Analysis of Coffee Supply Chain Crisis in China and Recommendations for Large Domestic Coffee Companies

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ABSTRACT

The general increase in coffee prices in the Chinese market is mainly caused by the coffee bean supply crisis. This paper explores the global shortage and delays of coffee beans, which can be explained mostly by natural disasters, transportation crises, and labor shortages. This paper also analyzes the external environment of large coffee retailers in China via Porter's 5 Forces, taking Starbucks as a sample. To alleviate the coffee supply chain crisis exerted on domestic large coffee retailers, recommendations are made based on the external environment analysis. The specific solutions proposed for large-sized coffee retailers are to expand inventories and to diversify the sources of coffee bean supply.

Keywords: *Supply chain, coffee beans, large coffee retailers, Five Forces Model*

1. INTRODUCTION

Coffee chains' well development in China has been raising drink prices, and these companies' sales and profits have been falling. In late February 2022, it was revealed that the prices of coffee drinks in chain coffee shops, such as Starbucks, Luckin, and Tims, have risen, ranging from 1 to 3 yuan [1]. On February 1, Starbucks disclosed its financial results for the first quarter of fiscal 2022 (October 4, 2021, to January 2, 2022). The same-store sales in the Chinese market fell by 14% in the quarter, mainly due to a 9% decline in the average transaction value and a 6% decline in overall sales value.

A large part of this spike in coffee prices is due to the global shortage of coffee beans, whose impact will last for the next two to three years. Firstly, the global bean shortage is partially caused by a sharp decline in the production of Arabica coffee beans in Brazil, which account for 60 percent of the world's total coffee bean production, resulting from extreme weather conditions [2]. Secondly, the global mounting crisis makes it even more difficult and expensive to ship the coffee beans to their destinations in China [3]. Thirdly, covid-19 has affected labor supply on the farms, either directly due to disease or indirectly due to social distancing measures, quarantines, and travel restrictions on the movement of farmers and migrant workers.

If the problems caused by the shortage of coffee bean supply to downstream retailers cannot be effectively solved, then it will be consumers that bear higher prices, with inconsistent bean quality and even the absence of coffee drinks they want. Simultaneously, the downstream coffee chains cannot earn sufficient profits to keep their business running smoothly. To create resilience in the face of the coffee supply chain crisis, we suggest downstream large coffee companies expand coffee beans inventory and diversify the source of the coffee bean supply in case one is not available. We expect that these two measures will have a significantly positive effect on the problem of rising coffee prices, as they both target the major cause of coffee price increases: the shortage of raw coffee beans. The former alleviates the risk of beans shortage since downstream coffee retailers having stable coffee bean storage can better respond to the shipping risk and production cuts. Due to the sky-high cargo prices, logistic costs have risen sharply, which is recognized as the bottleneck of the value chain. The latter measure calls for companies to

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source coffee beans from Yunnan and other high-quality domestic coffee bean production sites in China, to avoid maritime transport. In that case, the price of coffee beans excludes ocean shipping. Correspondingly, it reduces the raw material (coffee bean) cost of coffee drinks for large domestic coffee retailers.

The paper proceeds as follows. In section 2, the literature review, we give an insight into the global shortage and delays of coffee beans as well as the price rise of coffee drinks in the Chinese coffee industry. This section also provides details of natural disasters, transportation crises, and labor shortages in terms of complications. The literature review finally defines big companies since our analysis and hypotheses work for large-sized domestic coffee retailers. Section 3 analyzes the external environment that the Chinese coffee supply chain is facing via the Porter's 5 Forces model, taking Starbucks as a sample. In section 4, we propose viable recommendations for domestic large coffee corporations to alleviate the coffee supply chain crisis.

2. RESEARCH REVIEW

2.1 Coffee Consumption and Supply Chain in China

China's coffee consumption is generally on the rise, with an average annual consumption growth rate of 14.91%, which is 6.97 times the global consumption growth rate of 2.14%. From 2010 to 2020, China's coffee and product consumption are between 55,800 and 201,000 tons, of which, the quantity of imports is between 35,100 and 131,800 tons [4]. China's coffee consumption is generally on the rise, with an average annual consumption growth rate of 14.91%, which is 6.97 times the global consumption growth rate of 2.14%. Therefore, the worldwide shortage of coffee beans is an unavoidable issue for domestic coffee companies in China.

