

An Analysis and Optimization of the Value Chain of Dairy Industry after the Sanlu Event in China

Xiaoyan Shang, Guojun Ji and Guowei Wan

Abstract—Sanlu melamine milk event shocked the whole world after the Olympic Games successfully closing in Beijing in August 2008. It was reported more than six thousands babies were affected. It was not Sanlu only, but also YiLi, Mengniu and other firms. Their products had also been found to contain melamine. The dairy industry of China was trapped in the crisis of confidence. At the same time more foreign brands took the opportunity to occupy the market. Sanlu event has brought the industry to an unprecedented crisis. So what's the key point of China's dairy industry? How to be out of trouble and obtain a competitive advantage? We tried to build a model based on the industry value chain to analyze and solve the problem.

Index Terms—Dairy; Customer value; Industry value chain

I. INTRODUCTION

Dairy farming developed fast in China, especially in recent years. China has become the world's third largest milk-producing country. The production and sales of liquid milk grew by 17.8% in 2007, it is nearly 15,000,000 tons and 10 times of that in 2000[1]. Output and growth rate of liquid milk are shown in Figure 1. The growth rate declined since 2003, but still kept growing over 15%. Some major cities are getting saturated gradually in per capita sales, but the consumption of low-income groups increases obviously.

Sanlu event has hit the dairy industry heavily. The production of dairy in September 2008 was 1090.6 thousands tons, it reduced by 18.67% compared to the same period in 2007[1]. Although the dairy industry has been affected by Sanlu event, the trend can't be changed. There are both of challenges and opportunities to the native enterprises in China. It is necessary to further analyze the competitive situations to regulate the strategies.

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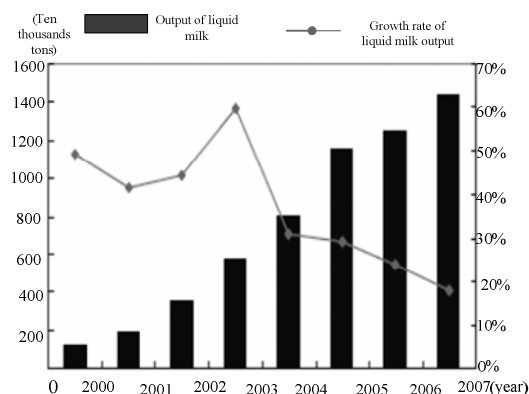


Fig. 1. Output and growth rate of liquid milk

We build a model based on the industry value chain (see Figure 2). It has 3 parts. The paper's structure is the same with the model. The first part is question raising. We have introduced the basic situation of the industry and given the question in this part. The second part is question analysis. It is the most important part of our paper. We use Porter's five-forces competitive model to analyze the main competition strengths of dairy industry, then we analyze the cost structure and profit distribution of industry value chain. All the analysis is based on the industry value chain and the customer value perspective. The third part is question solving. We have given our solutions by longitudinal and horizontal value chain.

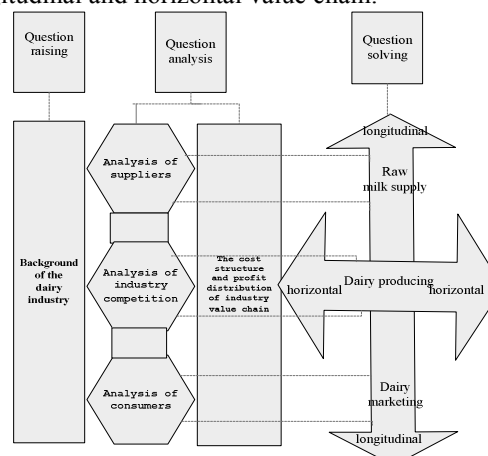


Fig. 2. The model based on industry value chain

II. AN ANALYSIS BASED ON INDUSTRY VALUE CHAIN

The concept of industry value chains is largely derived from the discipline of industrial economics, where the notion of value-added chains was developed to clarify the business' use in constructing competitive advantages within an industry [2][3]. Porter (1985) suggests that each organization's value chain 'is embedded in a larger stream of activities' that he calls the 'value system'[3]. Porter's value system is consistent with general theories of marketing[4].

