China's Air Purifier Industry Revisited: Implications for Competitive Strategy

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Air purifiers have been widely used in South Korea, Japan, and countries in the West, but their penetration in China is still very low, suggesting great growth potential. I researched China's air purifier industry in 2015 when it was experiencing a surge of new entries. In this study, I examine the development of the industry since then and firms' competitive positions. In addition, I also explore how firms could compete effectively in the future. I collect data from a major online platform in China. Results show that the previous industry entries were not successful. Massive exits occurred during 2016-2018. However, firms entered the industry again after it hit the bottom in 2018. I argue that the structural change of the industry can be better understood by studying the dynamics of its submarkets. Firms' competitive positions have also changed. Late-movers have successfully caught up and surpassed the long-time industry leader. The industry-level factors and firm-level resources have contributed to their success. Finally, I discuss practical implications.

Keywords: air purifiers, industry entries, industry exits, competitive position, competitive strategy

INTRODUCTION

The air purifier industry in China emerged in early 1990s to address air pollution in the indoor environment. It has evolved for 3 decades, but it may still be a young industry and have a lot of potential to grow. According to Huajing Industry Institute (www.huaon.com), the penetration rate of air purifiers in China, measured by the percentage of the relevant population that has purchased the product category at least once, is still very low, only 2%, compared with 70% in South Korea, 40% in Europe, 34% in Japan, and 28% in the US. I researched China's air purifier industry and firms' competitive strategy in 2015 when it was experiencing a surge of new entries (Xie, 2016). The research suggested the importance of product positioning, branding, and early industry entries.

This study investigates the development of China's air purifier industry since 2015 and firms' competitive strategy as the industry continues to evolve. Specifically, I examine the following questions. First, how has the industry structure changed since then? I use industry entries and exits to measure industry structural change. They are key variables in industry evolution (Geroski, 2003). Firms rushed into China's air purifier industry in the first half of 2010s. There were 151 competitors in 2013. The number increased by more than 3 times the next year. Has the industry continued to attract new entrants since then? Given the low penetration of air purifiers, it is likely that firms would continue to enter the industry. However, would it also be possible that the industry has had more exits than entries since then? If there were more exits, how to reconcile the seemingly conflicting phenomenon: industry exits and potential industry growth?

Second, how have firms' competitive positions changed? A competitive position is the position a firm has acquired relative to its competitors in the industry. Its importance to firm success in a competitive environment has been emphasized in both the strategy and marketing fields (Porter, 1980; Hooley & Greenley, 2005). Though the number of air purifier firms in China reached 556 in 2014, only a small percentage of them had established a strong position to compete effectively. They were generally the early movers. Demographically, a small number of foreign firms controlled 80% of the market. First-mover and early-mover advantages have been widely studied (e.g., Lieberman & Montgomery, 1988; Makadok, 1998). Would the successful early-movers be able to sustain their competitive positions? Would it be possible that late movers caught up and replaced their dominant positions? If late-movers did catch up, what might have contributed to their success?

Third, how could firms compete effectively as China's air purifier industry continues to evolve in the future? When the number of firms reached a peak in 2014, I found that product differentiation was not significant from a technical point of view. I argued, therefore, that product positioning and branding would be important (Xie, 2016). Have the industry products become more differentiated or standardized since then? What competitive strategy should firms use in the future?

By answering these questions, this study contributes to the theories of industry evolution and firm competition, two important topics in the field of strategy. The paper proceeds as follows. First, I present an overview of the air purifier industry. Then, I examine the structural changes of China's air purifier industry during 2015-2018 based on archival data. Third, I identify the industry's current structure and firms' competitive positions. I collect data from a major online platform in China. Finally, I explain findings, present answers to the research questions, and discuss both theoretical and practical implications.

THE AIR PURIFIER INDUSTRY

Air purifiers were initially created to remove smoke and odor from coal burning in the 18th century. They did not have significant improvements until a breakthrough technology known as Smoke Helmet was invented to protect firefighters from exposure to the smoky and toxic environment. As air purification technology continued to improve, air purifiers have gradually expanded their uses from the industrial environment to the nonindustrial segments such as residential homes, office buildings, hospital rooms, vehicles, etc. In this study, I focus on air purifiers used in the nonindustrial indoor environment in China.

