Comparative Dominance of Fast Fashion Model from the Perspective of Game Theory

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Abstract: A fast-fashion system combines quick response manufacturing capabilities with better product design skills to create new items that capture the newest consumer trends while also taking advantage of short production lead times to balance supply with fluctuating demand. This research builds a model of such a system and compares it to three other systems: quick-response, improved design, and traditional. According to this study, improving design helps to reduce strategic behavior by providing customers with a product they value higher, making them less eager to wait for a clearance sale and maybe suffering a stockout. Quick reaction mitigates strategic behavior through a different mechanism: it minimizes the likelihood of a clearance sale by better matching supply to demand. Most crucially, this study discovers that, while rapid reaction and improved design might be complementary or substitutive, the complementarity effect tends to win out. As a result, when both quick response and enhanced design are integrated in a fast fashion system, the company often sees a bigger incremental improvement in profit than if each method were used separately.

1. Introduction

Fashion is a very interesting phenomenon that plays a vital role in the economy. First, fashion is a huge industry. Despite the complexity of giving a satisfactory definition of the fashion industry, its global market size is estimated at around $200 billion. Luxury fashion is France's fourth-largest source of revenue; it is also one of the most important industries in Italy, Spain, the US, and emerging markets such as China and India. The sector is now one of the largest employers in France and Italy." Secondly, fashion is a continuous and effective consumption stimulus. It is becoming more and more popular for people to throw away old things, not because they don't meet their material needs, but because they are no longer fashionable. Fast fashion is to take advantage of people's desire to pursue fashion and show fashion elements to consumers on time. Characterized by a low price, large amount, and small quantity, fast-fashion stimulates consumers' interest and satisfies consumers' needs to the maximum extent. Fast, fashion may become the development trend of the clothing industry in the next few years.

Liu et al. begin by summarizing quick fashion businesses, big data, and digital marketing, gathering data from authoritative agencies, and examining the need for rapid fashion brands to enter the digital stage. Second, effective digital marketing instances of representative fast fashion firms are thoroughly examined. Finally, by summarizing the study's illuminating findings, this article offers some recommendations for developing a digital marketing strategy for fast fashion firms in China, as well as marketing techniques appropriate for the development of Chinese businesses [1]. Zhou et al. look at the quick fashion market throughout the world, focusing on Zara, H&M, and UNIQLO in terms of effective supply chain management, limited value creation, low-cost promotions, and positioning strategy, with comparisons to other well-known fast fashion firms. Statistics from an overall examination of B2C clothing online retailing in China suggest that there is a huge room for the online retailing fast fashion business to explore, but that it is still a long way from catching up with the world's leading firms in terms of e-commerce scale. The next section examines the keys to success of a Chinese fast- fashion online retailer, Vancl, by examining correct product positioning, brand positioning,

business model, marketing strategy, products and services, user experience, logistics, and team management [2]. Warren et al. introduce a model for evaluating the effects of supply flexibility (in particular, reduced stockouts and markdowns) on operational financial variables such as revenue, cost, and profit. The estimated profit percentage gains range from 22 to 28 percent, assuming conservative revenue improvements of 5% in both decreased markdowns and reduced stockouts as a result of applying supply flexibility. The price/earnings ratio is then used to determine the proportional rise in market capitalization for 53 companies in the fast-fashion or short-product-life-cycle industries. The consequence is a 30–37 percent increase in market valuation; this rises to 35–43 percent if a 15% drop in inventory levels owing to enhanced supply flexibility is expected [3].