Customer value is what they 'get' (benefits) relative to what they have to 'give up' (customer sacrifices)[5]. The creation of customer value has long been recognized as a central concept in marketing [6] and the fundamental basis for all marketing activity [13]. It has been suggested as the purpose of organizations [7], a main key to success via differential positioning [8], and a precursor to customer satisfaction and loyalty [9]. As a company, if it wants to be competitive, it should offer the customer the products that they feel worthy.

Porter suggested that there are five basic forces in the industry, he brought out Five-Forces Competitive Model [2]. A company has to compete with the supplier, customers, substitutes, potential enters and the ones with the same business. We can clarify the competitive condition by Five-Forces Competitive Model.

In this part, we use a comprehensive analysis by industry value chain, customer value perspectives and Five-Forces Competitive Model to analyze the raw milk suppliers, producers, customers and the cost structure and profit distribution of dairy industry value chain.

A. The analysis of main competitive forces

1) The raw milk suppliers

a. The output per cow and the quality are inferior to developed countries. Raw milk is in short supply by natural in China.

Dairy farming is strict by economic development and natural conditions, the quantity and quality of milk are still far from developed country. All of these result in natural short supply of raw milk.

In China, dairy farming is not as important as other aspects of agriculture. It needs a long time to develop consumption habits and accumulate breeding technology. Besides, the deep rooted reason is that China has just solved the problem of food and cloth, and has limited land but large number of people to feed. The developed countries use 40-70% of the land for breeding; we only use 5% of it. The feed is also very different. We use straw, corn and beans. The average protein output per mu is 60 kilograms; while in developed countries, they use high quality grazing such as alfalfa, the average protein output per mu is 400 kilograms.

At last, the breeding method is different. Most cows are breeding dispersedly in China. 60% of cows are feeding in the fields, 30% of them are in the farmers' breeding areas, and only less than 10% of them are in the modern grasses [10]. Dispersed breeding results in the lack of technologies and capitals, it is hard to form scale economies effect. The most serious problem is that the poor condition results in the disease; it further

reduces the quality of raw milk. Because of these reasons, the output per cow in developed countries is 2 times of that in China. The quality is much better than that in China (TABLE1). It is not so easy to turn to produce high added value products in China because of the bad quality raw milk.

TABLE1 QUALITY INDEX [10]

Index	China	Developed countries
Out per cow (ton/year)	3.8—4	9.5
Content of DM dry matter	11.50%	12.5—13%
Content of protein	2.80%	3.40%
Feed	straw ,corn and beans, 400 kilograms protein per mu	High quality grazing, 400 kilograms protein per mu
Manner of breeding	Dispersed in fields	centralized in modern grasses
Content of bacterium	500 ,000/ml	50,000—100, 000/ml

b. Over capacity of dairy industry induces the short supply of raw milk.

It is not difficult to enter the dairy industry, so more and more local factories are founded. The output of all industry is about 30,000,000 tons, but the production capacity gets to 50,000,000 tons. It is about 40%-50% of the production capacity being surplus in some provinces. Figure 3 shows that the rates of raw milk to dairy production supply declining continuously.

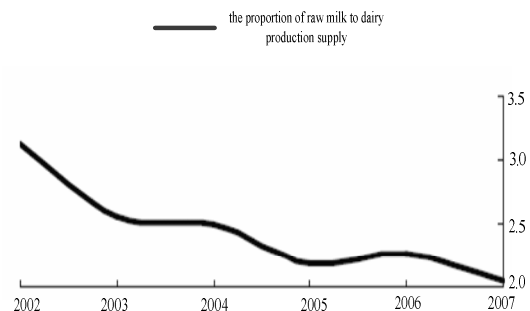


Fig.3. the proportion of raw milk output to dairy production [11]

c. Dairy farmers are at a disadvantage in the market.

Most of the dairy farmers are at a disadvantage of bargaining with the dairy factories. A lot of dairy farmers get limited profits even are at loss. The dairy factories compete fiercely in the downstream so that they try their best to reduce the cost of the raw material. The dairy farmers are dispersed and the raw milk has no difference, the price is forced down at a low level. It was reported by Dairy Industry Association of Heilongjiang in 2008 that the output of the milk increased with the temperature since April[10], but some dairy factories refused the raw milk, it harmed the farmers. Some of them sold or killed the cows and gave up breeding.

Remark:All the reasons result in the short supply of raw milk. The raw milk suppliers are at weak position in the industry value chain. They can't supply steady and high quality raw milk.