There are three types of airborne pollutants in the indoor environment: particulate, gaseous, and microbial, which result from two sources: the indoor environment itself and the outdoor environment. The particulate pollutants are airborne particles which are often smaller than 0.1 millimeter. They come from cooking smoke, cigarette smoke and incomplete combustion. They can also be outdoor air pollutants entering the building. If the particles are as small as 10 micrometers, they can enter people's respiratory system. When they reach 2.5 micrometers, they are likely to enter people's lungs. Gaseous pollutants take many different forms including formaldehyde and volatile organic compounds (VOCs) which are often released from furniture and remodeling materials. The microbial pollutants include bacteria, viruses, fungi, etc. They often result from poor indoor air circulation, particularly in the damp and dirty areas.

Different technologies, including HEPA filters, activated carbon, negative ion generator, photocatalytic oxidation, ultraviolet light, and electrostatic filters, have been employed to remove the three types of pollutants in the indoor environment. They function in different ways and each of them has pros and cons. Among them, HEPA filters have been most widely used. They can effectively remove 99.97% of 0.3-micrometer particles. A main limitation is that they cannot remove viruses, harmful gases and odors effectively. In addition, they generally have a short lifespan. All other technologies can remove or absorb viruses, harmful gases, and odors, but they are not effective in removing airborne particles. In addition, some of them could generate undesirable byproducts like ozone.

Air purifiers entered the Chinese market in early 1990s. Most Chinese people were not familiar with them until early 2010s when most parts of China were attacked by heavy air pollution known as smog which caused air quality deterioration in the indoor environment. Chinese people learned a main component of smog: PM2.5, the airborne particles equal to or smaller than 2.5 micrometers in diameter which could

cause respiratory and cardiovascular problems. Removing the outdoor smog was beyond their control, but they could use air purifiers to get rid of PM2.5 in their indoor environment. As the demand for air purifiers increased, both domestic and foreign firms rushed into the industry in order to grab a piece of cake. There were 151 competitors in 2013. 2014 saw a surge of industry entries with the number of competitors reaching 556. My research conducted in 2015 did not have the total number of competitors for that year, but it found there were 416 firms selling air purifiers through JD online platform, the most favorable online selling site in China. Among them, 360 were domestic firms and 56 were foreign firms representing 11 countries. Air purifier prices ranged from RBM1,000 ($140) to RMB20,000 ($2,800). The high-end segments were dominated by foreign firms, while the low-end segments were dominated by domestic firms. Top performers included Philips, Honeywell, and IQAir. All of them were foreign firms.

What has changed since then? According to Zhiyan Consulting, firms continued to enter the industry in 2015, but exits started the following year. By the end 2018, two thirds of firms had left the industry. Table 1 shows the number of competitors from 2012 to 2018.

TABLE 1
NUMBER OF AIR PURIFIER COMPETITORS: 2012 – 2018

2012	2013	2014	2015	2016	2017	2018
112	151	556	687	567	360	211

(Source: Zhiyan Consulting)

Massive exits occurred in 2017 and 2018. A main reason was the improved outdoor air quality leading to reduced demand for air purifiers. In addition, poor performance of most firms and ineffective cleaning technologies had facilitated the industry exits. The new industry standard issued in late 2015 had also played a role. When the industry was expanding during 2012-2015, many firms engaged in improper competition in order to earn quick profits. They overstated the functions of their products and misled consumers. Even cheating was not rare. In addition, some test agencies were also reported to behave irresponsibly. To cater to their clients' interest, they produced test results that deviated from the procedures. The old industry standard was blamed for having little control over firms' improper behaviors as it left room for misinterpretation, manipulation, and other unethical practices. China issued a new industry standard in late 2015 which generated positive results in the first year of its implementation (Wen, 1997). On the one hand, the new standard helped regulate the industry; on the other, it provided guidance for consumers to choose air purifiers. It also raised the bar for doing business in the air purifier industry, which contributed to the industry exits during 2017-2018.

According to Mei (2019), the industry has entered a "readjustment period of time" since 2018. Firms were adjusting their strategies and products in response to the decreased demand and the new industry standard. Given the low penetration of air purifiers in China, could new entries occur after the industry hit the bottom in 2018? How would firms adjust their strategies? Would the previous top performers be able to maintain their competitive positions? Could there be new firms that have stood out to become industry leaders? To answer these questions, I collect data, which is discussed in the following section.