Mo's goal is to figure out how trends relate to the quick fashion business and how the fast fashion industry affects the environment. With the stages of literature study, this study employs qualitative research methodologies. Toxic contamination and garbage that is difficult to degrade are issues that result from the fast fashion business. The fast fashion business has a significant impact on global warming. Waste created during production will be dumped into rivers or the sea, polluting the seas and the creatures who live there. Chemical content can also contribute to air pollution, which contributes to global warming [4]. Caro et al. examine this business model in depth and explain its implementation by examining the industry's most notable businesses. Then we look for research that is especially relevant or directly connected to fast-fashion in the academic literature. Our objective is to highlight the most important aspects of fast-fashion and to find unexplored research possibilities [5].Rese et al. respond to the topic of which services and technology physical fast fashion businesses should invest in. A literature analysis, business practice, and expert interviews yielded fifteen improvement possibilities. Then, using Kano's technique and the segmented Kano viewpoint, a sample of 255 Generation Y participants assessed and categorized these possibilities as appealing, indifferent, must-be, one-dimensional, or reverse. The findings reveal that Generation Y valued service enhancements (such as salesperson friendliness and competency) over technological advancements. However, although quality-conscious fast fashion buyers are often uninterested in technological advancements, other customer categories find '3D Bodyscan,' 'Barcode App,' 'Click&Collect,' 'iDressroom,' 'iTerminal,' 'Loc Aware App,' or 'Self-Checkout' quite appealing[6].

Erhardt et al. compare fast fashion's consistent consumption habits to a new emerging kind of consumption that has the potential to be an alternative as well as a sustainable version of quick fashion consumption. This study is based on a theoretical framework of scientific literature, which includes government and press announcements, in order to assess the current state of consumption and answer the research issue. Potential features of rising enterprises and sustainable alternative forms of rapid fashion may be indicated, as can a new consumption pattern and an emerging sharing economy. The study's scope is confined to the textile and fashion industries in developed nations, with an emphasis on consumption in the twenty-first century [7]. Landi et al. present a model for studying the dynamics of fashion attributes that are only influenced by social interactions. People change their style to optimize social success, and they depict the interaction as a recurring group game with payoffs that reflect social norms determined by fashion. On the one hand, the desire to replicate popular stereotypes vs the desire to deviate from them to assert uniqueness; on the other hand, the use of sex appeal for dating success versus societal moral values. As anticipated by the adaptive dynamics modeling paradigm, these competing pressures generate variation in fashion attributes [8]. Bhardwai et al. examines the literature on developments in the fashion clothing sector during the 1990s, focusing on the advent of the 'throwaway' or fast fashion idea. It discusses rapid fashion from both a supplier and a consumer's standpoint, as well as a number of prospective research topics [9].

2. Model introduction

2.1 Model introduction

A single company produces a single product for a limited period. The demand of the market is uncertain. And the consumers in the market are random. Represented by N with continuous random

change, the distributive quantity is F (.), the average value is U. The consumer thinks the value of the product is v. The product is sold throughout the season. Before sales, the company's total inventory is Q, the unit cost is c, the sales price is p, and the maximum expected profit is π (Q, P). In the last quarter of sales, the promotional price of remaining inventory is s.

Consumers anticipate to some extent, they anticipate that the price of the product will eventually drop so they delay buying until it does. The future consumer discount is &, until the promotional purchase will lose part of the consumption value, and the future practicality of clothing will also be reduced. In addition, & also reflects consumers' strategic degree to some extent, or the durability of the clothing. This paper refers to the larger &, the higher the degree of strategy. Influencing the degree of the strategy includes the product itself, the overall market characteristics, and the personal behavior of consumers. All consumers arrive at the store at the beginning of the sale and, after looking at the sale price P, decide whether to buy at price P immediately or postpone the purchase until the sale price is reduced. When putting off a purchase, consumers are more likely to buy it right away

The value-added and delayed purchase price is represented by s, the discount factor is &, and the purchase probability is represented by Q. Two situations arise for individual consumers. If the company runs out of stock, then the game is over. If the company has stocked all the time, then the consumer will choose to get the product at a specific price during the promotion. The additional price of immediate purchase at price p is v-p, while the expected added value of a delayed purchase is &φ (v-s). The higher the added value is, the more inclined consumers are to buy. This paper believes that if consumers are indifferent to these two behaviors, they will buy as a full price.

2.2 Basic model

To add to this paper's research on the value enhancement components of fast fashion systems, this paper analyzes all potential operational models.

