A Wealth of Data

Summary

In this paper, we separately summarize the online sales rules of 3 products, and provide pertinent and credible sales strategies for each product, as consultants of sunshine company. We analyze the relationships between parameters in sales data from different angles. Word frequency analysis is also adopted to build standard measures of products, and to explore the changing of consumers' demand.

In the first part of each product report, we obtain the overall market performances of the product by analyzing the situation of star rating, favorable rating, and sales volume in the past years. Quarterly analysis among years is also done to find the relationship between sales volume and seasons. We also study the relationship between favorable and unfavorable ratings and contemporaneous sales volumes. Based on the above research, we draw a conclusion that hair dryer is a seasonal commodity and sells well in winter and spring; baby pacifier's sales will decline in summer; and microwave oven is not a seasonal commodity. We also find that the sales volume of hair dryer is closely related with the favorable and unfavorable ratings, while the sales volume of baby pacifier and microwave oven has little relationship with favorable ratings.

In the second part of each product report, we use word frequency analysis in customers' comments of each product to study the product attributes and the concerns of consumers. Main indicators most concerned by customers are concluded separately for these 3 products by analyzing the degree of consumers' attention. We also get the conclusion that the customers of hair dryer will constantly change their preference for the product from 2006 to 2015; the customers of infant pacifier mainly change their demand from "price" and "size" to "safety" and "appropriateness of bottle" from 2012 to 2015; most of customers of microwave oven are concerned much more about the "size" of microwave oven, and the online market of microwave is immature.

In addition, we find that online market is mostly affected by the effect of big brand via comparing two different hair dryer brands in different years. The annual whole market performance is set as the control group. When there are a small number of brands, brand awareness is positively related to product praise rate, and praise rate is positively related to product sales. It is also found that when users see some high praise comments from low stars, they are likely to write comments related to them; the emotional color of the comments is highly consistent with the rating stars of users, and if the better the user's comments are, the higher the rating will be, and vice versa.

At the end of this paper, we draw the conclusion for the marketing director of sunshine company: different products have different susceptibility on the market feedback; good comments and the market change reflected by the sales volume can indicate the success of the products. And we give the specific sales strategies for different products.

Keywords: user feedback   seasonal product   word frequency analysis   brand effect

Contents

Advice to Sunshine Company

Dear Sunshine company,

Hello, as a special consultant of your company, we have analyzed the data of hair dryer, infant pacifier and microwave oven provided by your company in the past years, and put forward the following suggestions to your company through the conclusions:

1、 Ensure product quality and reputation

We find that different product ratings have different effects on sales volume by studying the change of sales volume and the corresponding praise rate.

For hair dryer, the product rating will greatly affect the sales volume of hair dryer. For example, from the first quarter of 2012 to the fourth quarter of 2012, both the positive and negative evaluation rates fluctuated greatly. According to the sales volume fluctuation of the hair dryer in the four quarters of 2012, it really shows that the user's evaluation of the hair dryer can reflect some problems existing in the hair dryer, which leads to the change of the sales volume of the hair dryer. Therefore, when selling hair dryer, you should pay attention to keeping a good reputation of hair dryer.

For infant pacifiers, the evaluation of the whole market remained unchanged from 2003 to 2015, and the sales volume kept stable growth in other time except for the seasonal sales decline in summer. However, this does not completely indicate that the sales volume of infant pacifiers has nothing to do with word-of-mouth. It should be noted that in such a long period of time, the praise rate of the whole market is as high as 81.12%, and in the two years from 2012 to 2012, the praise rate of the market is also up and down 81%. Therefore, it may not be a direct way to increase the sales volume for stabilizing the reputation and quality of infant pacifiers, but it can still ensure that the sales volume of products will not decline, which is also an indirect way to increase the sales volume.

For microwave ovens, the market's scores fluctuated greatly, ranging from 0.07% to 15.28% in the four quarters from 2012 to 2013, but the market's sales volume was abnormal. Despite the decline in the popularity of microwave ovens, the sales volume of microwave ovens is still growing by a small margin. Therefore, the method to ensure the reputation and quality can not improve the sales volume of microwave oven.

2、 Pay attention to the impact of seasonal changes on products

Not only market factors but also environmental factors, such as seasonal changes, should be considered to affect product sales. Through the analysis of each quarter from 2012 to 2013, we found that the hair dryer is a bimodal seasonal products, for example, in the spring and winter of 2012, the sales volume increased by nearly 80%, and the sales volume in the summer and autumn of 2013 dropped by 16.37% on average; for the infant pacifier, it is not a seasonal

commodity, but it will appear seasonal sales in the summer The decline of quantity; for microwave oven, the change of season will hardly change its sales volume. Therefore, when selling hair dryer, we should make different strategies according to the seasonal changes. For example, when changing seasons in spring and summer, we can timely promote sales and increase the average sales volume of the whole year by increasing the spring revenue.

3、 Focus on the change of users' demand for products

In addition to the grasp of the overall market, if we want to truly achieve the success of the product, targeted analysis of user demand for the product is very necessary.

For hair dryer, between 2002 and 2015, the main demand of users for hair dryer is temperature control, price, noise level, However, the user's demand is constantly changing. For example, in 2010, the user is more concerned about the weight of the hair dryer. At this time, the hair dryer should be light-weight processing; for infant pacifiers, the user's demand is mainly size, price, material, and users' demand for safety and bottle appropriateness is growing. Therefore, when selling infant pacifiers, your company should focus on improving the safety and adaptability of products; for microwave ovens, the user's demand is mainly the size of microwave ovens. Until 2015, the user's demand for the size of microwave ovens has become higher and higher. Therefore, at present, in order to meet the different size needs, in order to make corresponding strategies in time, you should pay more attention to micro Demand change of microwave oven market.

4、 Build your own brand influence

Through the analysis of the hair dryer brands Andis and Conair, at the beginning, their sales volume was similar to that of other brands. However, after other brands were eliminated, they could still exist. In the middle of the development of Andis and Conair, the brand influence gradually gives play to its advantages, and the annual sales of Andis and Conair are growing rapidly. Therefore, for your company, through advertising and other forms, it can quickly improve the popularity of products, so as to improve brand influence and product sales.

The above is all suggestions for your company. Thank you for your employment. I hope your company can succeed.