DATA

As in my previous study conducted in 2015, I collected data from JD.com again in this study. According to China Air Purifier Industry Bluebook, most firms have started to sell air purifiers through online selling platforms since 2014. To check whether online selling was still popular recently, I interviewed two managers in June 2022 who were running an air purifier business in China. Both confirmed the necessity of using online platforms, though offline channels were still important. Online platforms were not only efficient distribution channels, but also served as important promotional tools. Chinese people have increasingly used the online information such as sales ranking and customer reviews to make informed

purchase decisions. Among the major online platforms, JD was still most popular and preferred by both sellers and buyers. Based on its website, JD is now China's largest online retailer and biggest Internet company by revenue. "Its unrivalled nationwide fulfillment network covers 99% of China's Population."

A complete list of firms selling air purifiers on JD can be easily found by entering "air purifier" in Product Search. As of the end of August 2022, there were 325 firms on the list. Among them, 242 were domestic firms and 83 were foreign firms representing 12 countries. 69.7% of foreign firms came from three countries: US, Germany, and Japan, contributing 25, 22, and 11 firms respectively. Well-known foreign firms included 3M, Bosch, Honeywell, LG, Panasonic, Philips, Samsung, Sharp, Siemens, Westinghouse, and Whirlpool.

Most firms sold different models with different prices on JD. Prices ranged from around RMB100 ($15) to as high as RMB 47,800 ($6,828). More domestic firms were at the low end of the price range and more foreign firms at the high end. The typical pollutants air purifiers were designed to remove were formaldehyde, PM2.5, bacteria, viruses, second-hand (SH) smoke, allergen, and pollen. Most air purifiers aimed to remove two or more of those pollutants, but formaldehyde was most wanted to be removed, followed by PM2.5. Technologies used to remove those pollutants included HEPA filters, photocatalytic oxidation, negative ion generator, and ultraviolet light, but HEPA filters were most widely used. A few firms including Dyson have offered multifunctional products which could not only remove airborne pollutants, but also serve as a humidifier or heater. There were five groups of customers air purifier firms particularly targeted: families with pets, allergic people, babies and mothers, people working in office buildings, and smokers. Applicable room size was largely between 20 and 80 square meters, but some air purifiers were designed to clean a space smaller than 20 square meters and some designed to clean a room larger than 100 square meters. The prices of air purifiers were generally associated with the room size they were able to clean.

In this study, I focus on two groups of firms: those that have established a strong competitive position in the industry and those that have not established a position to compete effectively. The former are termed as high performers and the latter termed as low performers. To identify high performers, I used two criteria: recent top seller and strong customer base. JD ranked air purifier firms every day on the basis of their sales in the past 15 days. Those that ranked high were top sellers. The sales ranking was model-specific, not associated with a firm's total sales of all models. Top sellers achieved success recently. Recent success does not necessarily mean a long-term strong position in the industry. Therefore, I added a second criterion to find high performers: a strong customer base established by top sellers which is defined as the group of people who repeatedly buy the firm's products or use its services.

I assess a firm's customer base on the basis of the total customer reviews it has received. Firms sell both air purifiers and filters. Filters need to be replaced regularly. They are often customized, so consumers tend to buy filters from their air purifier producers. Thus, old customers are the major contributors to the firm's customer base. Though the number of a firm's old customers is hardly accessible, it can be assessed based on the total number of customer reviews. According to my interviews with the two managers, customer reviews were extremely important for selling air purifiers both online and offline in China. The number of customer reviews and the overall ranking had significant impact on people's purchase decisions. Therefore, firms often made efforts to encourage each customer to write a good review for each product they sold. The number of customer reviews on JD was cumulative. It ranged from 0 to above 200K and was model-specific. Given that the highest number of customer reviews has reached above 200K, it can be argued that a firm has a relatively weak customer base if none of its models have received at least 5,000 customer reviews. Therefore, I screened top sellers based on the threshold of 5,000 customer reviews.

Detailed written reviews could be found under the "total number of customer review" tab. JD only included a maximum of 1,000 written reviews for any specific model. I found that some models' main pages displayed 5,000 or more customer reviews, but the number of the actual written reviews was less than 1,000, suggesting those models did not show accurate number of customer reviews on their main pages. Possibly, other models had contributed to their total number of customer reviews. Therefore, I used the actual written reviews to verify the total number of customer reviews displayed on each model's main page.