A traditional model, denoted simply by T, refers to a typical firm with a long production cycle and standard production design capabilities. Rapid response systems, denoted by Q, cannot to improve design, but significantly shorten theproduction cycle. While improving the design system, represented by D, improves the design capability (so consumers have a higher willingness to buy), but the production cycle is still very long. This model represents the supply chain management advocated by Milgrom, which focuses on product design and ignores the most important impact on shortening production cycle. Finally, fast fashion models, which are being widely used by retailers such as Zara, H&M and Uniqlo [10].

In each of these models, this paper analyzes a game between firms and consumers. The company chooses the selling price and inventory level. This is how consumers decide whether to buy at full price or wait for a potential sale (possibly at the risk of being sold out). This part of the paper introduces the basic model and analyzes the traditional model - that is, the model that neither improves the reaction speed nor improves the design. This paper takes this model as the basic model and analyzes the other three models on this basis.

3. Model analysis

3.1 Traditional model

The equilibrium condition includes:

$$(q_t, p_t) = \text{argmax}_{q,p}\pi_t(q, p) \tag{1}$$

$$vp_t > \&\varphi(v - s) \tag{2}$$

$$\varphi = F(q_T) \tag{3}$$

In this paper, consumers' discount expectations for future consumption are random. This makes equilibrium prices and inventory levels harder to express. Nevertheless, the equilibrium analysis is similar to this paper. We define:

$$A(v) = v(1-\&) + s(1+\&), B(v,c) = sv - \&c(v-s) \quad (4)$$

In the traditional model, non-zero inventory equilibrium exists and is unique. In equilibrium, all the consumers buy in advance. The balanced full price is:

$$p = \frac{A(v)+\sqrt{[A(v)]^2-4B(v,c)}}{2} \quad (5)$$

3.2 Quick response model

In the rapid response model, the design level is normal and the production speed is fast. Thus, although the product is designed to be of less value to the consumer, inventory can be controlled by understanding market demand. In order to demonstrate the rapid response model, this paper uses many models used in the literature. Examples: Cachon and Swinny 2009, Fisher and Raman 1996. According to the literature, this paper argues that at the beginning of sales, companies can predict inventory through market feedback. And market feedback revealed the reality that production was fast enough to reach stores before the start of the sales season. Low cost can be maintained by determining inventory based on demand information (C, that is, part of the initial cost of the traditional model). Meanwhile, additional inventory is generated after understanding the real market demand, and the additional cost is Cq> 0, because additional production and transportation are needed.

When determining inventory requirements, it is necessary to fully understand the actual demand information. It is obvious that the profit per unit (P-C-CQ) is positive, and all the company has to do is produce just enough inventory of the positive price demanded. As with traditional models, the only equilibrium is when all consumers try to buy at full price. In this equilibrium, the predicted initial inventory of quick response is Q, the price is P, and the profit of P>C+Cq is:

$$\pi_Q(q,p) = \mu(p-c) - c_Q L(q) - (c-s)I(q) \quad (6)$$

And the three equilibrium conditions are:

$$(q_Q, p_Q) = \text{argmax}\pi_Q(q,p) \quad (7)$$

$$v - p_Q > \&\varphi(v-s) \quad (8)$$

$$\varphi = F(q_Q) \quad (9)$$

In rapid response system, non-zero production equilibrium exists and is unique. In equilibrium, all the consumers buy in advance. Equilibrium price is:

$$p_Q^* = v - \delta\frac{c_Q}{c+c_Q-s}(v-s) \quad (10)$$

The p_Q>c +c_Q. Because if p_Q is greater than c plusc_Q, this equilibrium is the same as the traditional model. By choosing to acquire additional inventory later, the company's initial inventory is lower than the traditional model, leaving the company with fewer products in stock during the promotional season. And from the consumer's point of view, the probability of getting the product at a lower price is also lower. At the same time, there will be less willingness to buy at a lower price. In other words, the company can maintain that all consumers charge more when they buy at full price, and the extra cost c_Q of quick response is not very high.

If and only if p_T: > c+c_Q. The equilibrium price of rapid response system is higher than that of traditional model p_Q>p_T. Otherwise, p_Q=p_T.

