

Competition, Strategy, and Performance: A Case Study of China's Emerging Air Purifier Industry

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When industries are in their early stages of evolution, competitors often show some common behaviors (Geroski, 2003), but “right” strategies do not seem to exist (Porter, 1980). By using data from a major purchasing website, this study investigates the emerging air purifier industry in China. Findings support some assumptions on new industries: a surge of new entries, competing technologies, and unrealistic expectations. Implications for effective strategies include product positioning and branding. The study also suggests the importance of early entry into a new industry, but early entry does not ensure success.

INTRODUCTION

Any industry evolves. Its life cycle is the supply-side equivalent of the product life cycle which is one of the best known and most enduring concepts in the field of marketing (Day, 1981). The industry life cycle is likely to have a longer duration than that of a single product. The early stages of industry evolution tend to be uncertain because different options exist (Eggers, 2014). There are no clear rules of the game in this period of time (Porter, 1980). However, some structural features are often shared by different industries and firms show some common behaviors (Geroski, 2003; Verreyne & Meyer, 2010).

Geroski (2003) investigated the common features existing in new markets. First, there is often a huge surge of entry into new markets. Though only a few firms are present at the very beginning, the number of new entrants will increase dramatically soon after, leading to an extremely high level of population of firms by any standard. These new entrants include both newly formed firms and newly formed units of established firms, but the percentage of the former is often much higher (Porter, 1980). Second, competing technologies tend to exist in early markets. They solve customer problems in different ways. Product designs vary and change frequently and there is no dominant design preferred by a majority of consumers (Grant, 2008). Third, new markets are often fluid. A number of new entrants come and go frequently with high entry rates and low exit rates leading to high net entry rates. Products with new features also come and go with great frequency. The fluidity of new markets is associated with competition, the innovations new entrants bring to the market, and their failures. Do these characteristics such as a surge of new entries, competing technologies, and market fluidity still hold true in non-western contexts? This is a question this study explores.

According to Porter (1980), there is no “right” strategy when an industry is emerging. Competitors include pioneers and fast followers. They may adopt different technologies and product configurations, position their products in the marketplace in different ways, and use different marketing approaches. Coping with competitors is a difficult task due to the wave of entry during this period of industry development. In addition, consumers usually do not have much knowledge about a specific technology

and product. When they face a large number of choices, they become bewildered. Winning skeptical customers is likely to go beyond the product itself. Though specific “right” strategies may not be available, Verreynne and Meyer (2010) offered some broad suggestions for firms competing in the emerging industries: broadening product scope and innovation in product lines.

This study explores a new industry in a different context: the air purifier industry in China and attempts to answer the following questions: How does this industry look like in its early stages? Is there a surge of new entries? If yes, how do firms compete and position themselves? Are there any effective strategies? By examining these questions, this study makes two contributions. First, it contributes to theory development by testing existing theories in a different context and suggesting new theories. Second, it provides practical implications for firms that compete in emerging industries.

This article proceeds as follows. First, I introduce the air purifier industry in China. Second, I discuss research methodology and present data. Third, I perform an analysis of the data, compare the results to the findings in the literature, and discuss implications. Finally, I discuss limitations and directions for future research on China’s air purifier industry.

CHINA’S AIR PURIFIER INDUSTRY

The term “air purifier” was unfamiliar to most Chinese people just a few years ago, but it has become a hot topic recently in China due to its heavy pollution, particularly in big cities. Pollution results from a variety of sources including automobile exhaust, chemical factories, power plants, industry boilers, painting and decorative materials, etc. Improving outdoor air quality is beyond individuals’ control, but indoor air quality may be improved with proper technologies. Therefore, Chinese people have started to use air purifiers to clean their indoor air recently. The air purifier industry has thus begun to emerge.

Indoor air purification is related to removing airborne pollutants in the room. Pollutants can be grouped into three categories: particulate, gaseous, and microbial. In China, PM_{2.5}, airborne particles equal to or smaller than 2.5 micrometers in diameter, is a major concern for people. These fine particles are believed to pose a great risk to health because they can get deep into the lungs and cause respiratory and cardiovascular problems. Gaseous pollutants such as formaldehyde and odors from remodeling or other sources also concern Chinese people. The release of formaldehyde into the air can cause health problems, such as coughing, eye/nose/throat irritation, skin rashes, headaches, and dizziness. Hospitals are becoming interested in removing microbial pollutants such as bacteria and viruses in their operating rooms.

