The Current Game Between Takeaway Platforms

Yucheng Chen[1,†],Yuxin Gao[2,*,†], Xinrun Xue[3,†], Jialin Yin[4,†]

[1]Jingying Middle School, Tianjin, China

[2] Department of IBDP, Macdaffie Bilingual, Shanghai, China

[3] Beijing New Oriental Yangzhou Foreign Languages, Yangzhou, China

[4] The Potter's School, Springfield, Virginia, 22153, the United States

[†]These authors contributed equally.

*23yuxin.g@gwa.edu.sg

Abstract. Online food delivery has become a central part of the current tertiary industry. While many products provide people with many conveniences, there is also a massive market in the industry, from the perspective of game theory, based on the principle of competition and cooperation to discuss the current competition pattern in the takeout field. The Prisoner's dilemma and price war dynamic models are used to analyze the game between takeout enterprises. The results show that the profit of Meitnerium takeout and ELEME takeout when they cooperate on the competitive platform is always higher than the profit of the former two when they are in vicious competition. Therefore, they adopted a new method, Elem Takeout, and Meitnerium adjusted their pricing to win the game; In the future, in the field of food delivery, the most reasonable game mode between oligarchs will be a competitive game with the coexistence of competition and cooperation rather than a zero-sum game.

Keywords: Food delivery, Game theory, Competitive pathway.

1. Introduction

1.1 Research Background

With the rapid development of the Internet, many industries in China have begun to apply the technology of the Internet to their business operations, especially online food delivery businesses. Due to its vast market potential, many investment entities have entered this new industry: the online food delivery system. The online food delivery platform provides an online sales market for brick-and-mortar food stores and broadens the marketing channels.

Food delivery platform companies use their platforms to attract buyers and sellers, making profits by charging sellers a specific commission. China's online food delivery platforms mainly include Meitnerium, Ale, and Baidu. Competition among these platforms is fierce, especially between Ale and Meitnerium. In order to gain more market share, food delivery platform companies use various competitive strategies, such as actively exploring the food delivery market in third- and fourth-tier cities, expanding the takeout consumption period from the double peak period of lunch and dinner to the full-time period, broadening the range of goods, and delivering non-meal products, such as desserts, beverages, daily necessities, fresh vegetables, and the like [1]. In 2020, Meitnerium captured 69% of China's food delivery market, 5% greater than in 2019. Elem only has 26% of the market share, just the same as in 2019. Platforms like Baidu Takeaway only account for 4% of the Chinese takeaway market [2]. Although platforms have different market shares, they operate with one primary common purpose: maximizing their interests. While having the same goal, all platforms can cooperate with or compete against each other to achieve the goal. Subsequent paragraphs, however, are indented.

1.2 Literature Review

In terms of foreign takeout studies, many scholars have conducted some studies. Li Jiangxi (2020) proposed that, based on the Internet and the epidemic situation, investment in Africa and the development of takeout mode in their restaurants not only improve food safety but also create value

and significantly improve the local competitiveness of stores [3]. Along with the development of the era, competition between delivery platforms is becoming bigger and bigger, the competition between platforms; many scholars conducted some research Rao Haiqing (2016) by constructing a game model to study the concurrence relationship between delivery platforms can establish between platform alliance was proposed more personalized service, to achieve win-win business model [4]. Zheng Want eng (2015) proposed by studying the competition between food delivery platforms that the actual situation of the field or problem should be considered when studying a particular type of practical problem [5]. Do more Research into the reality of these platforms. By studying the relationship between the prices of e-commerce enterprises, Kong Yaqui (2021) proposed that, as a monopoly manufacturer, to maximize its interests, it must always want to stay in the monopoly position and prevent the entry of other manufacturers [6]. The one who wants to enter the market will choose to enter the market aggressively because the industry is profitable and the economy is strong. Many scholars have conducted Research on the development status of the takeout industry. Zhang Zhixiang (2017) investigated the development status and supervision of various takeout platforms and proposed strengthening the threshold requirements of O2O platforms, rejecting vicious price competition from merchants, improving supervision equipment, and supplementing complete food information [7]. Moreover, through the game of takeaway merchants, construction site tragedy proposed strengthening the supervision to produce qualified takeaway. Song Ya (2020) proposed building an effective model to build a profit model for the takeout platform by studying the pricing of a takeout network broadcast to see how to determine the equilibrium price under profit maximization [8].