- 2) The competition among the dairy companies.
 a. Overcapacity led to fierce industry competition.

Low barriers to entry resulted in overcapacity which led to short supply of raw milk. On the other hand, it direct results in the fierce competition and profits declining. Figure 4 shows the sales and gross margin of dairy industry declined obviously since 2006.

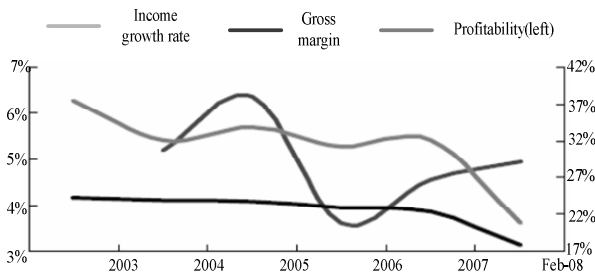


Fig.4. The income growth rate, gross margin and profitability of dairy industry

b. The major domestic enterprises' competitive strategies¹ led to fierce competition in the industry. Before Sanlu event erupted, the total market share of liquid dairy products of the four major domestic enterprises was as high as 72%, and it formed a strong oligopoly structure; their combined market share was close to 40%.

However, the competition of the industry is still fierce. The MDE made a price and marketing war. Taking Yili and Mengniu for example, Yili marketing cost at a rate as high as more than 20%, which was much higher than the industry ratio of 12%; Mengniu's marketing cost was 13%. It was also higher than the average ratio (see Figure 5.). In addition, the major dairy products tend to homogeneity, so promotional discounts can be seen everywhere.

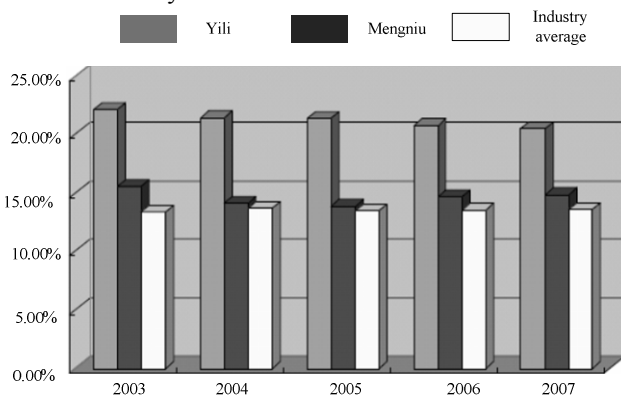


Fig.5. The rate of marketing cost

- c. The competitive strategies of foreign enterprises

Foreign enterprises compete with the domestic enterprises by mergers and strategic alliances. The leading domestic company's liquid milk products have been well developed. They have occupied big market share. The foreign enterprises don't compete with the domestic ones directly. They take two strategies: first, to control the local enterprises by investment and holding stock. Danone Group is one of the first foreign companies to enter China, it has cooperated with Guangming, Mengniu and merged miaoshi (a local brand in Beijing) in 200 now it is making great efforts to cooperate with

Newhope group. Second, to associate with other foreign enterprises. A lot of dairy multinational enterprises entered the market in 1900s. They are experienced and have stable consumers. They want to keep their seats by combined reinforcement. Danone Group merged Royal Numico NV, which was the biggest baby food manufacturer, somewhat considered to own the market of milk powder in China by the brand 'Duomeizi' of this company.

Foreign enterprises focus on high-class infant milk powder. At present, the market size of high-class infant milk powder has reached 50 billion Yuan in China. It is growing rapid. The high-class infant milk powder accounted for 36% of the entire milk powder sales; it reached 46% in 2007; it was 50% in 2008[11]. The foreign enterprises are expanding the market of the high-class infant milk powder in China. Wyeth invested 20 billions to build a new factory in Suzhou in March in 2008. The capability can satisfied with 1600 thousands babies. Arlafood of Denmark invested 5.4 billions to the market by cooperation with Mengniu in 2006. A lot of famous foreign enterprises have invested in the high-class infant milk powder market of China [11].

Foreign brands have monopolized the milk powder market of China. Foreign brands have the absolute superiority. Nestle, Wyeth, Dumex, Abbott and other foreign brands total occupy the market share as high as 80-90%[11].

