party chooses not to reduce prices, the party that reduces prices can obtain 12 million yuan, and the party that does not reduce prices can obtain a profit of 3 million yuan. At this time, we assume that JD.com reduces prices. If T-mall does not reduce prices, JD.com can obtain 12 million yuan, while T-mall can only obtain 3 million yuan. If T-mall chooses to reduce prices, it can obtain 6 million yuan, so T-mall will choose to reduce prices at this time. If JD.com does not reduce prices, T-mall can obtain 12 million yuan by reducing prices at this time, and can only

obtain 10 million yuan by not reducing prices, so T-mall's choice at this time will also be to reduce prices. Similarly, JD.com also has this idea, so there will be two companies reducing prices one after another, and at this time it is trapped in the "prisoner's dilemma" in the game theory problem.

Table 1. Game theory model of the price war between JD.com and Tmall.

		JD.com	
		No price reduction	Price reduction
T-mall	No price reduction	A =2000,A=2000	B = 300 , C = 1200
	Price reduction	C = 1200, B = 300	D =600,D=600

At this time, the result of the game is that JD.com and T-mall have reached the Nash equilibrium, that is, both parties choose to lower prices. From Table 1, we can see that if both JD.com and T-mall choose not to lower prices, they can both get 20 million yuan, but when both parties lower prices, they can only get 6 million yuan each. The conclusion drawn from the chart is that both JD.com and T-mall should choose not to lower prices, but the reality is that in order to maximize economic benefits and see the losses that they may suffer when the other party lowers prices but they do not, JD.com and T-mall will eventually choose to lower prices. Individual rationality leads to collective irrationality, which also reaches the Nash equilibrium of this game. Even if we can conclude from the perspective of industry profit maximization that both parties do not lower prices, the industry profit will be maximized, but (no price reduction, no price reduction) is not the Nash equilibrium of this game, so both parties will eventually choose (price reduction, price reduction).

2.2. Establish a game model to avoid vicious price wars

According to the game model established in Table 1, as long as: (1) C>A>D>B; (2) A>(C+B)/2, the best options for JD.com and T-mall are (lower prices, lower prices). At this time, they are caught in a prisoner's dilemma, and as prices continue to fall, it will turn into a vicious price war. In order to avoid a vicious price war, we established a new game model to destroy the above two conditions and thus change the structure of the game. At this time, our options are: (1) JD.com and T-mall both actively choose to change; (2) regulatory authorities join in to change the game structure.

2.2.1. JD.com and T-mall changed their measurement indicators from revenue to profit.

When JD.com and T-mall use profit as a measurement indicator, the above conditions are no longer met. Assuming that JD.com and T-mall both choose not to reduce prices, the profit margin is 50%, and when both choose to reduce prices, the profit margin becomes 30%. At this time, the following table 2 will be obtained.

Table 2. Game theory model after JD.com and Tmall's price cuts.

		JD.com	
		No price reduction	Price reduction
T-mall	No price reduction	A '=500,A'=500	B '=150,C'=360
	Price reduction	C '=360,B'=150	D '=180,D'=180

After taking profit as the measurement indicator, the price of JD.com and T-mall is (500, 500) if they do not reduce the price; (180, 180) if both parties choose to reduce the price; (360, 150) if one party does not reduce the price and the other party reduces the price. At this time, we assume that JD.com does not reduce the price. If T-mall does not reduce the price, it can obtain a profit of 5 million yuan. If T-mall chooses to reduce the price, it can obtain a profit of 1.5 million yuan, so T-mall will choose not to reduce the price. Assuming that T-mall does not reduce the price, if JD.com does not reduce the price either, it can obtain a profit of 5 million yuan. If JD.com chooses to reduce the price, it can obtain a profit of 1.5 million yuan, so JD.com will choose not to reduce the price. Assuming that JD.com reduces the price, T-mall will eventually choose to reduce the price in order to obtain more profits. So in this case, there are two pure strategy Nash equilibria, namely (no price reduction, no price reduction) and (price reduction, price reduction). However, further analysis is needed to determine which method JD.com and T-mall will choose. The main purpose here is to prove that this method has produced a second Nash equilibrium, that is, JD.com and T-mall have the opportunity to choose another method to avoid a vicious price war.