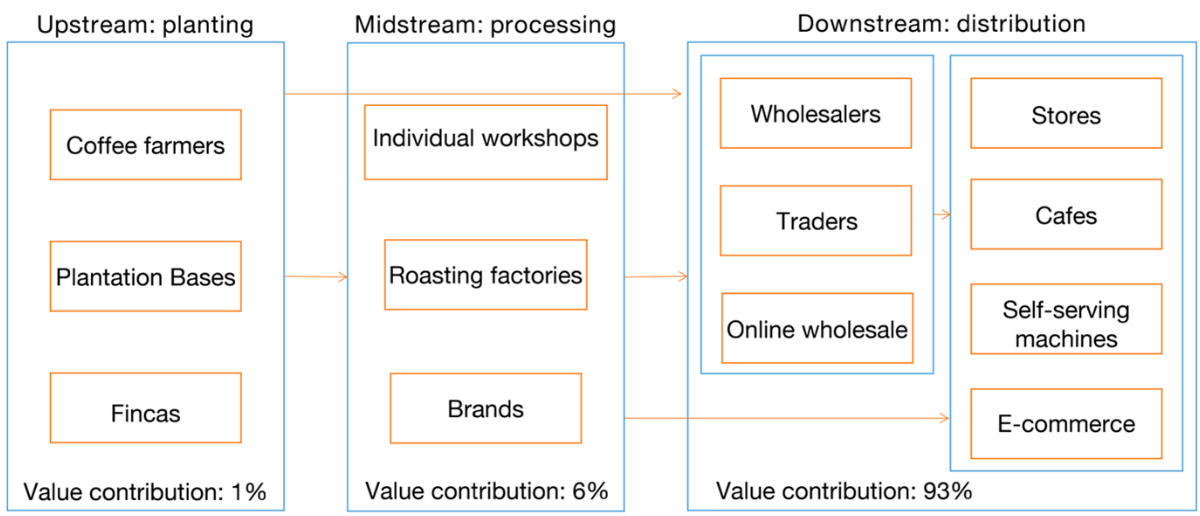

Figure 1 Diagram of coffee industry chain and value contribution

Figure 1 is compiled based on Dongxing Securities' analysis of the Chinese coffee supply chain [4]. As shown in this figure, to comprehend the coffee supply chain as a flow of coffee beans from the origin point to the end, we break down the coffee value chain into three sectors: planting, processing, and distribution. According to Dongxing Securities, coffee planting and raw material sales are mainly in developing countries, while the midstream processing industry and deep processing and terminal sales are mainly in the United States, Japan, and other developed countries in Europe [4]. The value contribution of global coffee production and sales distribution is asymmetrical as the value concentrates in the downstream distribution chain accounting for 93%. We utilize the visualized coffee value chain to identify the main problems in the elements of each sector, aiming to discover the biggest limitation in the flow of the value chain.

2.2 Coffee Bean Shortages

Now there is an obvious worldwide shortage of Arabica beans. Figure 2 is based on data released by ICE Futures U.S. exchange in February 2022, arabica coffee stocks totaled 1.078 million bags, the lowest level since the New York Stock Exchange began monitoring arabica beans in February 2000 [5]. Reduced inventories have led to 2021 arabica bean prices rising about 80% from 2020, even reaching the highest levels in 2022 since 1996 [2].