Based on the three criteria, i.e., recent top seller, at least 5,000 customer reviews, and 1,000 actual written reviews, I identified and recorded high performers on a daily basis from June to August in 2022. I found that the high performers might not have the same sales ranking every day, but they maintained their high positions consistently in the three-month period of time. Among 325 firms selling air purifiers on JD, 25 were found to be high performers, including 12 domestic firms and 13 foreign firms. They have established relatively better positions in China's air purifier industry. Table 2 shows the Top 10 high performers in the industry. Each of them has received more than 20K customer reviews with a rating of at least 95%. Xiaomi, a domestic firm, has secured the No. 1 position.

TABLE 2
TOP 10 HIGH PERFORMERS

Domestic Firms				Foreign Firms					
352	Huawei	Midea	Xiaomi	A.O. Smith	Blueair	IAM	Panasonic	Philips	Sharp

I screened low performers based on 100 customer reviews for two reasons. First, it can be argued that if none of a firm's models have received at least 100 customer reviews, it is not in a good position to compete effectively in the air purifier industry. Second, if the number of customer reviews is too low, it may not be reliable. According to my interviews with the two managers, it was hard for new firms to sell their products. To address the liability of being new in the industry, those firms tended to engage in the so called "buyback" practice: they bought their own products and wrote customer reviews by themselves. Among 325 air purifier firms on JD, 200, or 61.2%, were found to be low performers, including 159 domestic firms and 41 foreign firms.

In this study, I am also interested in firms' competitive strategy. I examined all 25 high performers and found that all of them sold a number of models with different prices, but only a few models put them at the top in certain price ranges. I also found that the percentages of low performers were different in different price ranges. Therefore, I segmented the industry based on prices. Table 3 shows price-based industry segments, the number of firms in each segment, the percentage of high and low performers, and the Top 3 high performers' competitive strategy: cleaning technology used, pollutants to be removed, additional functions incorporated, and room size targeted. Some segments had less than 3 or no high performers.

TABLE 3
INDUSTRY SEGMENTS, HIGH/LOW PERFORMERS, AND COMPETITIVE STRATEGY

Price Range (RMB)	No. of Firms	High/Low Performers (Percent)	Top 3 High Performers	Cleaning Technology	Pollutants Removed and Additional Functions	Room Size
20,000-47,800	22	H: 0% L: 31.8%	None	N/A	N/A	N/A
10,000-19,999	54	H: 3.7% L: 46.3%	IQAir	HEPA filter	Formaldehyde; PM2.5; pollen	51-80m²
			SoleusAir	HEPA filter	TVOC; PM2.5	101-180m²
9,000-9,999	45	H: 0% L: 38.6%	None	N/A	N/A	N/A
8,000-8,999	51	H: 5.9% L: 41.2%	AO Smith	HEPA filter	TVOC; Formaldehyde; PM2.5; bacteria	101-180m²
			IAM	HEPA filter	Formaldehyde; PM2.5; bacteria	101-180m²

7,000-7,999	53	H: 1.9% L: 34.0%	DAGX	HEPA filter	Formaldehyde; PM2.5; bacteria; SH smoke	81-100m²
6,000-6,999	58	H: 8.6% L: 36.7%	Dyson	HEPA filter	Formaldehyde Additional function: humidifier	20-50m²
			Sharp	HEPA filter	Formaldehyde; PM2.5; SH smoke; pollen	81-100m²
			Ecovacs	HEPA filter	TVOC; formaldehyde; PM2.5; SH smoke Additional function: robot	101-200m²
			SoleusAir	Photocatalysis	TVOC; formaldehyde; PM2.5; SH smoke	101-120m²
5,000-5,999	79	H: 7.6% L: 48.1%	Xiaomi	HEPA filter	Formaldehyde; PM2.5; allergen; bacteria	51-80m²
			AO Smith	HEPA filter	Formaldehyde; PM2.5; bacteria; viruses	51-80m²
			Dyson	HEPA filter	Formaldehyde Additional function: heating	20-50m²
			IAM	HEPA filter	Formaldehyde; PM2.5; SH smoke; pollen	51-100m²
4,000-4,999	94	H: 8.5% L: 41.5%	352	HEPA filter	Formaldehyde; allergen; bacteria; viruses	51-80m²
			IAM	HEPA filter	Formaldehyde; PM2.5; bacteria	81-100m²
			Panasonic	HEPA filter	Formaldehyde; PM2.5; bacteria; viruses Additional function: humidifier	51-80m²
3,000-3999	114	H: 8.8% L: 50.0%	Honeywell	HEPA filter	TVOC; Formaldehyde; bacteria; viruses	81-100m²
			352	HEPA filter	Formaldehyde; PM2.5; SH smoke; pollen	51-80m²
			IAM	HEPA filter	Formaldehyde; PM2.5; bacteria	81-100m²
2,000-2,999	113	H: 12.4% L: 46.9%	Xiaomi	HEPA filter	Formaldehyde; PM2.5; allergen; bacteria	51-80m²
			Blueair	HEPA filter	Formaldehyde; PM2.5; bacteria; viruses	20-50m²
			Huawei	HEPA filter	Formaldehyde; allergen; bacteria; viruses	81-100m²
			Berk	HEPA filter	TVOC; formaldehyde; PM2.5; SH smoke	51-80m²
			Panasonic	HEPA filter	Formaldehyde; PM2.5; bacteria; viruses Additional function: humidifier	20-50m²