March 9, 2020
Sincerely, Team #2006905

I. Hair dryer Investigation Report

1. Online Market Analysis of hair dryer

The online market is composed of many online stores. Online stores are different from offline stores because each post-purchase customer can leave a message in the comment area below the product and give a score for the product. These comprehensive ratings can directly reflect the overall quality of the product. Therefore, we analyze a comprehensive rating of the overall online market of the hair dryer. We have screened each rating to get the corresponding number of different stars, as shown in Figure 1.1.1 below:
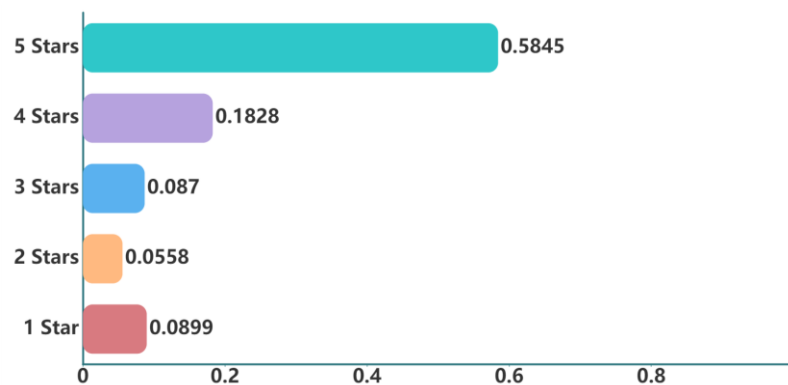

Figure 1.1.1 Stars ratings of hair dryer online market at all levels

From the above data, it can be calculated that the comprehensive rating of the whole online market of hair dryer is 4.11. We regard five-star and four-star comments as favorable comments, and one-star and two-star comments as unfavorable comments. Therefore, according to the above data, we can get the positive and negative ratings of the entire online market as shown in Figure 1.1.2 below.
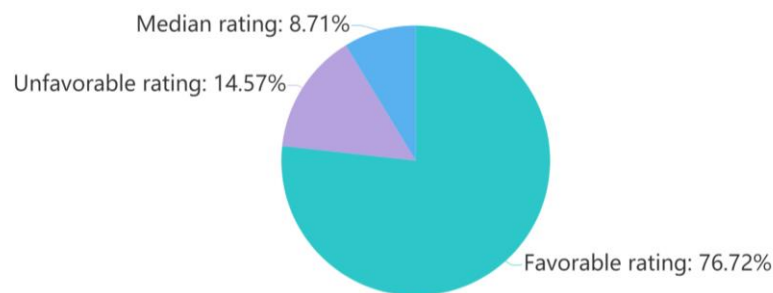

Figure 1.1.2 Proportion of favorable and unfavorable ratings

It can be seen from the above figure that between 2002 and 2015, the online market of the whole hair dryer has a favorable rate of 76.72% and an unfavorable rate of 14.57%. As the market may fluctuate for various reasons, we can specifically analyze the sales of each year by screening the number of reviews in each year, as shown in Figure 1.1.3 below.
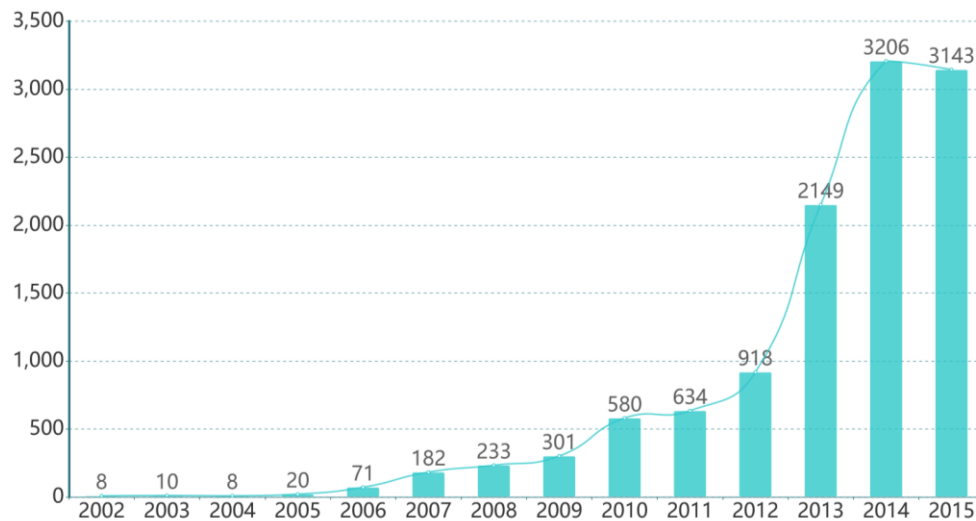
Figure 1.1.3 Annual reviews of hair dryer online market

As can be seen from the figure above, the overall sales of hair dryer online market grew slowly from 2002 to 2012. By 2013, there may be some reasons that led to a substantial increase in hair dryer sales. From 2011 to 2012, the sales increased by 44.79%, from 2012 to 2013, the sales increased by 134.10%. Compared with 2012, the sales in 2013 increased by 89.31%. Through the data screening, we get the sales volume and favorable ratings in the four quarters of 2011, and the sales volume and favorable ratings in the four quarters of 2012, as shown in Figure 1.1.4.
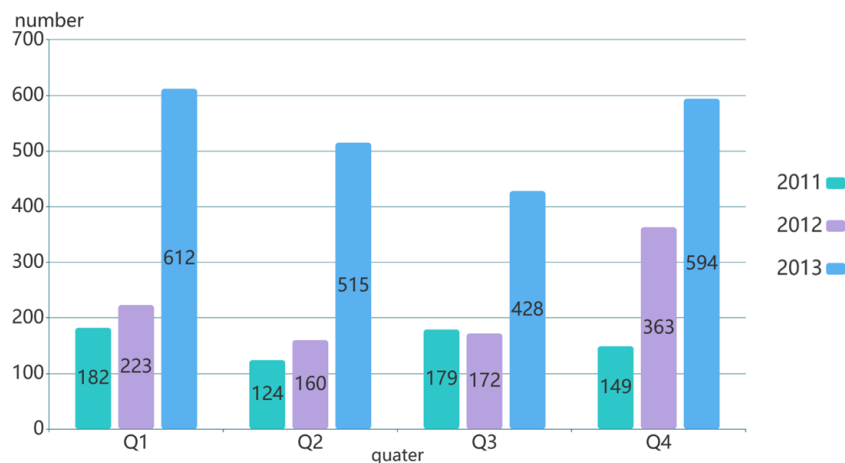

Figure 1.1.4 Sales volume in each quarter of 2011~2013

According to the above figure, the sales volume in the four quarters of 2011 are 182,124,179 and 149, 2012 are 223,160,172 and 363 respectively. The sales volume in the second quarter of 2011 decreased by 31.87% compared with the previous quarter, increased by 44.35% in the third quarter, decreased by 16.76% in the fourth quarter, increased by 49.66% in the first quarter of 2012, decreased by 28.25% in the second quarter, increased by 7.50% in the third quarter and increased by 110.05% in the fourth quarter. In the second quarter of 2011 and 2012, the sales of hair dryer decreased by about 30%, and in the second quarter of 2013, the sales of hair dryer in the

third quarter and the second quarter of 2013 were significantly lower than that in the first quarter and the fourth quarter, so it can be concluded that the sales of hair dryer in summer and autumn were relatively small, while the sales of hair dryer in winter and spring were relatively large, **indicating that the hair dryer was affected by the season, it is seasonal product.**