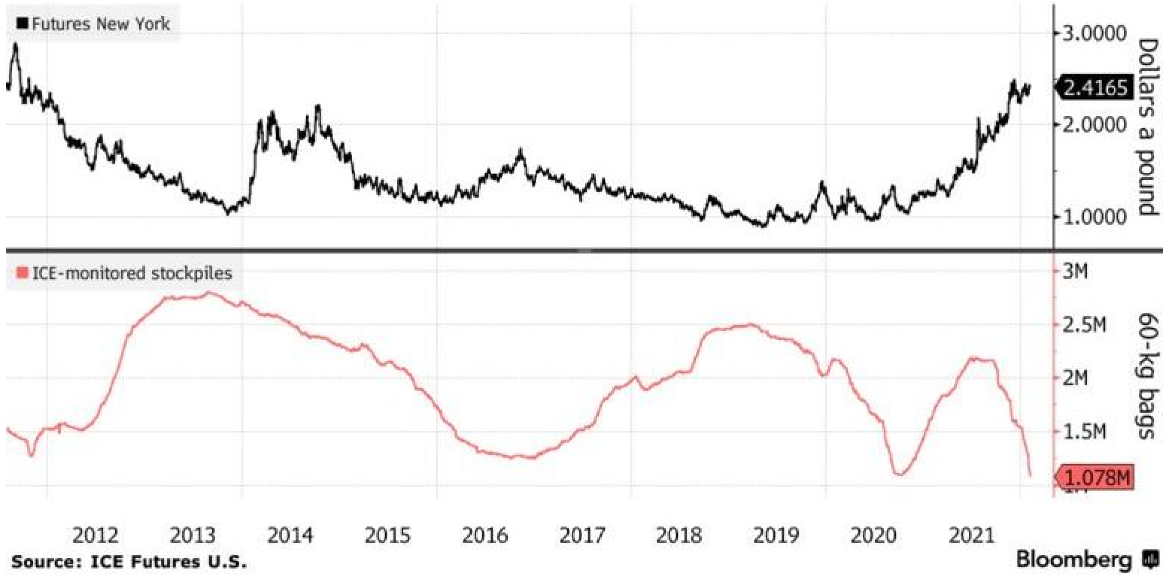

Figure 2 Brewing troubles: industry keeps using existing inventory amid a global supply shortage [5] (Source: Tatiana Freitas, Coffee Reserves Plunge to Lowest in More Than Two Decades., Bloomberg, 2022. Licensed by Bloomberg.)

As shown in Figure 2, this shortage has many large coffee companies in China's coffee market and they have raised the price of coffee to vary degrees. Extensive research has shown that US coffee chain Starbucks raised the prices of several products by 1 to 2 yuan so that the price of drinks is concentrated in the 25-to-40-yuan range. Luckin Coffee, a Chinese brand, has raised the price of some drinks by about 3 yuan. Tim Horton, a Canadian chain brand, has adjusted the prices of nine products slightly by 1 to 2 yuan [6].

2.3 Main Reasons for Coffee Bean Shortages

2.3.1 Natural Disaster in Brazil

Brazil, a major supplier of Arabica coffee, suffer its worst drought in 90 years and the worst frost in decades in 2021. Drought and frost-damaged about 1.5 million square kilometers of farmland and nearly 600 million kilograms of coffee beans [7]. The extreme and unpredictable weather has wreaked havoc on the crop, making the beans more vulnerable to many common diseases and pests, such as pink disease, coffee leaf rust, hemileia vastatrix and leucoptera coffeella [8]. Brazil's coffee exports fell 23.8% in the first month of the harvest season alone, which was affected by natural disasters. According to the survey, as the climate changes, there will be a significant amount of land in Brazil that will become unsuitable for coffee cultivation, with the proportion of land suitable for coffee cultivation likely to drop from 70-75% to 20-25% [7]. Therefore, the occurrence of natural disasters has an important impact on the cultivation of Brazilian coffee beans.

2.3.2 Global Transportation Crisis

Internal logistics networks and the functioning of the export infrastructure were disproportionately harmed by the COVID-19 pandemic, since an unprecedented bottleneck of the whole transportation market revolved around the incapacities of shipping containers, resulting in postponed contracts during the early phases of the pandemic. Chaos in shipping and production capabilities directly lead to a ripple effect which resulted in a dramatic reduction in exports, especially for the agri-business suppliers. They are the large organization in the middle stream which purchase agricultural products from farmers, and also responsible for processing farming products before they are in grocery store. Agriculture business suppliers are those who had been affected by the disorder of transportation firsthand.