1,000-1,999	104	H: 12.5% L: 51.0%	Xiaomi	HEPA filter	Formaldehyde; PM2.5; bacteria; SH smoke	51-80m²
			Philips	HEPA filter	Formaldehyde; PM2.5; bacteria; viruses	20-50m²
			Huawei	HEPA filter	Formaldehyde; PM2.5; bacteria; viruses	51-80m²
900-999	39	H: 5.1% L: 43.6%	Midea	HEPA filter	Formaldehyde; PM2.5; SH smoke; pollen	51-80m²
800-899	49	H: 6.1% L: 38.8%	Huawei	HEPA filter	TVOC; Formaldehyde; PM2.5; bacteria	20-50m²
			Xiaomi	HEPA filter	Formaldehyde; PM2.5; bacteria; SH smoke	20-50m²
			Haier	HEPA filter	Formaldehyde; PM2.5; allergen; SH smoke	20-50m²
700-799	40	H: 5.0% L: 37.5%	IAM	HEPA filter	Formaldehyde; PM2.5; bacteria	7-20m²
			Xiaomi	HEPA filter	Formaldehyde; allergen; SH smoke	20-50m²
600-699	49	H: 12.2% L: 32.7%	Panasonic	HEPA filter	PM2.5; SH smoke; allergen; pollen	20-50m²
			Haier	HEPA filter	Formaldehyde; PM2.5; bacteria; SH smoke	20-50m²
			Xiaomi	HEPA filter	Formaldehyde; PM2.5; allergen; SH smoke	20-50m²
			Huawei	HEPA filter	Formaldehyde; PM2.5; pollen; SH smoke	20-50m²
			Yadu	HEPA filter	Formaldehyde; PM2.5; pollen; SH smoke	20-50m²
500-599	47	H: 6.4% L: 31.9%	Xiaomi	HEPA filter	Formaldehyde; pollen; SH smoke	20-50m²
			Midea	HEPA filter	Formaldehyde; PM2.5; bacteria; SH smoke	20-50m²
			Haier	HEPA filter	Formaldehyde; PM2.5; bacteria; SH smoke	20-50m²
400-499	45	H: 4.4% L: 40.0%	Haier	HEPA filter	Formaldehyde; PM2.5; SH smoke; allergen	20-50m²
			Midea	Negative ion HEPA filter	Formaldehyde	< 20m²
300-399	37	H: 2.7% L: 48.6%	Xiaomi	HEPA filter	Formaldehyde; PM2.5; allergen; pollen	< 20m²
200-299	53	H: 0% L: 45.3%	None	N/A	N/A	N/A
Below 200	51	H: 2.0% L: 47.1%	Denoda	Ozone generator	Odor; bacteria	20-50m²

DISCUSSION

China's air purifier industry experienced a surge of new entries in 2014. Firms continued to enter the industry in 2015. In the following three years, however, two thirds of firms exited the industry due to improved outdoor air quality. Given the low penetration of air purifiers in China, would the industry have new entries again after it dropped from 687 firms in 2015 to 211 in 2018? This study did find new entries

after 2018. As of August 2022, 327 firms were selling air purifiers on JD. It is likely that not all firms sold air purifiers on JD, so the industry could have more than 327 firms, an increase by at least 55% in less than four years, suggesting the industry has not lost its attractiveness.