As can be seen from the above figure, the first quarter of 2012 increased by 22.52% year-on-year compared with the first quarter of 2011, the second quarter decreased by 28.25% year-on-year, the third quarter decreased by 3.91% year-on-year, and the fourth quarter increased by 143.62% year-on-year. Then we count the favorable and unfavorable ratings of each quarter from 2011 to 2012 as shown in Figure 1.1.5.
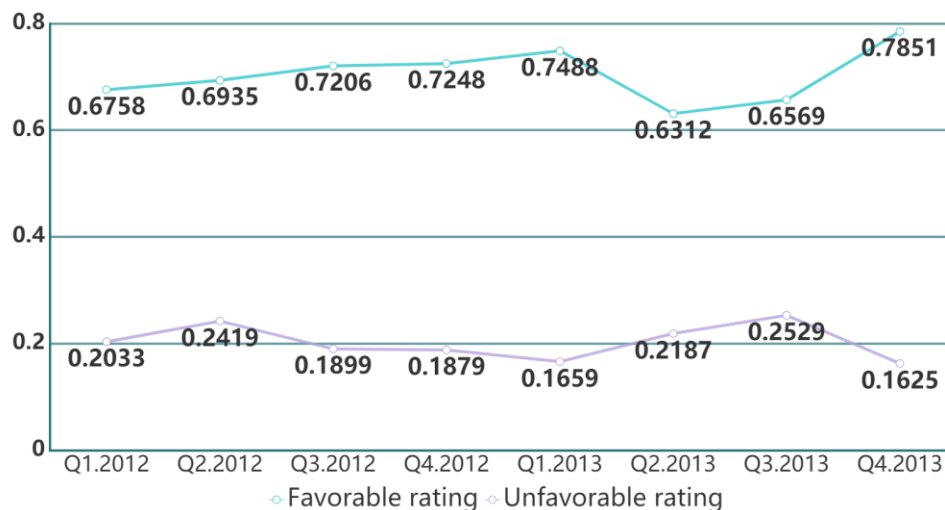

Figure 1.1.5 Favorable and unfavorable ratings in 2011-2012 quarters

In the first quarter of 2011, the positive and favorable rates were 67.58% and 20.33%, respectively, while in the first quarter of 2012, they were 74.88% and 16.59%, with the favorable rates increasing by 7.30% and the unfavorable rates decreasing by 3.74%; in the fourth quarter of 2011, the favorable and unfavorable rates were 72.48% and 18.79%, respectively, while in the fourth quarter of 2012, they were 78.51% and 16.25%. Compared with the above-mentioned 22.52% year-on-year growth in the first quarter of 2012 and 143.62% year-on-year growth in the fourth quarter of 2012, it can be seen that the rise of favorable rate and the decline of favorable rates are closely related to the year-on-year growth of sales volume. Therefore, improving the favorable rates of the products can effectively improve the sales volume of the products and make the products succeed.

2. Specific measures to improve the favorable rate of hair dryer

2.1 Meet users' changing product needs

2.1.1 Relevant measures of product attributes

At the request of the marketing director, we can calculate the impact of each product on the sales volume by calculating the product feedback made by the users who purchase the product. In distinguishing different users (such as vine man and verified-purchased man), according to the

existing feedback (user's review and user's helpfulness rating), the word frequency of different users' attribute evaluation words can be calculated.

If the user is a vine man, the word frequency of his review keywords will be recorded as twice; if the user is not a vine man, and he is a verified-purchased man, the word frequency of his review will be calculated normally; if the user is a vine man but not a verified-purchased man, his review will be invalid, and the vote of his helpful rating evaluation will be invalid. When the word frequency of product attributes is obtained, combined with the characteristics of the product, the influence measure of product sales can be obtained. The flow chart of the steps to obtain indicators is as follows.
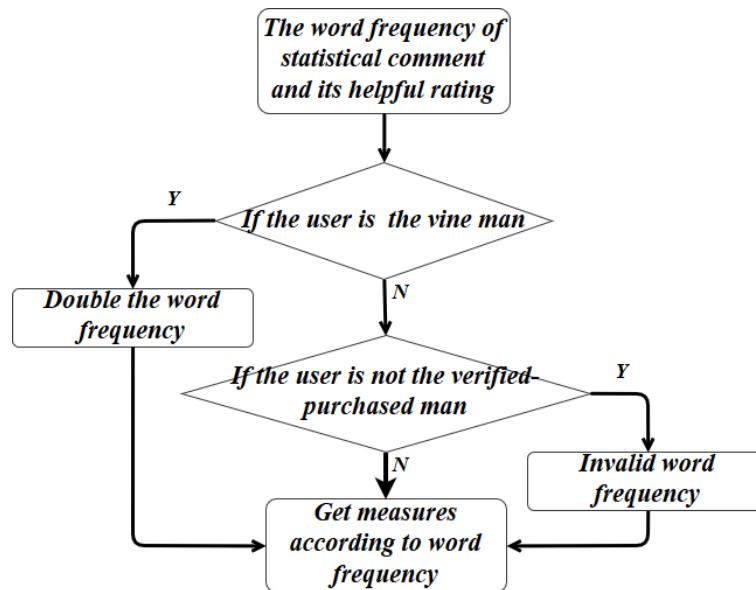

Figure 1.2.1 Flow chart of getting measures

According to the above flow chart, the following word frequency cloud can be obtained after selecting the words related to product attributes and removing the irrelevant words from the data brought into the hair_dryer.tsv table.
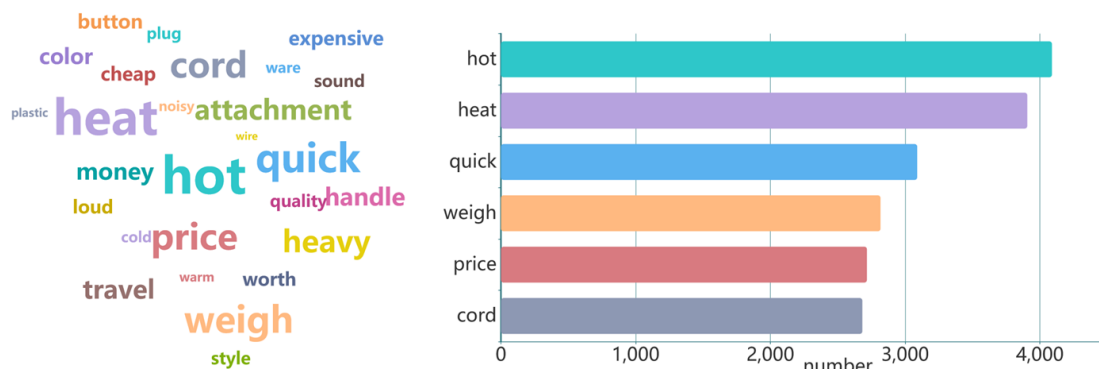

Figure 1.2.2 The word frequency cloud of hair dryer

According to the characteristics of different word frequency products of word frequency cloud, such as heat-word and hot-word can reflect that users care about the wind temperature of the hair dryer, and that heavy-word and weigh-word can reflect that users care about the weight of the hair dryer. It can be concluded that the main indicators most concerned by users who buy hair dryer are: temperature control, price, noise level, weight and hardware quality.