The surge in daily necessities during the pandemic has led to the turmoil that huge piles of cargo ships overflowing with goods that cannot be stored in warehouses. At this time, the amount of cargo ship transportation also greatly increased with the demand. As thousands of cargo ships sail off to major terminals with coincident shipping schedules, resulting in loading flow difficulties, this phenomenon leads to the occurrence of transportation bottleneck as the conjunction makes it hard to deliver orders on time. A variety of factors including chaotic shipping timetables induced by a surge of boats arriving at the same time, the high turnover rate of labor owing to COVID-19 outbreaks, lockdowns, or capacity constraints could contribute to the crisis. As the situation worsened, Luiz Gouveia, the sales coordinator of the Maersk Group brand claimed that 40 percent to 50 percent of all coffee cargos were delayed at ports in the midpoint of 2020, compared to 10 percent to 20 percent in the first three months of the year. As a result of these variables, a port may have 20 or more boats waiting at any given moment. The period of September 2020 has witnessed a period of scarcity of container quantity when up to 60 to 70 vessels waiting in the Port of Los Angeles at one time, altogether with the Port of Rotterdam-one of Europe's major seaports are among the most impacted [9]. Green coffee exports from Brazil, the world's largest producer, plummeted 27 percent in August from a year earlier to 2.33 million 60-kg bags as issues finding containers and space on ships grew, according to the exporters' group Cafe. The survey which has conducted by Cecile revealed that 3.5 million bags of coffee were unable to be transported on schedule this year owing to transportation issues, costing the country's coffee exporting business around $500 million [10].

To alleviate the serious backlog and delay problem, many coffee retailers revert to the way coffee beans were transported 20 or 30 years ago - bulk cargo ship coffee beans export. Cooxupe, Brazil's largest coffee cooperative, also chartered a grocery ship in early December to export 108,000 bags (60kg/ bag) of Arabica beans to Europe. The company also plans to continue to export two arabica beans via bulk carriers in January 2022. Loading and unloading coffee beans is a challenge. While the facility constraint made the unloading process became time-consuming and intricate, coffee beans are extremely vulnerable under the weather during transportation that they are susceptible to moisture and mildew. Actual costs turned out to be higher than originally estimated due to the postponed contract, forcing the company to renegotiate the higher price with customers [11].

2.3.3 Production Drawdown Drove by Labor Shortage

A survey conducted by the ICO has shown that the catastrophe of which the increase in coffee prices, as well as the lower consumption level, was expected to attribute to the prolonged labor shortages of farmers and producers. It created a chain reaction that included diminished infrastructure, and degradation of loyalty with the buyers. The labor of manual workers in coffee harvesting accounts for up to 60% of production expenses. Likewise, climate change, disease outbreaks, and demand volatility can alter established labor patterns, resulting in labor shortages and the creation of conditions conducive to unethical labor practices [12].

The ICO market research revealed that the virus's propagation affects the number of employment available along the value chain, either directly via illness or indirectly through quarantine mandate, with global coffee output falling by -1,9% in 2019 in the first year of the pandemic outbreak. Coffee exports fell to 14.6 percent in May 2020 in one year, even though this amount is the third biggest on record for May and follows extraordinarily strong shipments last year [13]. The limitation on free movement also influences the downstream coffee chain that Arabica exports fell 19.7 percent year on year to 6.43 million bags, while Robusta shipments fell 5.2 percent to 4.6 million bags. Colombian Milds shipments declined 13.4 percent to 999,000 bags. This is mostly attributable to a 13.1 percent decrease in Colombian exports to 894,000 bags in May 2019 compared to May 2019 [14].

Labor interruptions in India where many coffee bags are manufactured led to price fluctuation farther down the chain as coffee producers struggle to obtain all of the export materials they require [14]. With frost interrupting coffee bean production in Brazil, the price of Arabica coffee beans had increased more than 40% in 2020 to moreover $2 per pound, even though minor fluctuation had seen in the dropping of the price to approximately $1.91 per pound in 2021 according to the report of Robert Wang. The owners of small-scale companies would assume a lot of losses come under the present market situation from the high turn-over rate of retailers, prices of beans which are dramatically high, and unavailability to access to packing materials due to the sipping crisis, etc. It seems not possible to open the store because of a shortage of supplies during the pandemic or to raise the price if the owner hasn't opened the business yet when the owners of small coffee shops expect the new business to come out of the gate with inviting prices [15]. Nevertheless, a large coffee retailer such as Starbucks which dominate the market share and with a high admiration rather choose to stock-piling the coffee beans beforehand when facing the supply chain challenge, which prevents price booming. Big coffee companies can anticipate the minor fluctuation throughout the supply chain, whether is production costs or lack of demand [14].