Remark: By competition analysis, we can see that the domestic enterprises have occupied a large market share. Especially in the liquid milk market, the main domestic enterprises almost formed monopolized. But they still compete fiercely, it is mainly due to industry overcapacity and they take the low price and brand strategies. While foreign brands choose to combine with each other and merge, they also take focusing strategy on high-class milk powder market which is a weakness of the domestic enterprises.

- 3) Analysis of customers

a. Consumers' brand loyalty is declining. According to McKinsey's research [12], the brand had been very important in China. Compared to other markets, China is more affected by the brand. About 2 / 3 of the consumers choose a certain brand or several brands that they have decided advanced, but less than half of the consumers in Britain and Japan have the same habit. As shown in Figure6.

With brands' amount increasing, the consumer brand loyalty is on the decline, especially in food and beverage industry: less than 1 / 4 of the interviewees said they would continue to buy the original brand - the figure is half of that in 2007. As shown in Figure 7.

b. Consumers pay more attention to food safety. 91% of the Consumers are care about food safety. More than half of them are willing to pay more money for it [12].

High-end consumers are inclined to choose quality products; low-end consumers think much of price. Brand effect and consumer loyalty will be further weakened. A growing number of consumers concerned more about food safety, product

¹ They were Yili, Mengniu, Bright and Sanlu before Sanlu event.

quality, and are willing to pay more money.

I only choose my favourite brand.

I considered several brands, and choose one of them

I considered several brands, but if other brand has a discount I will choose it.

I always buy the brand which is on the special offer.

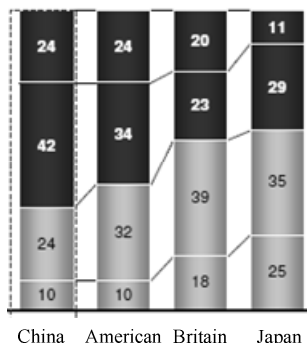


Fig.6. Brand preference in different countries [12]

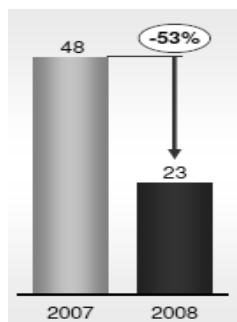


Fig.7. Brand loyalty of beverage in 2007 and 2008[12]

Based on an analysis of customers, we can draw such a conclusion: the bargaining power of consumers has been strengthened. In addition, we suggest that: it is not suitable to focus on the marketing excessively. Enterprises should meet the consumers demand to improve the quality and reduce the cost, offer lower prices and better quality products.

B. The cost structure and profit distribution of industry value chain.

1) The cost structure of industry value chain.

Cows breeding, dairy producing and sales make up most of the cost of the industry.

We suppose a medium-sized dairy factory with daily output of 100 tons. It produces raw milk by itself. We can roughly calculate the cost of every part.

There are 7000 cows in the factory. Each costs 10,000 Yuan; breeding one cow is 5,000 Yuan a year. the total cost of dairy farming is 42, 000, 000yuan a year.

Production equipment investment and labor cost are the main cost of milk processing. The equipment values about 50 million Yuan. The machine is depreciated in 10years. It is about 500 million yuan for annual amortization. Equipment maintenance costs, labor costs and other costs is around about two million yuan one year. The total cost of processing for one year is 7 million yuan. Sales costs are lower than milk processing, which is about 2.33 million yuan per year. Table 2 gives the data¹.

TABLE 2 COST STRUCTURE

Item	Cost(Yuan)
price per cow	10000
annual breeding cost per cow	5000
total breeding cost per year	42,000,000
annual amortization	5000,000/year

¹ The data based on telephone interviews to the farmers of Xinfu town Daoli District, Harbin, Heilongjiang Province and the in-service of dairy industry.

equipment maintenance costs ,labor costs and other costs	2,000,000/year
annual processing costs per year	7,000,000
sales cost per year	2,330,000

2) Profit distribution of the industry value chain

a. Dairy farmers' profits. China's milk suppliers are basically retail ones. Nearly 80% of the cows are owned by the retail farmers. Each farmer keeps less than 10 cows. They get limited profit about 2000-2500 Yuan a year from each cow only when the raw milk is purchased normally. In addition, the enterprises often force down the price and refuse the milk for various reasons; many dairy farmers are even at a loss.