2.2.2. Participation of regulatory authorities.

Now let's analyze the impact of the participation of regulatory authorities (as shown in the following table). At this time, the regulatory authorities have two choices: regulation and no regulation. If JD.com and T-mall reduce their prices, they can obtain a profit of F if no regulation is carried out. If regulation is carried out, JD.com and T-mall will lose E. If the regulatory authorities do not regulate, JD.com and T-mall do not reduce their prices, and they will obtain a profit of H. If JD.com and T-mall choose to reduce their prices, and the regulatory authorities do not strictly regulate, they will lose G. If JD.com and T-mall do not reduce their prices maliciously, and the regulatory authorities also do their best, then there will be no merit or demerit. As can be seen from the table below, there is no effective Nash equilibrium in this game model, so careful regulation can avoid price wars for a certain period of time, but if it is not due diligence, it cannot eradicate price wars. If the regulatory authorities are to perform due diligence supervision all the time, it is necessary to make the loss of the e-commerce platform in price wars caused by the regulatory authorities not regulating be greater than the benefit of the e-commerce platform not reducing prices, that is, G>H. In this case, price wars can be effectively avoided, allowing the two e-commerce companies to engage in stable collusion.

Tabel 3. Game theory model of JD.com and Tmall after regulators join in.

Firm name	Choice	Regulatory agencies	
		control	No regulation
JD.com T-mall	Price reduction	- E,0	F ,-G
	No price reduction	0 ,0	0 ,H

The above article studies the game model of price wars, and through analysis, it is found that price wars belong to the "prisoner's dilemma" problem in the game method. In order to solve this dilemma, that is, to avoid the occurrence of vicious price wars, the above article mentioned two game models, namely the changes in JD.com and T-mall's own measurement indicators and the participation of external regulatory agencies. These two different situations can avoid the occurrence of price wars to

a certain extent, and we analyzed the effectiveness of these two methods. The method is mainly to make the unique Nash equilibrium non-unique or non-existent, so that the inevitable conditions for the occurrence of price wars will be eliminated, although these two methods cannot absolutely solve the problem of price wars, or require the effective implementation of external forces to solve the problem of price wars in the short term. But this is an attempt to solve the problem of price wars, and we still need unremitting research to obtain more effective methods.

2.2.3. The "first - mover advantage" problem

In theory, the party that starts a price war first often has certain advantages in the subsequent game. In the case of T-mall and JD.com, T-mall was the first to launch the event during the Double Eleven promotion, and this is also reflected in the real data. So, can we assume that it is precisely because of T-mall's "first-mover advantage" that it has taken the lead? If not, why?

For the platform, the more merchants participate, the richer the products will be, the better the consumer experience will be, and one-stop shopping can also bring considerable transaction volume. According to data, there are more than 100,000 merchants participating in T-mall's Double Eleven event in 2020, while the number of JD merchants participating is about 70,000. Moreover, JD's strength has always been digital home appliances, and it has a clear disadvantage in clothing. Therefore, T-mall has a clear advantage in the richness of product variety. In terms of users, data shows that in January 2021, the number of active users of Taobao was 452 million, and the number of active users of JD was 199 million, and T-mall also had an advantage in the number of active users. Therefore, the Double Eleven promotion was initiated by T-mall, but it is slightly better than JD in terms of the platform's own conditions. This also proves the reason why the benefit assignments of the two parties in the game are different in the above-mentioned prisoner's dilemma model.

2.3. Impact of price war

2.3.1 Impact on Enterprises

Rational price wars reduce the normal profits of commodities but increase the transaction volume of online shopping platforms, bringing higher profits to online shopping platforms. The influx of consumers into the e-commerce market also increases the popularity of online shopping platforms, but the offline retail industry suffers losses due to the loss of some consumers. However, excessive price wars will reduce the quality of enterprises' products, and in the long run, they will lead to zero or negative profits for enterprises, disrupting the market order.

2.3.2. Impact on consumers

A rational price war can make consumers feel that the price is favorable while the product quality is guaranteed and the service is comprehensive and reliable, which can increase the competitiveness of enterprises. However, an extreme price war will have an adverse impact on consumers. Too low product costs will reduce product quality, service quality, and logistics delivery delays, thereby reduce the welfare level of consumers and damage their interests.