2.4 Definition of Large Company

The large companies defined in this paper are divided according to market share. At present, representative enterprises that grind coffee in The Chinese market include Starbucks, McCafe, Costa, and Luckin.

2.5 Research Question and Hypothesis

In the Chinese coffee industry, a key question is what measures big downstream coffee companies need to take to solve the problem of coffee beans shortage. The hypothesis of this study is twofold. The first is whether it is a worthwhile investment for big downstream coffee companies to increase beans inventory. The second is to figure out whether it is effective to diversify the source of the coffee bean supply in the case on is not available.

3. ANALYSIS

Porter's Five Forces model is used to analyze Starbucks as one of the enterprises in China's coffee industry.

3.1 Competition in the Industry

Some businesses have had a large number and a large base of customers, products that own similar quality, and there is fierce competition in the Chinese market. These years, take the instance of competitors, Luckin's sales have been increasing rapidly. Its revenue growth rate approximates nearly 3585%, from Q1 2018 to Q1 2019 [16].

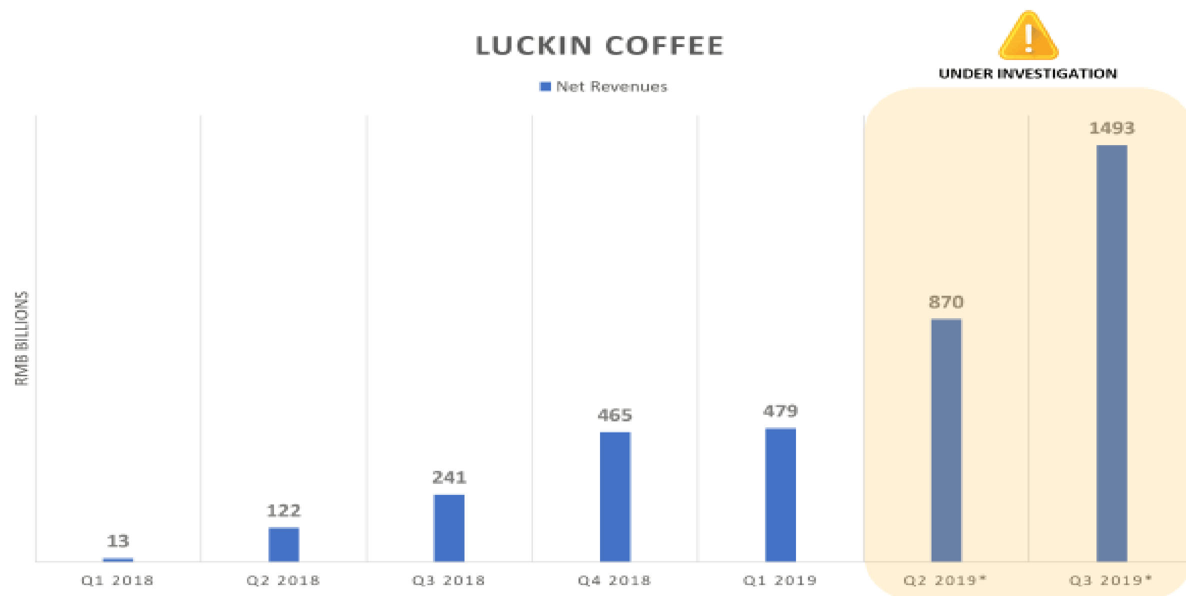

Figure 3 Luckin Coffee Net Revenue [16] (Source: Dean Goh, 3 ways Starbucks will take advantage of Luckin Coffee's RMB2.2 billion scandal, The Fifthperson, 2020. Licensed by The Fifthperson.)

Because of its advantage that Starbucks didn't own, it received that achievement. First, Unlike Starbucks, 91% of Luckin stores belong in the form of pick-up stores. They can use the mobile phone to pay and order. Luckin can reduce the cost of the salary of employees and such. Second, delivery. Since late 2017 when Luckin was set, it had developed excess delivery to Chinese customers. It made people who enjoyed and liked take-away service accept Luckin itself easily. Also, China's modern economy indeed needed delivery services currently. But in Aug 2018, Starbucks expanded to delivery service, cooperating with Alibaba's delivery platform Eleme. Third, another of Luckin's advantages is that the coffee it sells is much cheaper than Starbucks. In China, its prices are around 20-30% cheaper, compared to Starbucks [16]. Forth, Luckin is good at brand exposure in residential areas or office buildings, with advertising to increase their publicity. Many well-known Chinese actors, which have resonated with younger, white-collar workers, are invited to Luckin's campaigns. Furthermore, campaigns such as downloading or recommending others to download an app to get free coffee have helped Rise coffee gain a large number of customers.