The massive industry exits during 2016-2018 were largely driven by the decreased demand for air purifiers. Since the demand had decreased, why did firms enter the industry again? Low penetration could be an explanation, but it is too broad to explain this phenomenon well. It is necessary to narrow down. According to Bhaskarabhatla and Klepper (2014), an industry often has submarkets which may be linked or independent. Firms in submarkets may come and go over time. Industry shakeout is likely to occur within each submarket (Tong, 2009). The dynamics of submarkets can have important impact on the overall industry (Klepper & Thompson, 2006). For example, Bhaskarabhatla and Klepper (2014) examined the US laser industry and its submarkets. They found that the "solid-state lasers" submarket experienced a shakeout which affected the output and the number of producers of the whole laser industry. Submarkets existed in China's air purifier industry. PM2.5 was a submarket which was relatively independent. The massive exits during 2016-2018 can be interpreted as industry shakeout which occurred in the PM2.5 submarket. It affected the total number of producers in the industry, but it had limited impact on other submarkets due to its relative independence. The PM2.5 submarket would not grow or even grow negatively if the outdoor air quality continues to improve in the future. In countries where air purifiers have been more widely used, PM2.5 has never been a major problem. Therefore, the industry's future growth would most likely come from other submarkets. The recent industry entries were largely motivated by the indoor air pollution resulting from the indoor environment itself. This study shows that formaldehyde, emitting from remodeling materials and furniture, was an indoor pollutant most wanted to be removed.

Air purifiers had more in common than they had differences seven years ago (Xie, 2016). The lack of differentiation might offer an explanation for poor performance of most firms at that time. Firms began to readjust their strategies and products after 2018 (Mei, 2019). Have firms become more differentiated since then? What distinguished high performers from low performers? Table 3 shows a majority of high performers used HEPA filters to remove airborne pollutants. There were three exceptions: SoleusAir used photocatalytic oxidation in the RMB6,000-6,999 range, Midea used negative ion in the RMB400-499 range, and Denoda used Ozone generator in the lowest price range. HEPA filters were also mostly used by less successful firms including low performers. High performers were not found to use higher rated filters. Extra features such as PM2.5 digital display were incorporated into relatively high-priced air purifiers, but they were not exclusively used by high performers. A few high performers combined other functions such as humidification, heating, and robot control into their air purifiers. Both large and small rooms were targeted by both high and low performers. It does not seem, therefore, that product design, features, and functions were important differentiators for high performers. Air purifiers have not seemed to become more differentiated since 2015 when my previous study was conducted. Lack of differentiation would make imitation easier, which partially explains why firms could enter the air purifier industry easily.

When an industry is young, firms may enjoy first-mover or early-mover advantages, but they may not sustain their advantages if entry barriers are low (Makadok, 1998) and customer switching costs are low (Lieberman & Montgomery, 1988). China's air purifier industry is still relatively young. In its first two decades of development, Yadu, a domestic firm specializing in environmental solutions, had been the leading early-mover (Wan, 1999). According to China Market Monitor, for example, Yadu claimed more than 50% of market share in 2008. However, it has gradually lost its leading position since early 2010s, though it still has remained a high performer. Xiaomi, a domestic firm founded in 2010, has recently become the industry leader. It was initially an internet firm specializing in hardware and electronic products particularly cell phones. It entered the air purifier industry in 2014, so it was a late-mover. Three other late-movers, 352, Huawei, and Midea, have also surpassed Yadu. What might have contributed to those late-movers' success? From an external point of view, low entry barriers, low switching costs, and standardization of industry products could have made contributions. These industry conditions have weakened the early-movers' competitive positions and thus created opportunities for late-movers.

Air purifiers were priced in a wide range. Table 3 shows that more firms participated in the price range from RMB1,000 to RMB4,000. Interestingly, the percentage of high performers in this range was also

higher than in all other price ranges. Since high performers were identified on the basis of customer reviews as well as sales ranking, it can be argued that air purifiers in this price range were most popular. Low performers in this range were relatively high too in percentage, but some other price ranges had similar percentages of low performers. In the upper end segments priced RMB7,000 or above, no price ranges had three high performers, suggesting difficulty in acquiring customers. However, two price ranges, RMB10,000-19,999 and RMB8,000-8,999, did relatively better. Interestingly, relatively fewer firms participated in the range RMB9,000-9,999 and there were no high performers there. Possibly, this range was stuck in the middle because the RMB10,000-19,999 range could be more valued by consumers due to better quality and the RMB8,000-RMB8,999 range more valued due to lower cost. According to Porter (1980), firms stuck in the middle are in a poor strategic position.