1.3 Research Significance

The food delivery platform has developed and is deeply loved by consumers and has also been recognized by significant Internet giants, venture capital, and the industry. However, with the rapid development of the food delivery industry, many problems have also arisen [9]. All major platforms open the door to the takeaway market with low-price strategies. In order to preserve market share, the original platform had to fight a price war. The party with insufficient funds could only be acquired by a large platform or squeezed out of the industry. Even companies that are evenly matched will lose both in the end. From the industry's perspective, the value-added has not been realized, so the Research on the competitive strategy of the food delivery platform is of great significance to the development of its industry. This article is a research on the competition strategy of food delivery platforms, analyzes the current industry development status, macro environment, and competitive environment, and puts forward some suggestions based on this, hoping to help the healthy competition of food delivery platform operators. Presently, domestic and foreign scholars have little Research on the competitive behavior of food delivery platforms. The food delivery industry is developing rapidly and has fantastic potential. Therefore, an in-depth analysis of this industry is necessary and significant.

2. The Static Game of the Price War Between Meitnerium and Elem

2.1 Features of The Game Process

Based on the Analysis of game theory, the game process of the price war between Meitnerium and Elements has the following characteristics:

(1) Information completeness is a game in which both participants of the game have accurate information on the characteristics, strategy sets, and benefits functions of all other participants. Both sides of the game, Meitnerium and Ale. We have a particular person to follow up on each other's product quotations, so the two sides know each other's product prices and information.

(2) The game process belongs to a static game. Both sides of the game make decisions simultaneously, or the decision-making has a sequence, but the latter side does not know what action the first participant took.

(3) Similar products with minor differences in the brand, quality, and packaging of different foods allow them to be substituted, but they are not entirely substituted. Moreover, since both platforms have their preferred users, they are not entirely substituted.

2.2 Static Game of Price War

Based on the Analysis of the above points, a prisoner's dilemma model is established. The premise of the Prisoner's dilemma is that "prisoners" cannot establish effective trust, and they will make a beneficial choice before making a decision. The choice structure of both parties depends not only on the choice of individuals but also on the other party's choice. Even if the result of choice is the best, the individual result is not the same as the expected result—the game between Meitnerium and Ale. on the price war fits this assumption. Assign values to the benefits of both sides of the game, and set Meitnerium and Elem as game participant 1 and game participant 2, respectively. The game model is shown in Model Table 1.

Table 1. Meitnerium and Ale. Em's Prisoner's Dilemma Model

		Ale. my	
		Lower Price	Price Stays same
Meitnerium	Lower Price	（10，10）	（15，3）
	Price Stays Same	（3，15）	（18，18）

When both players do not cut the price, Meitnerium and Elem have a payoff of 18. On the other hand, when both players lower the price, Meitnerium and Elementary 10 payoffs. When Meitnerium chooses to lower the price while Elem chooses not to cut its price, Meituan’s payoff is 15, and ElEME's payoff is 3. Similarly, when Meitnerium does not cut its prices but Ale. lowers prices, Meituan's payoff is 3, and ElEME’s payoff is 15.

When encountering the opponent’s price challenge, Meituan and ElEME have two choices: if the other party reduces the price, it can also reduce its price. However, this will reduce their payoffs, and this choice is equivalent to the betrayal in the Prisoner's dilemma. The other option is to stick to the bottom line of its price and not change its price. Bettering customers' experience with the food delivery platforms and improving the quality and value of the goods is equivalent to cooperation in the Prisoner's dilemma. However, this action will cause the company to be at a competitive disadvantage because consumers value the product's price more than other aspects and will respond quickly.

During the first round of the game, both Meituan and ElEMEwill lower their price to maximize their profit, and the payoff matrix has (15,3), (3,15), and (10,10). However, it does not contain (18,18), which shows that two sides of the delivery platform belong to a non-cooperative game when the price reduction game is played. In the case of this non-cooperative game, no matter what strategy the players adopt, the highest profits of any party cannot be maximized.

If the game repeats in the second round of the game and subsequent games, both participants, considering maximizing their profits and the long-term benefits, will not change their price, not lowering the price. However, Nash equilibrium can only be achieved when both Meituan and Ele. Lowering their price allows them to obtain ten payoffs, but this does not enable both sides to obtain the highest payoff.