2.1.2 Normalized to standard measure

Statistics of word frequency related to the above indicators show that the highest word frequency reflected by users in all 11470 comments is the temperature control of hair dryer, which has 9375 times, followed by the price of hair dryer, the hardware quality of hair dryer, the weight of hair dryer, which has 7833 times, 8071 times, 6743 times, and finally the noise level of hair dryer has 2499 times.

It can be seen from the above figure that the highest word frequency measure reflected by users in all 11470 reviews is the temperature control of hair dryer, with 9375 times, followed by the price of hair dryer, the hardware quality of hair dryer, and the weight of hair dryer, with 7833 times, 8071 times, and 6743 times, respectively. Finally, the word frequency of noise level of hair dryer is 2499 times. After normalizing the frequency of the above indicators, the statistics are as follows:
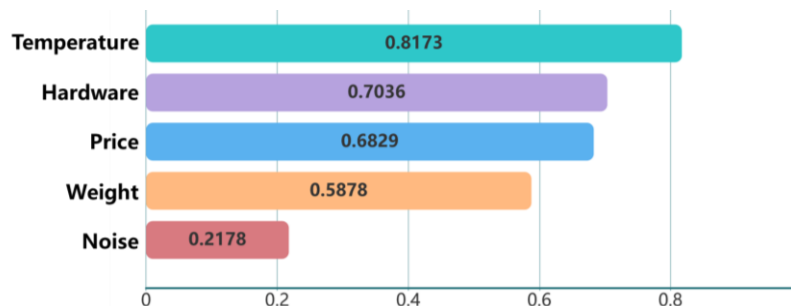

Figure 1.2.3 Normalization treatment of attribute measure of hair dryer

As can be seen from the above figure, 81.73% of the 11470 people who commented stated that temperature is important, 68.29% think price is important, 21.78% think noise problem is important, 58.78% think weight of hair dryer is important and 70.36% think external hardware attributes of hair dryer, such as hair dryer wire, plastic shell and color are important. It can be concluded that the vast majority of users are more concerned about the temperature control of the hair dryer, while only a small number of users are concerned about the noise of the hair dryer. From the above data, we can get the equivalent radar chart of five standard factors that affect the hair dryer sales volume.
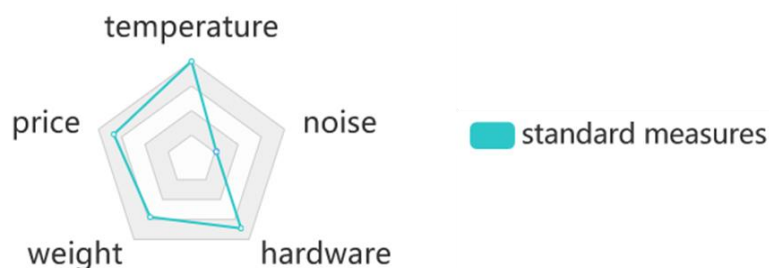

Figure 1.2.4 Standard measures radar chart of hair dryer

2.1.3. The user's attribute preference for hair dryer will gradually change

With the change of time, different users will have different needs for the same product. In different quarters, we need to develop new product design according to the market feedback to meet different needs.

By analyzing the data in hair_dryer.tsv table, we can get the purchase situation of products and the specific feedback of users from 2006 to 2015. According to the analysis of word frequency related to commodity attributes, we can get the attention degree of users to different indicators in different years. The data is shown in the figure below.
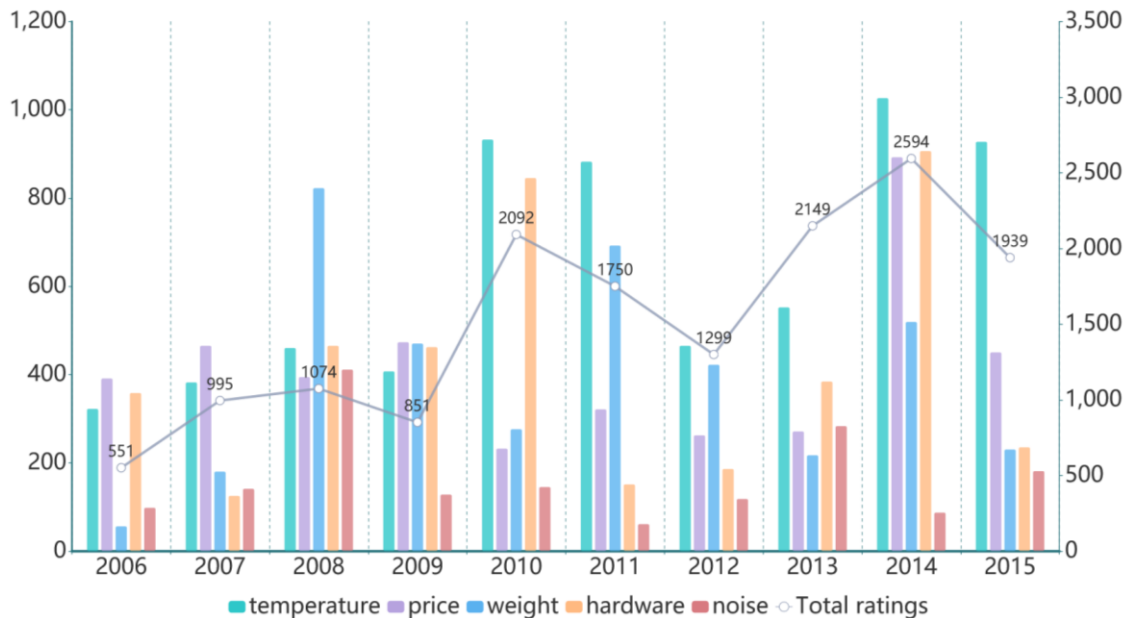