The high-end segments were less popular. The reason is simple: high prices reduce demand and thus the number of producers. However, air purifiers in the low-end segments did not seem to be popular either. Table 3 shows that the number of firms in the price ranges below RMB1,000 was dramatically lower, compared with that in the mid-price ranges. In the three lowest price ranges, the percentage of high performers was among the lowest and the percentage of low performers was among the highest. Why did a low-price strategy not work well in the air purifier industry? One reason could be that this strategy cannot help people solve their problems effectively. Air purifiers in the lowest price ranges were "mini models" with most of them either placed on desks or being portable. They had very limited cleaning capacity. According to Christensen and Raynor (2003), customers want to buy the products that can solve their problems, so they "hire products to do specific jobs" (P74). Mini models were cheap, but were unable to do the cleaning job well. This "job-to-be-done view" (P83) also helps explain why the industry entries in the first half of 2010 were not successful: as outdoor air quality was improving, removing PM2.5 was not an important job to be done anymore.

Practical Implications

This study suggests that firms do not have to be first- or early-movers to achieve success in China's air purifier industry. The industry conditions including low entry barriers, low customer switching costs, and product standardization have created opportunities for late-movers. They would also affect how firms compete successfully in the future. First, firms, particularly low performers, should identify their target market segments, concentrate their resources, and avoid being everything to everyone. Otherwise, they could lose their newly acquired positions easily. Most firms have sold a number of models in different price ranges in the air purifier industry, but less than 10% of them have established strong competitive positions. Those high performers have achieved success not because of their presence in many different price ranges, but their strong presence in a few price ranges or even in one price range.

Christensen and Raynor (2003) argued that the critical unit of market analysis is the circumstance or the job-to-be-done, not the customer. Therefore, they suggested using circumstance-based segmentation to gain a strong foothold in the marketplace. They used real-world examples to illustrate that companies targeting "their products at the circumstances in which customers find themselves in, rather than at the customers themselves" would more likely achieve success (P75). In China's air purifier industry, firms may find their target segments based on circumstances. For example, PM2.5 was an important circumstance in the first half of 2010s. Firms rushed into the industry to address the circumstance. In the second half of 2010s, PM2.5 as a circumstance became less severe, leading to a less important market segment. Therefore, firms exited the industry not because of the problem of the whole industry, but the problem of the circumstance. Air purifier firms need to understand different circumstances. Some of them may be seasonal like PM2.5 and pollen; some may be situational like formaldehyde and bacteria; some may be more perpetual like cooking smoke. They then need to develop relevant strategies, concentrate their resources, and become high performers there. The circumstance-based segmentation can help firms develop differentiation strategies and avoid imitation.

This study also suggests the importance of leveraging or utilizing resources in promotion and distribution, whether online or offline. It was found that domestic late-movers, including Xiaomi, Haier, Huawei, and Midea, have successfully caught up and become high performers in the air purifier industry.

Xiaomi and Huawei were IT firms. They were able to leverage their IT experience to promote and sell air purifiers online effectively. Haier and Midea were household electric appliance giants. They could add air purifiers, just another household electric appliance, to their long-established distribution channels so that air purifiers could be sold in a faster and cheaper way. The importance of promotion and distribution in the air purifier industry might be explained by product standardization. On the one hand, consumers would have problems in choosing between standardized products, so promotion becomes important. On the other hand, firms are likely to face pressure to price their standardized products more competitively. They gain cost advantages if they have efficient distribution channels. This study also found more than 60% of firms still have not gained a position to compete effectively in the industry. Assume their low performance had nothing to do with the quality of their products. Promotion and distribution would be key to their success. If they do not possess sufficient resources to promote and distribute their products, they would need to seek strategic alliances.

CONCLUSION

In this study, I revisited China's air purifier industry I researched in 2015. Firms rushed into the industry at that time, but most of them exited the industry in the next few years. The massive exits resulted from reduced demand for air purifiers. However, firms entered the industry again recently. The structural change of the industry can be better understood by examining the dynamics of its submarkets. Firms' competitive positions have also changed. Late-movers have become high performers and surpassed the former long-time industry leader. Both the industry-level factors and firm-level resources have contributed to the changes of firms' competitive positions. They would continue to affect firm success in the future.

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