

# Research on Enterprise Price Competition from the Perspective of Game Theory—Taking Luckin Coffee and Cotti Coffee as Examples

Lixuan Wang<sup>1\*</sup>

<sup>1</sup>Bachelor of Business (Applied Finance), Western Sydney University, Parramatta City, New South Wales, 2116, Australia

**Abstract.** In recent years, the competition between Luckin Coffee and Cotti Coffee has intensified, leading to an increasingly aggressive price war in the Chinese market. This research utilizes game theory to analyze the price competition between these two companies, offering a clearer understanding of the interdependent and dynamic nature of their pricing decisions. By constructing a price game model, the study delves into the essence and internal logic of their competition, comparing the pricing strategies, market responses, and overall impact of these price wars on both companies. In 2023, both Luckin Coffee and Cotti Coffee aggressively pursued market share through extreme pricing tactics, triggering a prolonged and fierce price war. The analysis reveals that while these tactics temporarily bolstered their market positions, they also exposed both companies to significant margin pressure and increased business risks. The research underscores the unsustainable nature of such competition and the potential long-term harm to both companies' profitability and market stability. Based on these findings, the paper offers several recommendations aimed at fostering a more fair, orderly, and sustainable competitive environment within the industry. By moving beyond aggressive price wars, Luckin Coffee and Cotti Coffee could focus on building brand loyalty, improving product quality, and innovating in service delivery, ultimately creating a healthier and more balanced market landscape.

## 1 Introduction

### 1.1 Research background

As a major player in the Chinese coffee market, Luckin Coffee has occupied most of the Chinese market for a long time. The financial report released by Luckin Coffee showed that Luckin Coffee's annual operating revenue for 2023 was 24.903 billion yuan, an increase of 87.3% from 2022 [1]. This year, Luckin Coffee surpassed Starbucks in China for the first time in terms of annual revenue.

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\* Corresponding author: [aacok@ldy.edu.rs](mailto:aacok@ldy.edu.rs)

In 2023, Cotti Coffee, as a newcomer, in order to quickly capture the market share, in 2023.5.11 to open the 'Daily 9.9' promotional activities. In June 2023, Luckin Coffee also opened the weekly 9.9 promotional activities named '10,000 shops with the celebration'. Cotti Coffee immediately after the launch of 'new users to drink coffee for 1 yuan' of low-priced activities, and Luckin started a fierce price war.

Within a month of opening the price war, the average daily cup volume of Cotti's shops across the country can reach about 310-320 cups, while more than 1,000 shops open every month, which is almost the fastest shop expansion speed of the entire coffee track. However, six months later, the situation took a sharp turn for the worse; the average daily cup of Cotti dropped to 150-160 cups at the end of 2023, while Luckin also suffered a crisis. The Q1 2024 earnings report shows that in the current period, Luckin reported revenue of 6.28 billion yuan, up 41.5% year-on-year, and a net loss of 83.2 million yuan, compared with a net profit of 564.8 million yuan in the same period last year [2].

Examining this competition in terms of game theory can help companies understand the deeper implications of their competitive strategies and help Luckin Coffee and Cotti Coffee better adjust their pricing strategies to each other's actions. With the help of the game model, the possible reflections of the market under different competitive prices can be inferred. Moreover, Luckin Coffee and Cotti Coffee are in a highly competitive market environment, and the complexity of their price competition is highly representative, which can provide references and ideas for the price competition of other similar enterprises, avoiding the adverse consequences of blind competition.

## 1.2 Literature review

Liu proposes that competitive companies must pay a steep price once they get into a price war, win or lose. A Vicious price war reduces the sales revenue of enterprises and adds to the heavy burden on society. Therefore, the igniting of the price war is conducive to peer firms and harmful to society. In the end, it also harms them. The rational firms will not let themselves into a price war [3].