Therefore, cost pressure on manufacturers led to the pressure to the suppliers. Most suppliers are retail farmers, are at a disadvantage of bargaining with the manufacturers. The row milk price is forced down unreasonable. Suppliers get limited profit throughout the value chain.

b. Dairy enterprise profits. Dairy industry keeps growing rapid over 20% in 5 years. The gross profit rate of the industry is more than 20%(see Fig 8) , while the net profit rate is only about 4%. Yili is about 2%(see Fig9), the marketing costs are as high as more than 20%, which is much higher than the industry ratio of 12% (see Figure 5).

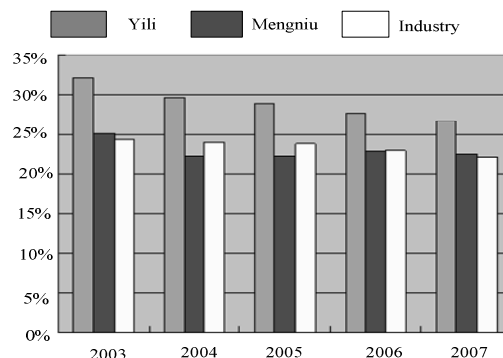


Fig.8. Gross profit of Yili, Mengniu and industry[10]

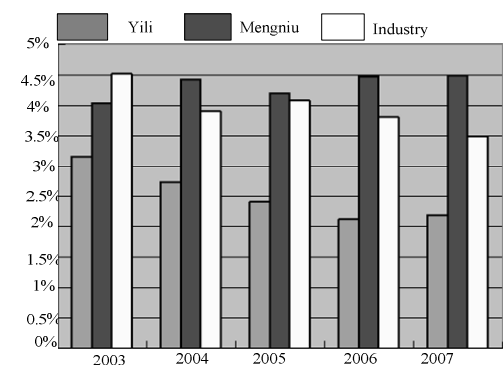


Fig.9. Net profit of Yili, Mengniu and industry[10]

We conclude that the competition is fierce; On the other hand, high marketing and advertising cost too much.

Remark: we can see that cows breeding spend most of the cost in the value chain, and it gets little profit. Production and sale cost less, but also get limited profit. It is mainly due to high marketing costs and fierce competition.

The consumers get the products by a low price, but not a good quality. We can say that the members of the dairy industry

including customers haven't got high or even normal value. The industry value chain developed lopsided.

III. TO ESTABLISH DAIRY COOPERATIVES AND OPTIMIZE THE INDUSTRY VALUE CHAIN

By the analysis of the suppliers, manufacturers, customers which are the main components of the industry value chain, we can conclude that the competition of the industry especially among the local Chinese enterprises is fierce. By the analysis of the basic characteristics of customers, we can conclude that brand loyalty begins to decline; the consumers begin to pay more attention to quality and food safety, and are willing to pay more money for it.

Section III showed that 80 percent of raw milk is supplied by retail farmers. They are in a weak position of industry value chain. The industry value chain is lopsided which lead to unstable supply and poor quality of raw milk.

Based on the basic analysis above, we use the value chain perspective for solutions.

A. Industry value chain optimization

Industry value chain analysis is based on customer value which is the customer's perceived value minus customer perceived price. Customer value is affected by customers' subjective feeling and preferences. The main points of the value chain are to clarify the basic characteristics of consumers and to satisfy with them. By this method, we can enhance the perceived value to improve the customer value and gain a competitive advantage.

The dairy enterprises have taken great efforts in the terminals. According to the research, the brand loyalty is declining, the brand impact to consumers is weakened gradually; more and more consumers pay attention to product quality and safety. We should cater to these characteristics change of the consumers, and take more effort on the production and the supply.

We can draw out this conclusion: Industry value chain has taken a lot of efforts on the terminal for customers' strong brand preference. Now the characteristics of customers have changed. It is necessary to optimize the industry value chain to adapt it(as shown in Figure 10). Based on this, we propose to build a new dairy cooperative to solve this problem.

Cooperatives are the working people united voluntarily to cooperate in production and management. The dairy cooperative is an organization of dairy farmers.