Consumers fall into two categories: household and organizational. Household users often possess the following characteristics. First, they are health conscious. Usually, children, senior people, and pregnant women are the drivers of air purifier purchasing. Second, they sometimes buy air purifiers to solve specific problems. For example, if they stay or will stay in a newly remodeled homes, they would be concerned with formaldehyde or other harmful substances and be motivated to own one or more air purifiers. Third, they are often well-educated people who have good knowledge about the consequences of living in a polluted environment and the possibilities of using technologies to protect themselves.

Based on China Air Purifier Industry Bluebook (2015), sales of air purifiers had been lukewarm before 2013, but have increased dramatically since 2013. Hundreds of companies, including both specialized and diversified, have entered the industry in a very short period of time. In 2013, there were 151 firms competing in the air purifier industry, but 2014 saw a dramatic increase, with the number of competitors reaching 556. Among them, about 80% were domestic firms, but it was the foreign firms that controlled 80% of the market. How do they compete? Do they compete effectively? I address these questions by collecting data from JD.com, a major online purchasing platform in China.

DATA COLLECTION

Beginning from 2014, a majority of firms have started selling air purifiers through online platforms and offline sales have begun to decrease (China Air Purifier Industry Bluebook, 2015). The important

online platforms include JD, Taobao/Tmall, and Amazon. Among them, JD is most popular and is preferred by both sellers and buyers. Some anecdotal evidence suggests that air purifier firms need to display their products on the JD platform in order to achieve success. In addition, customers often use the information from JD to help them make informed decisions, even if they make a purchase offline. In this study, I examine industry competition, firm strategy and performance based on the data from JD.

As of June 2015, there were 416 firms selling air purifiers through JD platform. Among them, 360 were domestic firms and 56 were foreign firms representing 11 countries. Both specialized and diversified firms were involved in this industry. Diversified firms were largely well-known multinational corporations including 3M, Haier, Honeywell, Lenovo, Mitsubishi, Panasonic, Philips, Samsung, Sanyo, Sharp, Westinghouse, etc. Prices ranged from below RMB 1,000 (\$158) to RMB 50,000 (\$7,936). Competitors offered different air purifiers in terms of technologies and filters used which were priced differently. The same company often competed in different price ranges by using different models. Price can be an important segmentation variable for an industry. Table 1 shows information on price-based industry segments: the number of firms competing in different price ranges. Products with prices above RMB20,000 or below RMB1,000 had relatively low sales, so firms competing in those segments were not included.

TABLE 1
PRICE-BASED INDUSTRY SEGMENTS

Price Range (RMB)	Number of Domestic Competitors	Number of Foreign Competitors	Total
¥15,000 - ¥20,000	1	4	5
¥10,000 - ¥14,999	2	8	10
¥9,000 - ¥9,999	2	8	10
¥8,000 - ¥8,999	2	4	6
¥7,000 - ¥7,999	3	6	9
¥6,000 - ¥6,999	9	8	17
¥5,000 - ¥5,999	15	19	34
¥4,000 - ¥4,999	13	20	33
¥3,000 - ¥3,999	34	21	55
¥2,000 - ¥2,999	33	17	50
¥1,000 - ¥1,999	51	19	70

Firms competing in the price ranges shown in Table 1 used different technologies, including HEPA, negative ionizers, ozone generators, ultraviolet light, photocatalytic oxidation, and electrostatic. Under each technology, there were a variety of product designs. For example, the inflow and outflow of air were designed in different ways. Some brands used a bottom-to-top air flow, while others used a top-to-bottom air flow. Some brands looked simple, while others complex with additional features and functions. An interesting phenomenon is that many competitors combined different technologies which allegedly could remove different types of pollutants. Table 2 shows those technologies and their characteristics. Each technology has its advantages and disadvantages. No single technology can effectively solve the indoor pollution problems Chinese people face.

Though hundreds of firms were competing through JD platform, only a few of them performed well. When ranking firms' sales performance, JD and other purchasing websites used the number of reviews

consumers created after purchasing. I followed this practice. Table 3 shows top performers' information in different price ranges since they started selling air purifiers through JD.