Selim found that existing companies should not lower their prices even in the face of lower-priced competitors. On the same line of thought, economists Tom Nagle at Boston Consulting, Adam Brandenberger of Harvard, and Barry Nalebuff of Yale argued that "cutting prices to gain market share - as opposed to doing it because of a cost advantage - can often permanently hurt both profits and revenues" [4].

Elzinga and Mills show that in the presence of high switching costs, in order to attract new consumers or steal them from existing firms, new entrants temporarily compensate consumers for switching costs by offering lower prices, thus triggering price wars [5].

Most scholars have mainly studied the benefits of the price war between Luckin and Cotti Coffee on consumers and the impact on the market. However, very few scholars have studied the impact of the two coffee companies' malicious price competition on themselves and how they should sustain their development in the future. The research idea of this article: firstly, the article will introduce the main concepts and analysis methods of game theory in detail and explain the applicability of the game theory in this case. Secondly, analyze the market of Luckin and Cotti Coffee, then set the basic assumptions and parameters of the model based on the price competition model of the game theory, and construct the game matrix of the two parties' price competition for analysis. Then, the data and events of actual price competition between Luckin Coffee and Cotti Coffee are collected, and the model is applied to interpret these actual situations. Finally, the results are summarised, and recommendations are given.

## 2 Description of Luckin Coffee and Cotti Coffee

Luckin Coffee has opened 3,000 shops in just two years since its establishment in October 2017. It successfully appeared in the market in May 2019 with a market capitalization of \$ 4.25 billion. At the beginning of 2020, Luckin Coffee was exposed by a third-party short-selling agency ‘Muddy Waters’ in the explosive news of financial fraud. Since then, Luckin Coffee has been ordered to be delisted. After that, Luckin turned the tide by shifting its operational strategy to target China’s affordable coffee market. In 2022, Luckin achieved annual revenue of over 10 billion for the first time. In the second quarter of 2023, the number of shops exceeded 10,000, and quarterly revenue exceeded that of Starbucks China. After Cotti Coffee came out of nowhere in November 2022, Luckin’s rhythm of development was disrupted. In the 2023 quarterly report, Luckin Coffee’s shop profit declined by 8.1% year-on-year, down from the original 21.1% to 13% [1].

Cotti Coffee Since its launch in August 2022, Cotti Coffee has made remarkable achievements in the domestic and international markets with its unique brand concept and rapid development speed. As of December 21, 2023, its shop count had reached 7,380, of which 7,351 were open and 29 were suspended. This is not only reflected in the rapid growth of the number of shops but also the improvement of its brand influence and market recognition. Through continuous innovation and market expansion, Cotti Coffee has become a force to be reckoned with in China’s coffee market. However, Cotti Coffee is also facing challenges in its pricing strategy. Its low-price strategy attracts customers but has limited profit margins, which is not conducive to the healthy development of the business in the long run. Overall, Cotti Coffee has encountered a number of challenges during its rapid expansion, including problems with capital management, brand image, staff treatment, and market competition. In the future, Cotti Coffee will need to address these issues to ensure its long-term and stable growth.

## **3 Comparative of Luckin Coffee and Cotti Coffee**

### **3.1 Basic concepts of game theory**

The basic concepts of game theory cover the following areas. 1. Participants: refers to the decision-making subjects in a game, which can be individuals or organizations. 2. Behaviour: the specific actions or strategic choices made by participants in a game. 3. Information: the knowledge about the game held by the participant, including the characteristics, strategies, and payoff functions of other participants. 4. Strategy refers to the planning of a set of actions or strategies by a participant during the game. 5. Payoff function: defines the gains and losses, i.e., the level of utility, of a participant in different situations. 6. Outcome: the state or result at the end of the game, including the final gain or loss for each participant. 7. Equilibrium: a state of affairs that exists in a game when each participant’s strategy is the best response to the possible strategies of the other participants.