3.2 Potential of New Entrants into the Industry

Some newly developing companies are poised to become potential competitors to the former tycoons of the coffee industry. One of the new brands: Manner. In Shanghai, Manner has opened more than 300 cafes. It plans to raise $300 million in Hong Kong to continue the expansion [2]. Manner leads a wave of new Chinese coffee brands with Luckin and has prepared to make its unique mark on the market [17]. Not only the Manner but there are also more and more entrants. They will make the demand for supply in the coffee market increase.

3.3 Supplier's Power

Supplier's bargaining power has little influence on Starbucks because the switching costs of suppliers for the biggest coffee retailer are not high so Starbucks can even substitute suppliers. Also, Starbucks cooperates with many corporations instead of several, suppliers don't have much ability on bargaining [18]. However, some of the suppliers' bargaining power has been increased these years, because of the increase in the shortage and the Chinese customers' expanding habit of coffee. Yunnan province beans become quickly popular in the coffee market in China. Yunnan owns a suitable geographical position, favorable climate, and enough areas to cultivate coffee beans, and it can breed high-quality coffee beans in the world. More than 99 percent of produced coffee in China comes from Yunnan province.

Brazil was the world's biggest coffee-producing place, but it experienced a nearly twenty percent decline in output last year, according to statistics agency Conab. It is because that Brazil endured extreme bad weather, such as drought and frost, during the time of harvest. Since late last year, the price of coffee made from Arabica beans often used by chains such as Starbucks has hit a 10-year high in New York. And their inventory is at the lowest levels in past 20 years. Logistics disruptions caused by COVID-19 are also driving up the price of coffee beans in the international market. Therefore, coffee beans abundant in Yunnan are valued by domestic and international retailers [19]. Shanghai is China's financial center and one of the busiest ports in the world. Experts say that the port of Shanghai is already experiencing severe congestion, and the expansion could exacerbate the congestion and further increase transportation costs. The epidemic prevention and control measures have caused serious delays in Shanghai Port. Shanghai handles more than four times as much as the Port of Los Angeles will do in 2021, according to the port authorities of both cities, it is the busiest container port in the world. Maersk, one of the world's largest container shipping companies, also said the Shanghai blockade could lead to shipping delays and higher costs [20]. Thus, suppliers' bargaining power has increased these years, even though it was originally low. And the power will grow faster when facing the epidemic.

3.4 Power of Customers

In big cities, customers' bargaining power is relatively high. In some of China's big cities, such as Beijing and Shanghai, coffee culture has become popular among residents. The pursuit of work efficiency and night work has expanded the demand for coffee. In March, a Shanghai-based research firm announced that Shanghai is the city with the most coffee shops in the world. With approximately 7,000 cafes, the megacity outranks its competitors Tokyo (3,826), London (3,233), and New York (1,591). But Shanghai still has plenty of room to grow, with China's coffee market set to exceed 300 billion yuan ($46 billion) by 2023, increasing by 30 percent from 2020, according to Qianzhan Industry Research Institute [17]. It means retailers have to make their products more attractive than other competitors' commodities.

3.5 Threat of Substitute Products

There are many types of products that can substitute for Starbucks: juices, teas, and alcoholic and non-alcoholic beverages. Many other bars and restaurants with a good atmosphere and high-quality products also attract customers. Another source of threat in this region is products that consumers can make at home. All of these factors make alternatives a moderate-to-large threat. Still, some factors mitigate this threat to some extent. In addition to great coffee quality, great customer service, and a great atmosphere, Starbucks also sells premium packaged coffee and coffee machines. High quality and brand loyalty mitigate the threat that is alternated.