TABLE 2
AIR PURIFIER TECHNOLOGIES AND THEIR CHARACTERISTICS

Technologies	Pros	Cons
HEPA filters	<ul style="list-style-type: none"> – Effective in removing 99.97% of 0.3-micrometer particles – No ozone production or other harmful byproducts 	<ul style="list-style-type: none"> – Short lifespan – Ineffective in removing viruses, harmful gases and odors
Activated carbon	<ul style="list-style-type: none"> – Effective in removing viruses, harmful gases, and odors 	<ul style="list-style-type: none"> – Short lifespan – Ineffective in removing airborne particles
Negative ion generator	<ul style="list-style-type: none"> – Effective in absorbing airborne particles, harmful gases, and odors 	<ul style="list-style-type: none"> – Ozone production
Photocatalytic oxidation	<ul style="list-style-type: none"> – Effective in removing harmful gases and viruses 	<ul style="list-style-type: none"> – Ineffective in removing airborne particles – Ozone production
Ultraviolet light	<ul style="list-style-type: none"> – Effective in sterilizing air that passes UV lamps via forced air 	<ul style="list-style-type: none"> – Ineffective in removing airborne particles
Electrostatic filters	<ul style="list-style-type: none"> – Able to remove airborne particles, viruses, and odors – Relatively longer lifespan 	<ul style="list-style-type: none"> – May not be as effective as traditional filters

In the air purifier industry, the number of customer reviews could be as important as the reviews themselves to online sellers. The reason is that consumers had very little knowledge about air purifiers, so they would look at the information on how well a specific brand was selling online to make a purchase decision. If a certain air purifier has been sold in large quantities, consumers would assume it was a good product or people would not buy it. The information about actual sales was not available online, so consumers would use the number of reviews as a substitute. As a result, online sellers had tried to encourage buyers to create reviews. It may be argued that sellers ranked #1, #2, and #3 in an industry are successful competitors. In this air purifier industry, however, the second or third best seller could be far behind the best seller, so they might not count as top performers. For the purpose of this study, if the number of customer reviews the second or third best seller received was only 25% or less than 25% of that of the best seller, they were not included in the “Top Performers” column of the table.

DISCUSSION

Both domestic and foreign firms rushed into China's air purifier industry in a very short period of time. While 151 air purifier firms were competing in 2013, 405 more were quickly added to the competitor population the following year. This phenomenon confirms the new market entry theory and is consistent with the findings in the West. For example, the number of automakers in the US reached about 275 shortly after the birth of the car industry. The population of beer producers was about 500 before the War, but skyrocketed to more than 25,000 just after the War (Geroskib, 2003).

The surge of entry often occurs before the industry begins to grow large. When it grows, the number of firms tends to decrease and the industry becomes more concentrated (Agarwal et al, 2002; Geroskib, 2003). Therefore, market entry and market size are often negatively correlated, which seems counterintuitive. Actually, the wave of entry into a new market is more like a speculative bubble which

will eventually burst because sooner or later industry shakeout will occur. In the case of China's air purifier industry, there is no obvious sign of exit yet, but given that most competitors received very limited or no customer reviews, the industry does not seem to have expanded big or fast enough to support all the players' entries. Why did so many firms flood into this industry before it was large enough to accommodate all of them? There could be several reasons.