### **3.2 The main analytical methods of game theory**

#### **3.2.1 Nash equilibrium analysis**

A Nash equilibrium is a game in which each participant’s strategy is an optimal response to the strategies of the other participants when the entire portfolio of strategies is in a steady state. In the analysis, the optimal strategy response of the participants is found to determine whether there is such an equilibrium state. For example, in the classic Prisoner’s Dilemma, the two prisoners each have two strategies, ‘confess’ and ‘don’t confess’, which can be analyzed to find that (confess, confess) is a Nash equilibrium, and although this is not optimal

for the whole, neither party has an incentive to change their strategy, given the other's strategy.

### **3.2.2 Case study analysis**

Take the example of the 'Smart Pig Game', where there are big and small pigs in a pigpen. Pressing a switch brings 10 units of food into the trough, but pressing the switch costs 2 units. The big pig arrives first and gets 9 units of food, and the little pig arrives first and gets 4 units of food. If they arrive at the same time, the large pig will get 7 units, and the small pig will get 3 units. The analysis shows that (big pig presses the switch, small pig waits) is a Nash equilibrium. In practice, this can explain the phenomenon that large enterprises in some industries will actively innovate to develop the market, while small enterprises may choose to wait for a free ride. The case study method can show the abstract game theory concepts concretely in practical situations, help people better understand and apply the principles of game theory, and verify and develop the theory of game theory through the analysis of specific cases.

## **3.3 Market analysis of Luckin and Cotti**

### **3.3.1 Market analysis of Luckin**

Three years ago, Luckin launched the raw coconut latte, becoming the most understanding of Chinese people's tastes in coffee, a burst of the industry; in April this year, Luckin raw coconut latte launched the third anniversary of the sales of the category, has exceeded 700 million cups. In September 2023, Luckin and Maotai co-launched the 'soy sauce latte', a time of fire on the whole network, becoming a phenomenon! The product has become a phenomenon on the Internet. In September, Ruixing and Moutai co-branded the 'Soya Latte', which became a phenomenal Internet product. Statistics show that in the second quarter, Luckin in the domestic 25 fresh drinks were welcomed by the market, and new products accounted for 24% of the total domestic cup volume. After 2023, after the shop war, the domestic coffee market presents the situation of incremental and stock, with the intensification of competition in the industry, statistics show that in the first half of this year, the process of chain coffee brands to open shops have slowed down to varying degrees, some brands to open shops in slow progress from the same period last year, thousands of new openings fell to a few hundred new openings, and the industry is gradually aggravating the differentiation. From the price war 'kill out' Luckin resilience. Although the low price strategy may face the risk of margin compression, Luckin Coffee, by increasing product diversity and enhancing customer loyalty to balance this challenge, completed the 'low price' to 'cost-effective' and 'high convenience. However, by increasing product diversity and improving customer loyalty, Rexchip Coffee has balanced this challenge, completing the transformation from 'low price' to 'high-cost performance' and 'high convenience', and naturally has more and more fans [6].

### **3.3.2 Market analysis of Cotti**

Cotti Coffee's brand positioning is mainly targeted at young people aged 18-35, offering low to mid-priced coffee at an average price of around RMB 15, which is in line with young people's consumption habits by pairing it with a coupon offer of RMB 8.80

Against the backdrop of continued growth in the coffee market and the rise of local chain brands, Cotti Coffee has rapidly opened 5,000 shops and accelerated its business development with the help of its rapid shop expansion and capital subsidy strategy<sup>1</sup>.

Although Cotti Coffee hopes to realize its goal of making coffee a part of daily life through its three core competencies of performance, convenience, and product power, in practice, Cotti Coffee has experienced a decline in the number of cups in a single shop as a result of price adjustments, showing a However, in practice, Cudi Coffee has experienced a decline in the number of cups per store due to price adjustments, indicating a strong dependence on subsidies, and once it loses its price advantage, it will be difficult to maintain its shop operations. Secondly, Cotti Coffee has not yet stepped out of the shadow of 'Luckin imitators' in product research and development. But the subsidy activity period is still the main promotion of this product, showing its limitations in product development!