3. The Dynamic Game Between the Two Platforms

Figure 1 shows the price game between Meituan and ElEME, with Meituan facing two choices: to unify or lower the price. When Meituan chooses to unify its price, ElEME will also face the choice of unifying or lowering its price. When new manufacturers choose to lower the price, ElEME is also faced with the choice of uniform price or lower price according to Meituan's choice. Suppose that the actions of both players are simultaneous. In other words, neither knows what the other is going to do until they make a decision. In the sequential game, the platform that acts first will think in the shoes of its competitors and predict their actions. They predict their competitors' motivation and best response, how they will act in the future, and then use backward induction to figure out their own

best response. At this point, considering the preferences of consumers, although the vast majority of consumers of Meituan and Ele. I am an office worker and a student, and they are sensitive to prices. These people who change their preferences for products due to price changes are called "novelty-seeking psychology ."However, in addition to these price-sensitive consumers, some will stick to their original preferences for some reason, and their preferences will not follow the price. This is shown in Figure 2. When Meituan chooses to invest, if ElEME also uses the investment method to resist Meituan's entry, both parties will get the same income because both of them have invested a large amount of capital and cost, so even if they gain, their income will be small, when Meituan chooses to invest and enter, Ele.

Because of price advantage, Meituan grab a lot of market share. However, because Ele. me did not choose financing resistance, Meituan took advantage of consumer psychology to seize a lot of market share, and Ele. me will lose some consumers. When Meituan chooses not to invest in the market, if ElEME uses investment to resist the entry of Meituan, because the dynamic game between the two platforms use Meituan has just entered the market, a small number of consumers will choose Meituan out of a trial mentality. In contrast, most consumers will choose ElEME because of the price factor. If Meituan chooses non-investment entry, ElEME chooses peaceful coexistence because both choose peaceful coexistence without a price war, their costs will be significantly reduced, and both will get the same income. So for Ele. According to the principle of profit maximization, Meituan will choose the strategy of peaceful coexistence without investment; It is an optimal strategy for both, and it is a Nash equilibrium for both. However, since Meituan wants to enter the market, and the other party is bound to resist maintaining its market share, it is not easy to achieve Nash equilibrium.

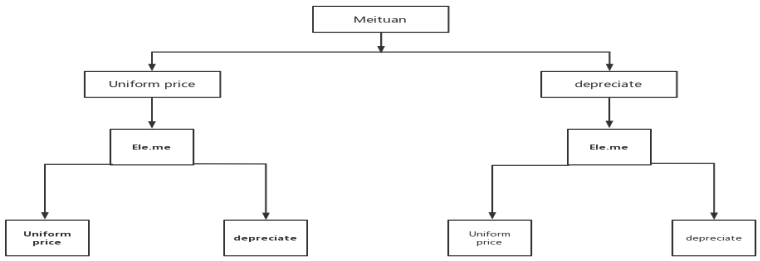

Fig. 1. The price game between the two platforms
(Photo credit: Original)

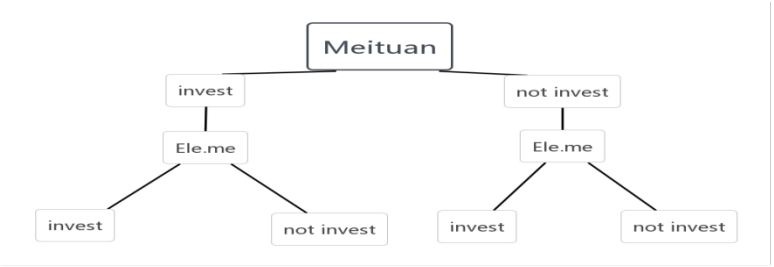

Fig. 2. Dynamic game between two platforms
(Photo credit: Original)

4. Suggestions

4.1 Develop a Differentiation Strategy

Since the business products of the major food delivery platforms are similar, it is necessary to withdraw from the current "price war" in time, formulate a differentiation strategy, and conduct indirect competition with competitors through service differentiation. The underlying logic of takeout is efficiency. The production method can be industrialized, but the operation method must return to its originality and focus on service [10]. There are three ways for takeaways to interact with customers: one is to transmit information through products, the other is to leave a message in the store's

evaluation, and the third is to communicate by telephone when encountering problems. Serve users well and reduce the rate of bad reviews, which can drive repurchase and enhance brand sense. Improve customer satisfaction by improving service levels, gaining customer recognition, increasing repurchase rate, and achieving differentiation from competitors. Under market competition, only a standardized price, credit, and service system can deliver customer satisfaction.