TABLE 3
TOP PERFORMERS IN DIFFERENT PRICE RANGES

Price Range	Sales Ranking	Top Performers	Number of Reviews	Starting Time at JD
¥15,000- ¥20,000	#1	IQAir	110	March 2013
	#2	Airgle	64	June 2014
	#3			
¥10,000- ¥14,999	#1	IQAir	1,228	March 2013
	#2			
	#3			
¥9,000- ¥9,999	#1	Philips	161	May 2010
	#2	Austin	73	September 2013
	#3	Siegenia	58	June 2014
¥8,000- ¥8,999	#1	A.O Smith	102	June 2015
	#2	Honeywell	43	December 2014
	#3			
¥7,000- ¥7,999	#1	Airdog	66	January 2015
	#2	Sharp	51	February 2012
	#3			
¥6,000- ¥6,999	#1	Blueair	3,361	April 2013
	#2	NBE	1,003	September 2014
	#3			
¥5,000- ¥5,999	#1	Blueair	1,238	April 2013
	#2	Airdog	345	January 2015
	#3			
¥4,000- ¥4,999	#1	Shinil	1,433	December 2012
	#2	Austin	804	September 2013
	#3	NBE	648	September 2014
¥3,000- ¥3,999	#1	Mfresh	7,279	January 2015
	#2	Blueair	6,303	April 2013
	#3	Sharp	5,630	February 2012
¥2,000- ¥2,999	#1	Philips	18,265	May 2010
	#2	Daikin	7,049	April 2012
	#3	Honeywell	6,633	December 2014
¥1,000- ¥1,999	#1	Sharp	26,698	February 2012
	#2	Panasonic	12,164	October 2010
	#3	Honeywell	8,247	December 2014

First, the entrants might have assumed China would be a huge market for air purifiers due to its deteriorating environment, so there could be an opportunity for them to set up a profitable business there. Getting into the market early would give them first-mover advantages. Second, the barrier of entry was relatively low. Set-up costs were typically small. The main components of an air purifier included filters, a motor, and housing. It was not difficult to acquire and assemble them. Standards explaining air purifier performance were yet to be established. There were a number of test centers in China, but they did not use the same indicators in their test reports and present the test results in the same ways. Third, most consumers did not have sufficient knowledge about air purification technologies and how to select air purifiers that would fit their needs. The entrants might have thought that consumers would not be likely to become fixed in their purchasing habits and loyal to a certain technology or brand. Therefore, its product would be as good as others' at satisfying consumer needs.

Table 1 shows that a majority of firms were competing in low-end segments. When competitors are broken down into domestic and foreign ones, we can see domestic competitors were more involved in low-end segments, while foreign competitors more involved in high-end segments. Interestingly, the number of firms competing in the price range RMB7,000-RMB8,999 was relatively low. A possible explanation is that firms would be more likely to position themselves as either being a high-quality brand or a low-price competitor. They did not want to be "stuck in the middle," which might not be an effective strategy (Porter, 1980; Segev, 1989).

Theory suggests competing technologies and a variety of product designs often exist in the early stages of industry evolution (Grant, 2008; McGahan, 2004). China's air purifier industry appears to support the theory. Competitors employed different air purification methods as shown in Table 2. Each had its own pros and cons. Despite the limitation of each technology, most competitors, including low price competitors, claimed they used the world-class technologies which could solve customer problems effectively. The fact is that only a very small percentage of firms appear to have convinced and acquired enough customers as shown in Table 3. This finding is not rare in new industries. The reason is simple: there are simply not enough customers to consume so many competitors' products.

The air purification technologies can be grouped into two categories: physical absorption and chemical decomposition which are used to address specific pollutants and customer concerns. The former category was more often used by competitors in high-end segments and advertised as producing no secondary pollution, but could be ineffective in filtering out bacteria. The latter was more often used by low price competitors and advertised as being able to kill bacteria, but could generate ozone. In order to improve their products' appeal, some competitors combined different technologies, but the result has yet to be seen. It is not clear whether combining technologies will become a trend in the future. Product designs seem to reflect the Chinese culture to a certain degree. For example, people in China often like their important household items to be aesthetically pleasing as well as functional. Therefore, many competitors, particularly domestic ones, had their air purifiers beautifully designed, but whether this could deliver real customer value in terms of cleaning the air was another issue.

From the competition point of view, not all strategies the air purifier firms used were effective. Only some seem to have worked well. First, top sellers competed either in the high-end or low-end segment, but seldom competed in both. For example, Sharp, a well-known multinational corporation, was leading in the low-end segment. It did not offer any expensive air purifiers though it had a deep pocket to develop them. There were some firms that offered air purifiers with both high and low price tags, but few of them succeeded. This result is consistent with the competitive strategy theory developed in the West. Firms are advised to be a cost leader or a high-quality brand, but not to be both because being both would harm their images and confuse consumers as well as complicate operations.