### 3.3.3 Similarities between Luckin and Cotti

Firstly, both adopt a rapid expansion strategy, aiming to capture the market quickly. Luckin Coffee has grown rapidly in a short period of time, while Cotti Coffee has followed suit, rapidly expanding the number of shops. This rapid expansion strategy has led to fierce competition between the two in the market. Secondly, both use price wars to capture the market, and this price strategy has led to a direct confrontation between the two in the market competition. Thirdly, Luckin and Cotti are very similar in terms of the flavors and innovations of their drinks. This has led to consumers valuing the price of the two brands more, making the price war between the two more intense.

## 3.4 Constructing the game matrix of price competition between Luckin and Cotti

In the price war between Luckin and Cotti, if Cotti chooses to maintain the price and Luckin also chooses to maintain the price, then their gains are 8, 8. At this time, if Luckin chooses to lower the price, then Luckin gains 10, and Cotti gains 5. If Cotti chooses to lower the price, and Luckin chooses to maintain the price, then their gains are 5, 10; and if Luckin also chooses to lower the price, then both Luckin and Cotti gain 6 (See Table 1).

**Table 1.** Game Matrix Diagram of Luckin and Cotti Price Competition

|                         | Cotti maintains price | Cotti lowers price |
|-------------------------|-----------------------|--------------------|
| Luckin maintains prices | (8, 8)                | (5, 10)            |
| Luckin lowers prices    | (10, 5)               | (6, 6)             |

In this table, (8, 8) indicates that when both parties maintain their prices, each of them can obtain relatively stable but probably not the highest returns. (5, 10) means that when Luckin maintains its price and Cotti lowers its price, Cotti may get more revenue while Luckin's revenue is damaged. (10, 5) means that when Luckin lowers its price, and Cotti maintains it, Luckin may gain more market, but Cotti suffers. (6, 6) indicates that when both parties lower prices, they may fall into a price war, with both revenues reduced but relatively balanced.

Because the game is a non-cooperative game, where each side is sure that the other will make decisions based on profit maximization, the equilibrium is for both sides to protect themselves by adopting a low-price strategy. However, this is not a desirable outcome for both firms.

## **4 Suggestions**

### **4.1 Establishment of cooperative alliances**

Luckin and Cotti can explore the possibility of cooperation in the development of certain products to address market challenges and jointly avoid excessive internal competition. Jointly carry out marketing activities to expand the brand influence and reduce costs at the same time, and joint bargaining on the procurement of raw materials to gain cost advantages. Luckin and Cotti share the data market with each other to jointly address industry challenges and changes.

As Meng-Hsien Yen Mike Bourne says, businesses learn from each other's experiences in cooperation and competition. In competitive cooperation, learning between partners may change the relative competitive positions and advantages between partners outside the alliance. Collaboration in the A-Team fosters a learning process where participants learn from each other to improve competency in value-based activities and share best practices [7]. Based on the above game rectangles, it can also be seen that profits are maximized when both parties cooperate, so win-win cooperation is an optimal choice for both firms.

### **4.2 Enhanced product innovation and differentiation**

Now, in the market, the similarity between Luckin and Cotti products is very high if they want to improve their competitiveness. As R. G. Cooper and E. J. Kleinschmidt say, a thorough investigation of customer needs, wants, and preferences should precede the product design and development phase of the new product process [8]. Satisfy customers' needs and invest more resources in research and development of unique coffee tastes, product formats, and value-added services to reduce over-reliance on price competition and attract consumers through product features. Companies can set up specialized product development teams to encourage creativity and experimentation and cross-border collaborations with other brands or sectors to create unique co-branded products.