2.3.3. Driving the development of surrounding industries

The main way to gain an advantage in a price war is to stimulate demand and increase consumption, so as to further expand market share. To this end, the two companies have been constantly improving

the Internet shopping industry chain. In terms of consumer credit, Alibaba launched Huabei and JD launched Baitiao; in terms of investment, Alibaba launched Yu'ebao and JD launched JD Finance; in terms of logistics, Alibaba launched Cainiao Station and JD launched JD Logistics. In addition, various express delivery companies are also constantly developing to adapt to the logistics of the surge in order volume.

2.3.4. Impact on social and economic development

Data shows that in 2020, the cumulative transaction volume of T-mall and JD.com during the 618 period was 698.2 billion yuan and 269.2 billion yuan respectively. These data fully reflect the consumption capacity of Chinese residents. The development of a rational price war has also greatly promoted the effective demand of consumers. The sale of a large number of goods is of great significance to the stimulation of production in my country and the current de-capacity. Extreme price wars will reduce the profits of merchants, reduce the speed and quality of product updates, and are not conducive to social progress. It will reduce the innovation awareness of enterprises and lead to weak growth of enterprises and even the national economy.

3. Countermeasures and Suggestions

3.1. Reduce costs and establish a reasonable corporate management philosophy

Technological innovation is the key to reducing costs. Reducing unnecessary costs can increase corporate profits and increase investment in product innovation and service innovation. Providing differentiated products and services can effectively avoid homogeneous competition. Most consumers will learn about product details and check buyer reviews before purchasing a product. High-quality sales services will encourage consumers to buy products. Reducing costs requires technological innovation and reducing the cost of various activities. Vicious price competition will only benefit in the short term and cause greater losses in the long term. Long-term profitability requires e-commerce companies to improve their technological innovation capabilities and reduce unnecessary costs. Correctly view the necessity and rationality of input-output, strengthen cost accounting, and strengthen process management. In order to improve the competitiveness of enterprises, strengthen the humanized management and credit guarantee of enterprises, grasp the leading role in the game between e-commerce and customers, strengthen the sense of responsibility, ensure product quality and logistics speed, improve the after-sales service system, and truly improve the information management system.

3.2. Develop an effective pricing strategy

JD International has been running promotions for many years, offering a 100 RMB discount on purchases over 199 RMB. The unit price of most products is twice the usual price. If you buy them in combination, they will be cheaper than usual. This is equivalent to a relatively free bundled sale. Consumers get the desired combination, and the platform also gets more profit. T-mall is more inclined to the principle of more purchases and more gifts. This strategy limits prices to a controllable range and does not affect products that are not involved in the promotion. Consumers and merchants are very inclined to these two sales models.

When neither e-commerce company adopts a price reduction strategy, the total revenue and individual

revenue are higher than when both e-commerce companies adopt a price reduction strategy. Therefore, e-commerce companies should establish a price strategy alliance and focus on R&D, marketing, and expanding new consumer groups. Implement differentiated marketing, establish a complete after-sales service system, improve after-sales service quality and logistics speed, thereby increasing the market share of e-commerce companies, encouraging e-commerce companies to seek innovation in business models, vigorously implement technological innovation, and promote healthy competition among e-commerce companies.

3.3. Improve relevant systems

We should further promote the enforcement of anti-monopoly and anti-unfair competition laws, strengthen supervision of malicious subsidies and low-price dumping by enterprises to seize market share, and various e-commerce platforms should form strategic alliances to complement each other's strengths and maintain a healthy and fair market environment. Unfair and unreasonable price wars not only disrupt the normal market order, but also greatly reduce the level of social welfare and affect fiscal revenue and tax levels. The public regulatory game analysis of e-commerce price competition shows that when the regulatory penalty is greater than the difference between the additional benefits obtained by enterprises from lowering prices and the actual losses, there will be no bad price reduction behavior among enterprises. Therefore, the price competition of e-commerce requires the intervention and involvement of public management agencies, the establishment of a strong supervision mechanism, the strengthening of the implementation of relevant laws and regulations, the continuous supervision of corporate behavior, and the establishment and improvement of public supervision mechanisms to maintain healthy market price competition and curb vicious price competition from disrupting market order.

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