Figure 1.2.5 Frequency of words related to different attributes of hair dryer from 2006~2015

The broken line chart above reflects the trend chart of the total rating feedback from users every year for 10 years. It can be seen that the trend is generally growing, that is, the trend of user feedback and user purchase is increasing every year, which can reflect the expansion of online market scale. According to the column shape, although the total rating number of user feedback is increasing every year, the content of user feedback is not the same or even there is a big gap. Take 2010 and 2011 as examples, normalize the frequency of each indicator, and the comparison with Figure 1.2.5 can be as shown in Figure 1.2.7.
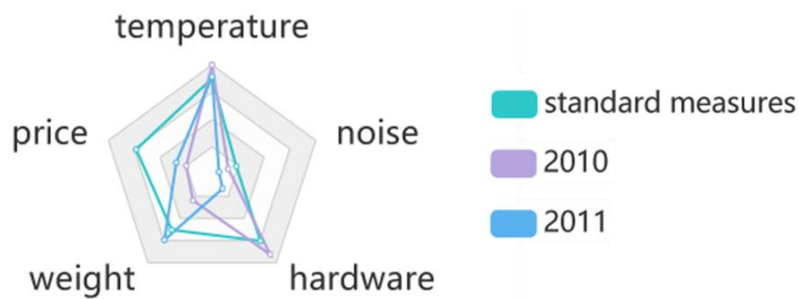

Figure 1.2.6 measures of 2010 and 2011 radar chart of hair dryer

It can be seen that in 2010, users are more concerned about the weight of the hair dryer, while the focus on hardware is far lower than the standard level. In 2011, users are more concerned about hardware, but price and weight are not so concerned because of the discussion and concern of users, so we should make statistics on user feedback by the end of 2010 The main demand of the user may change to the weight of the hair dryer, so it is necessary to process the material of the blower in light weight in the subsequent production process under the condition of satisfying the user's temperature control effect, so that it can meet the user's demand more.

To sum up, with the development of time, the online market of hair dryer is expanding, but the user's preference for hair dryer will change. **Paying attention to online feedback at all times and optimizing and improving the online commodity characteristics according to the user's feedback will help to further meet the user's demand, so as to further expand the online hair dryer Market.**

2.2 Improve brand awareness

2.2.1 The high famous brand of hair dryer in the online market

Brand awareness is an important factor that affects user purchase and product evaluation. Improving brand awareness can improve your sales volume and favorable rate, and the favorable rate can also reflect your brand awareness to a certain extent.

Through the analysis of the data of hair_dryer.tsv, it is found that the number of products purchased by users and the number of user feedback are quite different for different product brands. Therefore, we believe that there are more than 1000 comments for A-class brands, more than 100 for B-class brands, and less than 100 for C-class brands. Through the screening of the product title column, it is found that there are two A- class brands, with a total number of 5477 comments, seven B-class brands, a total of 2375 comments, and the rest are C-class brands, with a total number of 3618 comments. According to the above data, the market share of three different brands is shown in Figure 1.2.8:
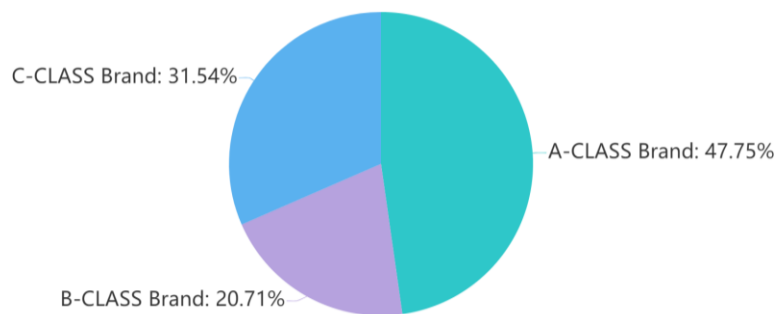

Figure 1.2.7 Proportion of various brands of hair dryer

The market share of A-class brands accounts for 47.75%, that of B-class brands accounts for 20.71%, and that of C-class brands accounts for 31.54%. The proportion of A-class brands is close to 50%, while there are only two A-class brands, one is Andis and the other is Conair. There are 2162 reviews of Andis products, accounting for 18.85%, and 3315 reviews of Conair products, accounting for 28.90%. As shown in the figure below.
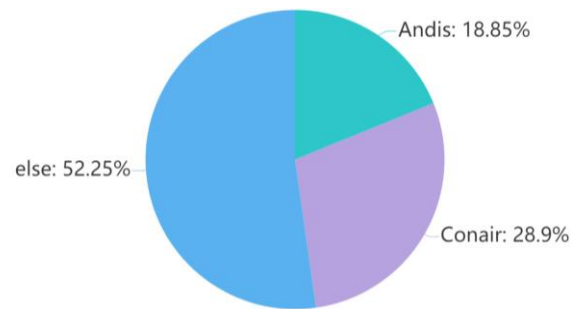
Figure 1.2.8 Proportion of Andis and Conair

It can be seen from the above figure that the products of Andis and Conair alone account for 47.75% of the hair dryer Market. Therefore, these two brands can be recognized as well-known brands of hair dryer online market as our standards.

2.2.2 The improvement of brand awareness of products will inevitably promote sales

We focus on the analysis of the sales performance of these two hair dryer products on a time scale. Favorable rate is an important indicator to measure the quality of a commodity. We think that users who give four or five stars are favorable rating. We compare the favorable rate of the whole hair dryer Market with that of Andis and Conair every year. In an effective review, through the screening of reviews, we can get all the evaluations of each year. Then we can screen out the four-star and five-star reviews of star rating, and divide them by all the evaluations of each year, that is, the favorable rate measure of the hair dryer Market of each year. Then we use the same method to screen the favorable rate of Andis and Conair of each year, and get the following specific numbers. See the figure below for details.