Second, like many other competitors, top performers had also offered a variety of models that were intended to address different customer concerns such as airborne particles, formaldehyde, odor, smoke, bacteria, etc., but only a few models sold well. Each top performer generally relied upon one or two models to generate most of the revenue. It seems product positioning is important in this emerging industry. A general theory is that a firm's product should be positioned distinctively in the competitive

marketplace (Porter, 1980), but in China's air purifier industry top sellers do not seem to have unique product positioning strategies, which is discussed next.

Third, competing air purifiers were not of much difference from a technical point of view. When they were in the same price range, they tended to use similar technologies and incorporate similar features. Facing a bewildering array of choices, most consumers only focused on a few brands that were relatively better known. Overall, foreign brands sold better than domestic ones. Chinese people have a tendency to favor foreign brands, which might be a reason why foreign firms achieved better success. Many foreign firms have actively participated in this industry, but only a few were able to attract enough consumers. Top performers were generally early entrants. They seem to have enjoyed an important "first-mover" advantage: brand awareness which has helped them enter a virtuous cycle, that is, the early buyers led followers to purchase the same brand who in turn led their followers to do the same so that more and more people would choose the same brand. Though early entrants enjoyed some advantages, not all of them achieved the same level of success. Based on Table 3, later movers still could outperform the pioneers, suggesting the importance of competitive strategy.

LIMITATIONS AND FUTURE DIRECTIONS

This study has two limitations. I collected additional data to assess their impact. First, I only used data from a major purchasing website: JD.com. Actually, firms sold air purifiers both online and offline. For online sales, firms also used other websites like Taobao/Tmall. A clearer picture about the industry might be generated if both online and offline data were combined. For the purpose of this study, however, this limitation would not have significant impact on the implications it provides. Theoretically, the study tests assumptions on industry structure and competition in a different context. The data from the JD website seem to confirm them. Though offline data were not collected, given the importance of online presence for air purifier firms, the online data from the major purchasing website would be able to reflect the real situation to a large degree. Practically, the study explores effective competitive strategies in a context of emerging industry. The data suggest the importance of competitive positioning, brand awareness, and early entry, which has important implications for practitioners. In order to make sure the data from JD were sufficient to explain competitive strategies, I performed additional research. First, I interviewed an air purifier firm in Beijing whose sales were both online and offline. I asked the employees about their pricing strategy for online and offline sales. Their response was that they kept prices consistent both online and offline. They stated this was a common practice in the industry because inconsistent online and offline prices would cause problems such as customer dissatisfaction and inappropriate competition within the same business. Second, I examined data from another important purchasing website, Taobao. I found that most sellers on JD also appeared on Taobao and those did well on JD were also doing well on Taobao, suggesting the data from JD would not lead to significant representativeness issues.

Given the importance of online presence in the air purifier industry, future research might compare online and offline sales and examine how online sales facilitate offline sales. According to Miller, Fabian, and Lin (2009), online sites can affect product demands, but strategy scholars have made very limited contributions to understanding demand dynamics through Internet. This study suggests online sales can improve customer awareness and firm credibility in a new market. Therefore, online presence might be a source of competitive advantage firms can exploit to acquire customers when the market is new.

The second limitation of this study is related to the assessment of firm sales. I followed JD and other online platforms' practices and used the number of customer reviews as an indicator of firm sales performance. It is likely that not all customers left comments online after purchasing, though sellers made great efforts to encourage them to do so. To be sure that the measurement would not cause significant problems in this study, I interviewed an air purifier firm whose employees stated that the number of customer reviews generally reflected a firm's sales performance, so it was often used as a benchmark for comparing competitors' online sales. Future research might focus on how the number of reviews affects consumers' perceptions and their choices.

When assessing sales performance, I did not consider the impact of the time the firm started selling air purifiers through JD. The earlier the firm started online selling, the more customer reviews it might receive cumulatively if all other things are equal. Therefore, firms might become top performers due to the measurement the study used rather than their actual competitiveness. In order to assess the time impact, I examined the data on Taobao. Taobao presented information about a firm's sales in the most recent 30 days measured by the number of customer reviews. I found that top performers listed in Table 3 were also selling better than most competitors on Taobao in the past 30 days. Based on this finding, it might be argued that the total number of customer reviews a firm received over time could serve as an indicator of its overall competitiveness. Therefore, the time impact would be limited, controlling for "first mover" advantages.