1) The dairy cooperatives in abroad

In developed countries, more than 80% of farmers have participated in one or more different types of cooperatives. For example, the cooperatives were established in 1970s in India. Under the guidance of the NDDDB (National Dairy Development Organization of India), 70,000 dairy cooperatives is established now. In the USA, 80% of the farmers participated in the cooperatives. Almost all the farmers have joined cooperative in Japan. The cooperatives offer the service of sale, transportation, purchase, insurance, credit, agricultural guidance, information consultation and so on.

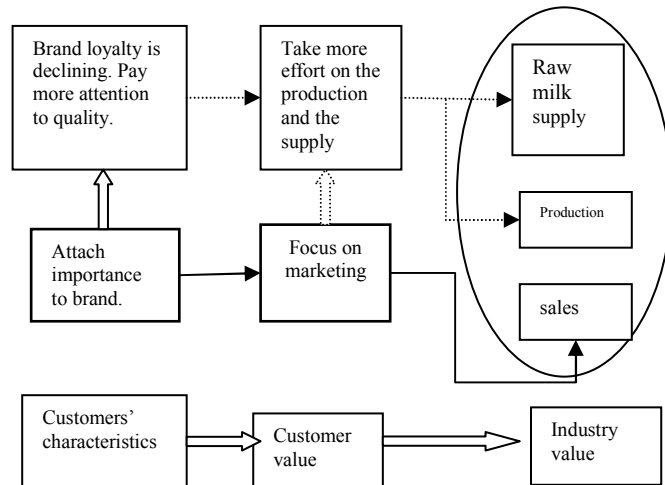


Fig.10. Industry value chain analysis

Most developed countries have built dairy cooperatives system, and the degree of concentration in the dairy industry continuously improved. This is played a great role in protecting and expanding the market, reducing operating costs.

2) New type dairy cooperatives based on the industry value chain optimization.

China's existing dairy cooperatives can be divided into three forms, dairy farmer-sponsored cooperatives; the third-party initiated cooperatives excluded farmers and enterprises; enterprises initiated cooperatives. The purpose of the dairy cooperatives is to safeguard the interests of dairy farmers, and enhance the power of bargaining with the manufactures at first. The role is gradually expanding later. However, it has not changed a lot by its nature.

This paper proposes a new type cooperatives which are initiated by the dairy enterprises and the farmer participate in them voluntarily. The dairy enterprises optimize the industry value chain by the cooperatives. This type cooperatives is different from others, it changes the competition relationship between the farmers and dairy enterprises into cooperative relationship, and bring the farmers to the industry value chain system to optimize it. At the same time, it reduces the risk of building dairy farms by itself.

Dairy cooperatives take the dairy enterprises as the core; the farmers join in the cooperative voluntarily by contracts or equity participation. Cooperatives provide technical support, exclusive sales and other services to dairy farmers; they stimulate farmers by dividends and other methods. It is easier to control milk collection, and improve the quality.

B. The Construction of the horizontal value chain to optimize the competitive environment.

According to our analysis, although the big four domestic enterprises has accounted for nearly 70% of the liquid milk market, competition is still fierce. The foreign enterprises have opted to avoid vicious competition, but they focus on high-end milk powder and combined with each other. Sanlu incident exposed the drawbacks of the domestic dairy enterprises under fierce competition. If they continue to compete by this method, it will create more chances to the foreign enterprises. So it is necessary to construct horizontal value chain.

1) The concept of Horizontal value chain.

The enterprises which are of the same or similar function in the same industries cooperate with each other to form the value chain. The relationships among the enterprises of horizontal value chain are competitive relations and then cooperative relations. The comparative advantages of the enterprise are different from each other. It is more effective to combine.

2) The effect of the Horizontal value chain of domestic dairy industry. The domestic dairy enterprises have own large market share. They can cooperate with each other by the methods as follows.

a. Cooperation in technological innovation. It can reduce the risk and solve the problem of the surplus production capacity to avoid vicious competition.

b. Enterprises can complement each other in the market and the raw milk supply. Sharing market channel and optimizing the use of dairy farms.

IV. CONCLUSIONS

The dairy industry of china was trapped in the crisis of confidence. At the same time more foreign brands took the opportunity to occupy the market. Sanlu event has brought the industry to an unprecedented crisis. So what's the key point of China's dairy industry? How to be out of trouble and obtain a competitive advantage? By using the building model based on the industry value chain, this paper analyzed and solved the problem.

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