Figure 1.2.9 Praise rate of Andis and Conair

From the above analysis, we can see that the reason why the praise rate of the hair dryer Market before 2006 will fluctuate greatly is that the number of users at that time was small and the market was not stable. In 2007-2011, the praise rate of Andis brand hair dryer always exceeds the market praise rate. In 2011-2015, the praise rate of Andis brand is basically the same as the market praise rate. In 2007-2011, the praise rate of Conair brand hair dryer is basically the same as the market praise rate. In 2011-2015, the praise rate of Conair brand began to rise and exceeded the market praise rate. Then we get the annual sales of Andis and Conair in 2006-2015 and compare them with the annual sales of the market as shown in the Figure 1.2.11.
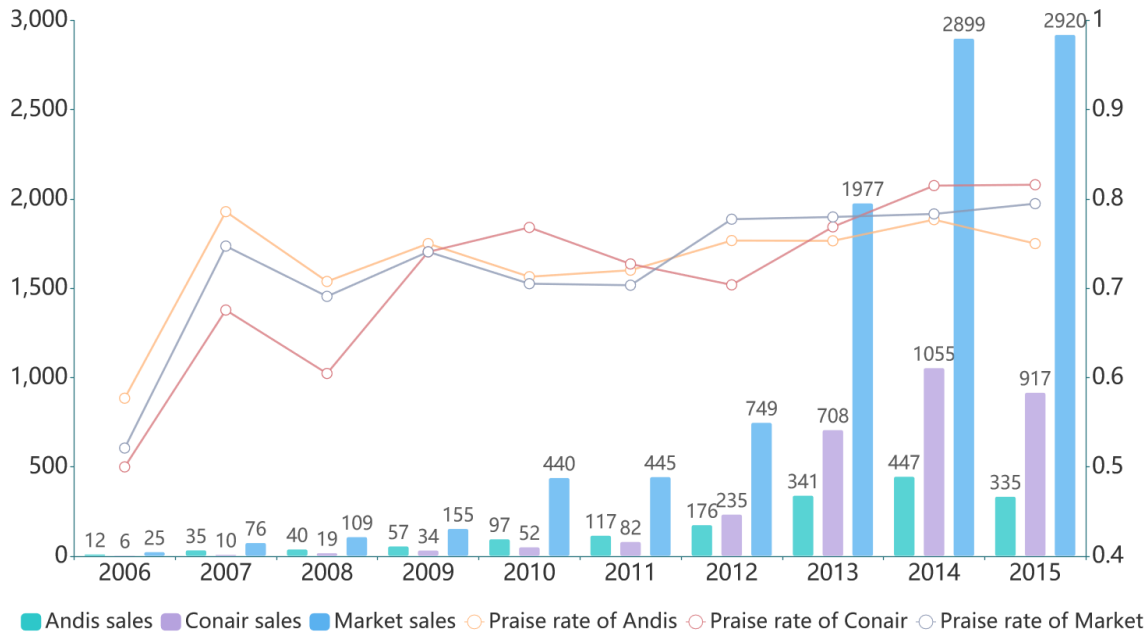

Figure 1.2.10 Annual sales of Andis and Conair

It can be seen from the figure above that the sales growth of andis brand in 2007-2011 is greater than that after 2011, while the overall sales situation of Conair brand began to increase after the rise of praise rate after 2011.

To sum up, when your product sales volume can continuously increase in the market share, it can show that your brand awareness is also constantly improving. The improvement of brand awareness will inevitably bring users a good impression of preconceptions, so as to improve your praise rate, and then improve your product sales. Therefore, brand awareness is positively related to product praise rate, and praise rate is positively related to product sales. Therefore, the higher your brand awareness, the higher your praise rate, the better your product sales.

II. Pacifier Investigation Report

1. Online Market Analysis of pacifier

Similarly, according to the above method, the star ratings of infant pacifiers from 2003 to 2015 are as follows:
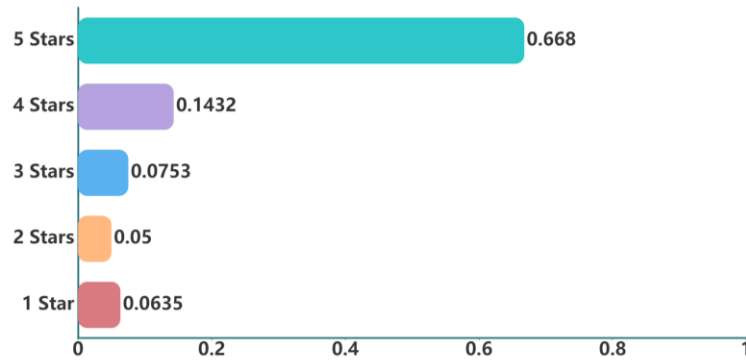
Figure 2.1.1 Stars ratings of pacifier online market at all levels

It can be seen from the above figure that the comprehensive score of pacifier online market is 4.3, and the favorable and unfavorable ratings of pacifier can be obtained as follows:
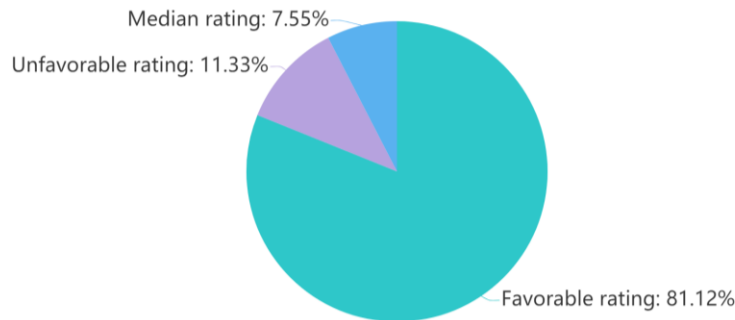

Figure 2.1.2 Proportion of favorable and unfavorable ratings

It can be seen from the above figure that between 2003 and 2015, the online market of infant pacifiers had a positive rating of 81.12% and a negative rating of 11.33%. It can be seen from this that the vast majority of users are quite satisfied with the pacifier they buy, while only a small number of users give unfavorable reviews. Therefore, we can get the sales of pacifiers in each year through the data screening as follows:
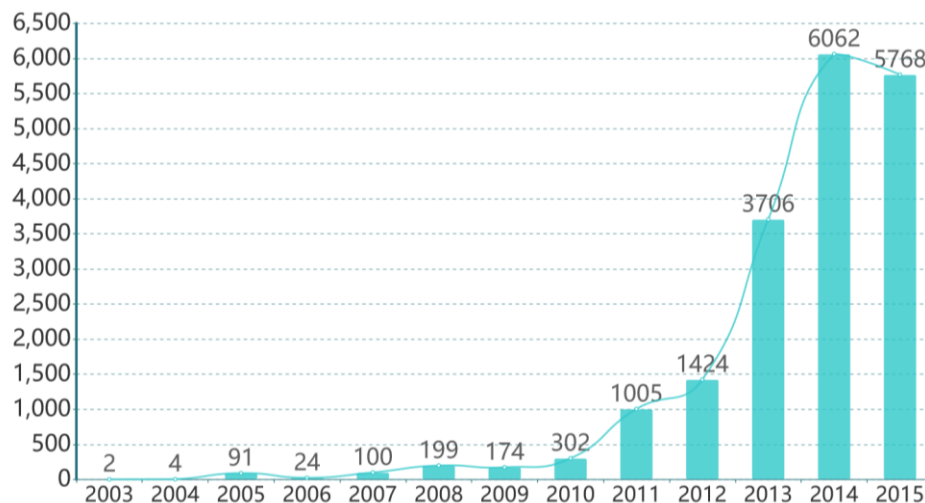