China's air purifier industry is still in its early stages of evolution. At this time, it is hard to know how the future will unfold, which provides ample research opportunities for strategy and entrepreneurship scholars. Future research may focus on three broad areas. First, how will the industry evolve? This question is practically important for firms currently competing in this industry. Firms have used different technologies to clean the indoor air. Would it be likely that a few of them finally become "standards?" Under the same technology, product designs such as air flows vary. Would there be a dominant design in the future? Another important question air purifier producers might need to answer is: how likely is it that this industry evolves to a growth stage? For example, firms have started to explore the possibilities of adding the air cleaning function to the air conditioning system, which means the air purifier as a single unit might disappear in the future. If this substitution is technically feasible, would the air purifier industry be an ephemeral phenomenon?

The second research area is related to the factors influencing the air purifier industry. The emergence of the industry was mainly driven by environmental concerns and consumer needs. What factors would play a key role in shaping the industry evolution? Would the evolution be influenced more by its own structure (competitors, customers, and suppliers) or by the macro environment factors such as sociocultural, political, technological, economic, and environmental concerns? As the industry evolves, consumers will become more knowledgeable. How would more knowledgeable consumers affect the industry in the future? The government has recognized the irregularities in the air purifier industry and has recently created new standards which will take effect March 1, 2016. The new standards would probably eliminate a number of existing air purifier producers, but would they encourage or discourage new entrants in the future?

The third research area is related to strategy. There have been so many competitors rushing into this industry. They have largely focused on the functionality of their products, but most of them were not successful in terms of winning customers. How would they change their strategy in order to avoid being driven out of the market? For example, a product may be seen as a collection of characteristics organized in a certain way (Geroski, 2003). These characteristics can be grouped into two categories: core and peripheral. Core characteristics are largely related to the technologies used in the product. They determine the nature of the product and how the product solves customer problems. Other characteristics are peripheral. Would peripheral characteristics become more important? Competitors include both big firms with deep pockets and smaller firms specializing in air purifiers. How would they compete against each other in the future? Who would do better? Competitors also include foreign and domestic ones. Currently, foreign competitors seem to be leading in this industry. Could they sustain their success? How likely would domestic competitors catch up and establish their positions? For entrepreneurial firms, could they survive competition and grow? How?

CONCLUSIONS

This study examines competition, strategy and performance implications in an emerging industry in China. Though the broad context in China is different from that in the West, the Chinese air purifier industry appears to present some common features found in the West. It is easy to understand why this industry emerged recently, but more difficult to predict how it will evolve. Many factors could affect its

evolution and they are probably intertwined. Research on this industry would not only contribute to theory development in the field of strategy and entrepreneurship, but also provide practical implications to practitioners.

REFERENCES

- Agarwal, R., Sarkar, M. B., & Echambadi, R. (2002). The Conditioning Effect of Time on Firm Survival: An Industry Life Cycle Approach. *Academy of Management Journal*, 45(5): 971-994.
- China Air Purifier Industry Bluebook (2015). www.tech.163.com.
- Day, G. S. (1981). The Product Life Cycle: Analysis and Applications Issues. *Journal of Marketing*, 45(4): 60-67.
- Eggers, J. P. (2014). Competing technologies and industry evolution: The benefits of making mistakes in the flat panel display industry. *Strategic Management Journal*, 35(2): 159-178.
- Geroski, P. A. (2003). *The Evolution of New Markets*. Oxford University Press.
- Grant, R. M. (2008). *Contemporary Strategy Analysis*. Blackwell Publishing.
- McGahan, A. M. (2004). *How Industries Evolve*. Harvard Business School Press.
- Miller, K. D., Fabian, F., & Lin, S. (2009). Strategies for online communities. *Strategic Management Journal*, 30(3): 305-322.
- Porter, M. (1980). *Competitive Strategy*. The Free Press.
- Segev, E. (1989). A Systematic Comparative Analysis and Synthesis of Two Business-Level Strategic Typologies. *Strategic Management Journal*, 10(5): 487-505.
- Verreynne, M., & Meyer, D. (2000). Small business strategy and the industry life cycle. *Small Business Economics*, 35(4): 399-416.