In summary, rapid response provides value to a company through two direct effects: (1) influence sales: under the same conditions, influence sales is the implementation of rapid response to reduce the loss of sales; (2) influence behavior: Influence behavior refers to that the implementation of fast fashion increases the sales price, because consumers predict a low probability of price reduction in the future. Perhaps many people think that rapid response affects sales, while behavioral impact is only strategic consumer behavior. In fact, however, rapid response generates value in two different ways.

3.3 Design improvement model

In an improved design system, the lead time to production is long, but the company adds value to the customer by improving the design. Therefore, this paper believes that improving design can increase the marginal profit of m>0 for consumers. That is to say, the value of the product that consumers buy to improve the design is v+m However, when the enhanced design is implemented, additional cost per product $c_D > 0$ will be incurred. For the convenience of analysis in this paper, the promotional price s is considered consistent with the traditional model. Company profit at the time of improving design is:

$$\pi_D(q, p) = S_{(q)}(p - s) - (c + c_d - s)q \tag{11}$$

And the equilibrium conditions are

$$(q_D, p_D) = \text{argmax}_{q,p}\pi_D(q, p) \tag{12}$$

$$v + m - p_Q > \&\varphi(v + m - s) \tag{13}$$

$$\varphi = F(q_D) \tag{14}$$

Non-zero production equilibrium exists and is unique in the enhanced design system. In equilibrium, all the consumers buy in advance. Equilibrium price is:

$$p_D^* = \frac{A(v+m)+\sqrt{[A(v+m)]^2-4B(v+m,c+c_D)}}{2} \tag{15}$$

Since both m and c_D of p_D have increased, p_D as another factor is the same as p_Q.Therefore, the m=$c_D = 0$ and enhancement designs of traditional systems are the same. So p_D>p_T. Although the price of the improve design is higher than that of the traditional system, the balanced consumption behavior is consistent with the traditional model: all consumers buy at full price rather than waiting for the promotion. Therefore, companies can raise prices by improving design without increasing strategic consumption waiting. If the cost of improving the design c_D is not too high, this is obviously very beneficial to the company.

$p_T < p_D - c_D$ Is a necessary condition for improving design and making money? This also means that improving design can increase profits. Although this is not a decisive condition for improving design profitability, higher production costs also indicate higher destocking costs.

Overall, improved design affects company profitability in three ways: (1) impact value, impact value is an increase in price. The added value is caused by v to v+m, and all other constants, such as & andφ, remain constant; (2) impact cost: Impact cost refers to the cost of production plus c_D. This reduces profits and increases the cost of destocking. Other constants, such as q and p, remain unchanged.

3.4 Fast fashion model

Fast fashion combines the characteristics of rapid response and improved design, which enables companies to both increase the value of their products and reduce the mismatch between inventory and market. In the improve design model, the consumer gets an additional m value per unit of clothing, while the inventory for each item increases by c_D>O. Therefore, the cost of adopting different models is also different, and the profit of fast fashion company is:

$$\pi_F(q, p) = \mu(p - c - c_D) - c_Q L(q) - (c + c_D - s)I(q) \tag{16}$$

And the equilibrium conditions are

$$(q_F, p_F) = \text{argmax}_{q,p}\pi_F(q, p) \tag{17}$$

$$v + m - p_{QF} > \&\varphi(v + m - s) \tag{18}$$

$$\varphi = F(q_F) \tag{19}$$

Equilibrium price is:

$$p_F^* = v + m - \delta \frac{c_Q}{c + c_D + c_Q - s}(vm - s) \tag{20}$$

The price of fast fashion system is higher than any other system.

4. Conclusions

This paper analyzes the nature of fast fashion, fast response and improved design, and also briefly analyzes the impact of service, price and quality on consumers' purchasing decisions. It's based on game theory, but it doesn't go far enough. The conclusion that when consumers are strategic consumers, the combination of rapid response and improved design can produce the maximum effect provides reference for the future development direction of domestic fast fashion. Fast fashion is an inevitable trend, such as Uniqlo, ZARA, H&M and other fast fashion enterprises are leading the trend. What domestic enterprises need to do is not only to imitate, but also to innovate and surpass.

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