Figure 2.1.3 Annual reviews of pacifier online market

It can be seen that from 2002 to 2010, the sales volume of infant pacifiers increased steadily; from 2011 to 2014, there were two explosive growth, the first explosive growth in 2011, 232.78% higher than the previous year; in 2013, the second explosive growth, 160.25% higher than the previous year. The explosive growth of two times brought the sales volume to 3706 in 2013. After the explosive growth, the growth slowed down again. By 2015, the sales volume in the online market had declined slightly, down 4.85% from the previous year. We have screened out the sales volume of each quarter in 2012, 2013 and 2014 as follows:
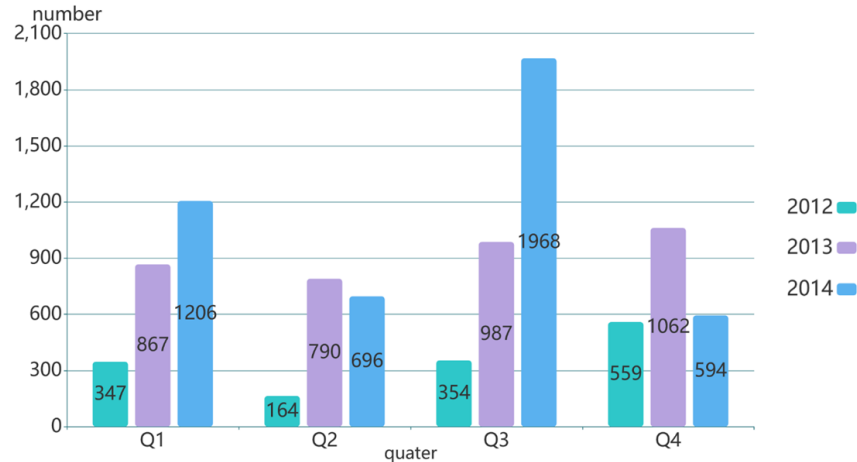

Figure 2.1.4 Sales volume in each quarter of 2012~2014

As can be seen from the above figure, the sales volume in the four quarters of 2013 is 347,164,354 and 559, and the sales volume in the four quarters of 2014 is 867,790,987 and 1062 respectively. It can be concluded that in the second quarter of 2012, compared with the previous quarter, the growth was 52.74%, 115.85%, 57.91%, 55.10%, 8.88%, 24.94%, 7.60%, 13.56% and 42.29% respectively. From the data point of view, the infant pacifier dropped significantly in the second quarter, while the rest of the quarter, except for the second quarter, grew slowly. This shows that infant's pacifier is a seasonal commodity, and it will have a seasonal decline in sales in summer. Then we can get the change of favorable and unfavorable ratings of each quarter in 2012 and 2013 through screening, as shown in the following figure:
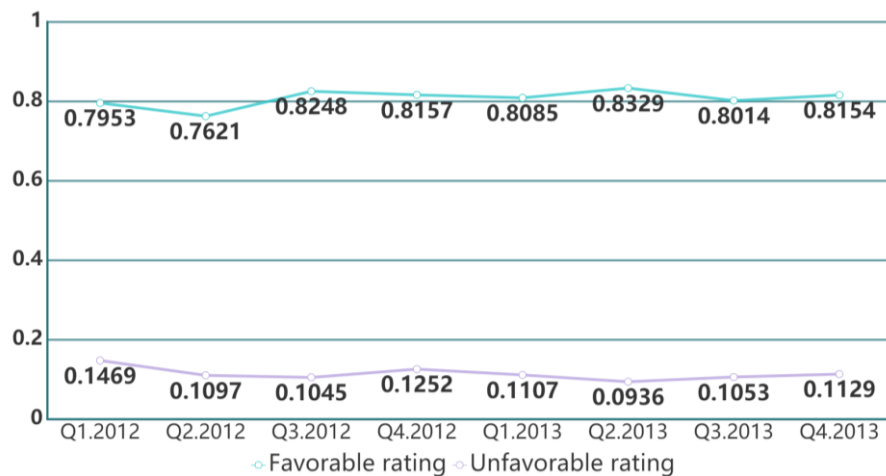

Figure 2.1.5 Favorable and unfavorable ratings in 2012-2013 quarters

From the above figure, from the second quarter of 2012 to the first quarter of 2013, the favorable rate basically fluctuated up and down 81%, and the unfavorable rate also basically fluctuated up and down 11%, which is basically the same as the favorable rate and unfavorable rate of infant pacifiers from 2003 to 2015, and according to the data in Figure 2.1.4, except for the seasonal sales decline in the second quarter, the sales of infant pacifiers at other times The volume basically keeps stable growth, which also conforms to the trend of stable positive and negative ratings in the figure above. **This shows that the online market of the whole infant pacifier has a favorable praise rate for users, and the favorable rate has no significant impact on the sales volume, but the sales volume will decline seasonally in the summer.**

2. Survey results of infant pacifier online market

2.1 Meet users' changing product needs

2.1.1 Relevant measures of product attributes

In the same way as the statistical method of hair dryer market, we find out the attribute measure that most affects the sales volume of pacifier, and it is the attribute measure that users most care about. The statistical results are as follows:
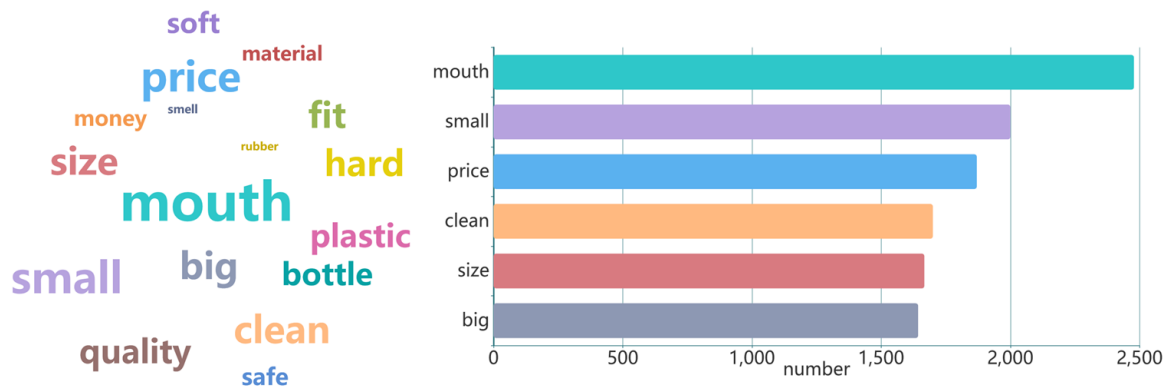

Figure 2.2.1 The word frequency cloud of pacifier

According to the characteristics of different word frequency combination products of word frequency cloud, for example, bottle-word and fit-word can reflect that users care about the suitability of infant pacifier and bottle, size-word and big-word can reflect that users care about the size of infant pacifier, etc. It can be concluded that the main indicators that users of pacifier most care about are: size, price, material, bottle appropriateness, safety.