4.2 Establish Strategic Alliances For Mutual Cooperation, Shared Benefits, and Shared Risks

Due to the high cost of building food delivery platforms, major food delivery platforms can establish alliances through co-construction and sharing to alleviate their respective competitive pressures and maintain the coexistence of overall interests. Shared delivery is an innovative model of instant delivery. The shared delivery platform is an information platform that connects the shared delivery staff and the service demand. The shared delivery staff in the alliance will transform the delivery work delivered to company employees or institutions into a group where individuals undertake the demand for delivery services in a free and voluntary form. However, co-construction and sharing will involve various interests, and the specific operation content is very complicated. Therefore, realizing co-construction and sharing is a long process, and it is necessary to continuously improve the system and process among various platforms and constantly improve the working mechanism. Carry out joint construction and sharing work.

4.3 Customize Some Joint Marketing Activities

While food delivery platforms are competing, they must consider the impact of new entrants caused by the integration of the food delivery industry and the Internet, prompting the existing food delivery platforms to re-examine the importance of cooperation, thus prompting them to adopt a cooperative game to obtain More market gains, based on the consensus reached by both parties, open consumer resources and launch customized joint marketing activities for different consumers to achieve the purpose of improving consumer stickiness. Having common interests allows for better cooperation in facing the threat of new entrants.

5. Conclusion

5.1 Key Findings

It is found that in the online delivery industry, appropriate measures can be adopted to reduce the intensity of competition. Platforms are too big. The current severe personalized backdrop, blindly using subsidies and grabbing market competition, has led to all online applications having the phenomenon of more subsidies and more cheated. All applications must know their service is about consumers, leading to enterprises, an essential factor in all markets that can come to the fore.

5.2 Future Studies

Considering the high cost of building a food delivery platform, all major food delivery platforms can establish alliances through co-construction and sharing to relieve their respective competitive pressure and maintain the coexistence of overall interests. Each central online platform should not only improve the product system setting and standardize the distribution logistics process but also establish a food safety alliance to promote the safety of distribution products, improve the product system and introduce distribution safety. The regulation of network services can effectively promote cooperation, thereby reducing the level of blind competition in the industry, providing consumers with a good service experience, and realizing a win-win situation for the entire industry. Therefore, all kinds of online takeout network platforms need to find bisectors and efficiently integrate online and offline information but also need to cooperate in dealing with food delivery, safety, and quality issues of the online takeout business. Each online network platform should not only improve the mechanism setting of its network platform, promote the standardization of the distribution logistics

process, but also form a food safety alliance, to promote the safety of the food distribution process. At the same time, it is hoped that each platform can improve the management system of the network platform in the future and introduce delivery insurance. While competing, food delivery platforms must consider the impact of new entrants brought by the integration of the food delivery industry and the Internet to urge existing food delivery platforms to re-examine the importance of cooperation and promote them to adopt cooperative games to obtain more market benefits.

References

[1] Yujun, Huang: Comparative Analysis of Competitive Strategies of Food Delivery Enterprises Based on SCP Perspective——Taking Meituan VS ELEME Takeout as an Example.

[2] NETEASE Homepage, https://www.163.com/dy/article/G40EL6L80518H9Q1.html, last accessed 2022/8/17.

[3] Li, J.X(2020), Kuanzhai Alley in Nairobi: CHINA INVESTMENT.Issue23,24 December, 114-116.

[4] Rao, H.Q(2016), Analysis on the competition and cooperation game of online takeaway business: China Academic Journal Electronic Publishing House. (C)1994-2022.

[5] Zheng, W.T(2015), Research on the competitive strategy of online food delivery platform under non-cooperative game: China Academic Journal Electronic Publishing House. (C)1994-2022.

[6] Kong, Y.Q(2016), Research on price war of e-commerce enterprises based on game theory: China Academic Journal Electronic Publishing House. (C)1994-2022.

[7] Zhang, Z.X(2017), Research on the safety of takeaway food on the O2O platform: Food Industry Volume 38, Issue 1, 2017,218-221.

[8] Song, Y (2020), Trends of international commodity prices under the global COVID-19 epidemic and its impact on China: China Academic Journal Electronic Publishing House. (C)1994-2022.

[9] Wang, H (2018), Evolution Process of Recycling Chain of Takeout Packages Based on Behavioural Science.10-14

[10] Luo, J.Q (2015), Relationship Between Corporate Governance and Corporate Social Responsibility Disclosures: Evidence from Transportation Industry in China. 112-130