Market research shows that young Chinese prefer tea shops to coffee shops. The NPD Group, an institution specializing in consumer research, found that tea was the fastest growing and growing category in the beverage industry, followed by coffee, juices, and sodas. The tea industry expanded rapidly in the last year as new brands entered the market. From the first quarter of 2017, there were 330,000 tea shops, and by the end of the third quarter of 2018, there were 570,000. According to Meituan-Dianping, a take-out company, among the top ten most searched freshly brewed beverage brands in 2018, Starbucks is the only coffee brand. However, the other nine are teahouse brands [21]. Considering the things analyzed above, the supply of the competitive market will shift to the right, with the entry of new entrants and substitutes. At the same time, the epidemic causes a huge problem with transportation. Businesses must pay attention to win on supply chains. That's the reason why suggesting transferring suppliers into Yunnan's coffee beans offer.

4. RECOMMENDATIONS FOR LARGE COFFEE RETAILERS

In terms of the above analysis, the solutions we proposed are generally from two aspects: increasing the retailer inventory and diversifying the sources of coffee bean supply. According to the latest report on the coffee bean industry, the global coffee inventory tends to decline further [22], thus the importance of procurement and inventory management is highlighted. To minimize the risk of sudden unavailability of coffee bean supply, downstream enterprises could brace for the global shortage ahead. Therefore, increasing the coffee bean inventory seems to be a relatively optimal alternative for these coffee retailers. For example, Nguyen Coffee Supply is a U.S.-based importer and roaster of fine Vietnamese coffee. Faced with unforeseen logistical problems, they are forced to order Vietnam coffee beans far in advance to make sure the commodity could arrive [23].

However, although it's a valid method to be prepared for the uncertainties, it may require prohibitive procurement and storage costs with such overwhelming demand. Additionally, on the cost side, prices for Arabica coffee beans have more than doubled in the past year due to dry weather in Brazil, supply chain turmoil, and freight costs. According to monitoring by the

Intercontinental Exchange, coffee stocks have fallen to a 22-year low. Not only that, but it has caused the price of Arabica coffee beans on the Intercontinental Exchange to climb to $2.59 per pound, a 10-year high. Another solution to achieve risk diversification is to find out more access to the sources of coffee bean supply, which may refer to coffee suppliers of similar quality from geographical locations within easy reach such as the Yunnan coffee beans for Chinese coffee retailers. For instance, faced with the possibility of late delivery which may take place at any time, Sucafina's solution is to track the transportation on a daily basis and keep the customer informed at least once a week. If the customer cannot get the coffee beans at the time they initially agreed, then Sucafina's team will be the first to give the customer an equivalent alternative coffee bean. By providing substitutes that equate to the initial coffee bean in both quantity and quality, customers' demands can be met as well [24]. Likewise, let's take the Yunnan coffee bean suppliers as an example, which now have profound potential as possible coffee bean suppliers. The current situation states that there are more enterprises mainly for coffee primary processing and supply, and compared to mature foreign processing enterprises their production scale, quality, and technology lag behind a lot due to the different levels of development of each enterprise, the quality of the coffee beans supplied is not the same. In this case, the coffee suppliers in Yunnan are bound to promote the technology, efficiency, and scale of production as soon as possible to keep up with the giant suppliers in the coffee bean industry. Therefore, we also call for technological innovation in the Yunnan coffee bean industry.

5. CONCLUSIONS

To sum up, what pushes up the general coffee prices in the Chinese market? We found that there are three main reasons. First, extreme weather caused a reduction in coffee bean production, in which there is little downstream enterprises can help. Second, since coffee bean picking is a labor-intensive job, the labor shortage due to COVID-19 caused a shrink in coffee bean production efficiency to some extent. Third, the availability of vessels and cargo in the port is lower than normal, which is mostly resulted from irregular shipping schedules and understaffing of terminal employers due to COVID-19 outbreaks [3]. To overcome these challenges and keep the business running smoothly, we encourage large-sized coffee retailers to expand the coffee bean inventory and diversify the bean sources. A limitation of this paper, however, is that our analysis via the Five Forces Model and recommendations are dedicated to large-sized downstream coffee retailers like Starbucks, Luckin Coffee, and Tim Horton. Since large-sized downstream coffee retailers perform with different business models and have larger bargaining powers than small and medium enterprises. We leave for future study providing advice for small and medium enterprises in terms of the coffee supply chain crises.

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