### **4.3 Optimising cost management**

Luckin and Cotti can optimize the supply chain. Operational efficiency improvement and other means to reduce costs so as to be able to respond more flexibly to pricing strategies while ensuring profitability rather than competing solely by depressing prices. Enterprises and suppliers to establish long-term stable cooperative relations for more favorable procurement prices and terms [9]. And optimize the logistics and distribution process to reduce transport costs and time loss. Assign specialists to fine-tune shop operations to improve people efficiency and ping efficiency. Utilise technological means, such as intelligent inventory management systems, to reduce waste and costs.

### **4.4 Industry self-regulation and regulation**

Industry associations take the lead in formulating guidelines and norms for price competition, restraining and warning against vicious competition behavior, establishing communication and coordination mechanisms between enterprises on both sides and promoting information sharing and positive interaction [10]. Enterprises should clearly define their long-term development goals and visions, formulate stage-by-stage strategies to match, balance the short-term performance pressure and long-term development needs, and avoid damaging the

foundation of the brand because of a momentary price war. Advocate fair competition, win-win cooperation, and industry culture to create a healthy competitive environment.

## 5 Conclusion

This paper focuses on the importance of studying the price competition between Luckin Coffee and Cotti Coffee and the adverse effects of vicious competition on enterprises in the current market, as well as the key role of game theory in analyzing such phenomena. Firstly, the core concepts of game theory are introduced in detail, and the development history and market position of the two companies are introduced to show their competitive situation in the coffee industry. Finally, a game model of price competition between Luckin and Cotti is constructed to analyze the benefits of both parties under different states and explore the possible equilibrium state. At the end of the article, some suggestions are given that Luckin and Cotti can make improvements in terms of win-win cooperation, improving their creativity, and optimizing cost management.

Based on the game theory perspective on the price competition between Luckin and Cotti to discuss a clearer understanding of the vicious competition between enterprises, for the market competition between similar enterprises to provide a reference, to solve the vicious price competition between enterprises, regulate the market order. Lead to a healthier and more orderly competitive environment and avoid excessive and vicious competition.

## References

1. China Daily, luckin Coffee Announces Fourth Quarter and Full Year 2023 Financial Results, Full Year Net Income Up 87.3%, 2024, 2, 23. Retrieved on July 29, 2024. Retrieved from: <https://baijiahao.baidu.com/s?id=1791698347938164607&wfr=spider&for=pc>
2. Luckin Coffee Inc. Announces First Quarter 2024 Financial Results, April 30, 2024. Retrieved on July 29, 2024. Retrieved from: <https://investor.lkcoffee.com/static-files/0b8aebec-fc80-4206-b717-f958e404f886>
3. Liu, Y. E-commerce Price War Based on Game Theory. In 2021 3rd International Conference on Economic Management and Cultural Industry (ICEMCI 2021), Atlantis Press, 3266-3271 (2021).
4. Selim, T. H. Strategic pricing: a game in market economics. *Journal of Business & Economics Research (JBER)*, **8**(6) (2021).
5. Elzinga, K. G., & Mills, D. E. Price wars triggered by entry. *International Journal of Industrial Organization*, **17**(2), 179-198 (1999).
6. China Daily, Analyse Luckin's earnings report to see why it's hard to see a second Luckin in China's coffee market? 2024-08-05. Retrieved on August 6, 2024. Retrieved from: <https://baijiahao.baidu.com/s?id=1806514232105237645&wfr=spider&for=pc>
7. Peng, T. J. A., Yen, M. H., & Bourne, M. How rival partners compete based on cooperation?. *Long Range Planning*, **51**(2), 351-383 (2018).
8. Cooper, R. G., & Kleinschmidt, E. J. Success factors in product innovation. *Industrial marketing management*, **16**(3), 215-223 (1987).
9. Lu, Y. An Analysis of Marketing Strategy for Cotti Coffee—Comparing with Luckin Coffee. *Highlights in Business, Economics and Management*, **37**, 96-101 (2024).

10. Huang, Y., Ren, S., & Yang, T. Analysis on the "COTTI Coffee Model" of Coffee Industry Marketing Promotion. *Highlights in Business, Economics and Management*, **23**, 917-922 (2023).