2.1.2 Normalized to standard measure

According to the statistics of word frequency related to the above indicators, it can be concluded that the highest word frequency reflected by users in all user feedback is the size of infant pacifier, with a frequency of 3182 times, followed by the approval, safety and material of infant pacifier, with 2478 times, 2252 times, and 2137 times respectively, and finally the word frequency of price is 1870 times.

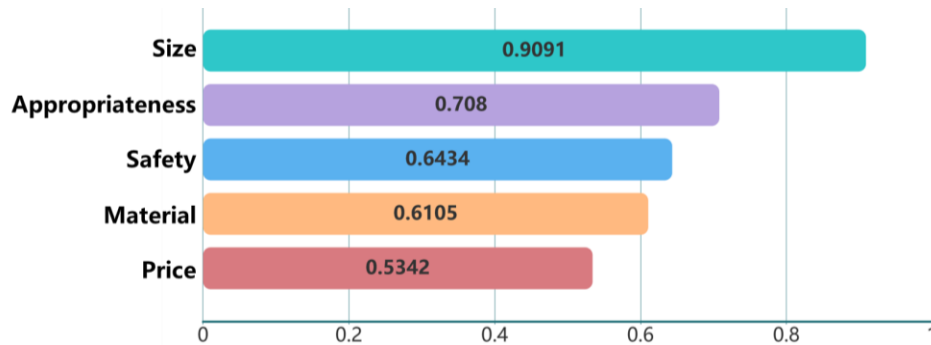After normalizing the frequency of the above indicators, the statistics are as follows.

Figure 2.2.2 Normalization treatment of attribute measure of pacifier

From the above data, we can get the equivalent radar chart of five standard factors that affect the sales volume of infant's pacifier.

Figure 2.2.3 Standard measures radar chart of pacifier

2.1.3 Infant pacifier should steadily improve product quality

By analyzing the data in pacifier.tsv, we can get the purchase of products and specific user feedback from 2009 to 2015. According to the analysis of word frequency of Related words of commodity attributes, we can get the degree of users' care about different indicators in different years. The data is as follows:
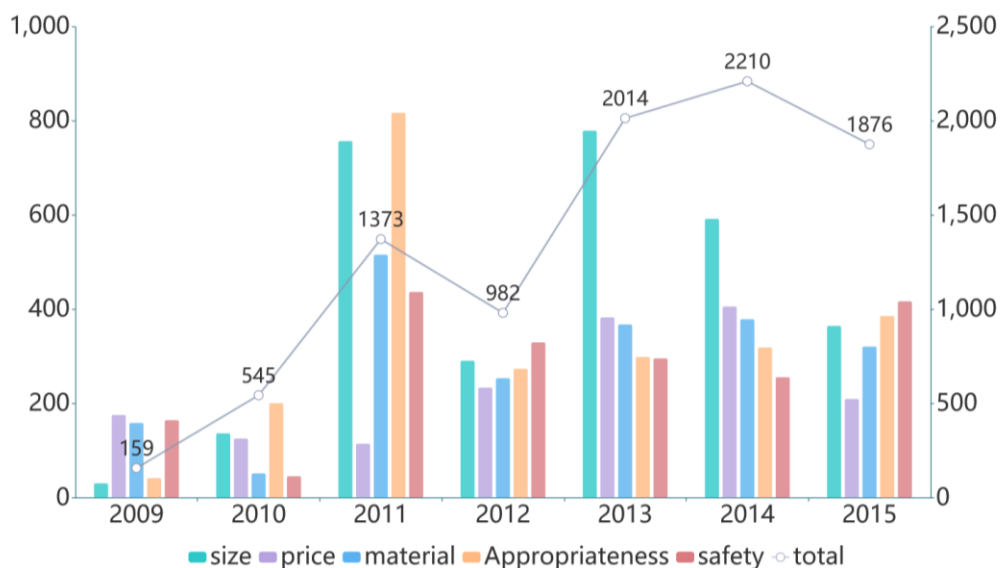

Figure 2.2.4 Frequency of words related to different attributes of pacifier from 2009~2015

The broken line chart above reflects the trend chart of the total rating fed back by users every year for seven years. It can be seen that the market trend is a slow growth trend except for the insufficient sample size in 2009 and 2010. According to the column chart, users pay more attention to the attributes of infant pacifier itself. Take out the data from 2012 to 2015 after the market is stable, and the normalization of each measure frequency can be obtained as follows:
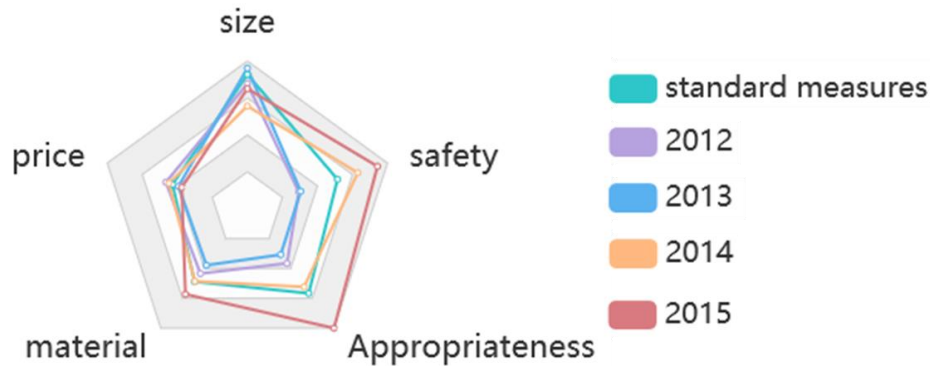

Figure 2.2.5 Measures of 2012~2015 radar chart of pacifier

As can be seen from the above figure, for infant pacifiers, the indicators that users care about gradually change from the price, size and cost performance of infant pacifiers to the adaptability and safety of infant pacifiers and bottles. Therefore, in the follow-up production process of infant pacifier, we should focus on improving the safety and adaptability of infant pacifier on the basis of ensuring the high level of other indicators, so as to meet the needs of users.

To sum up, with the development of time, the online market of infant pacifiers has gradually expanded and stabilized. Enhancing the safety and adaptability of infant pacifiers will help to further meet the needs of users and further promote sales.

III. Microwave Investigation Report

1. Online Market Analysis of microwave

Similarly, according to the above method, the star rating of microwave ovens from 2004 to 2015 is as follows:
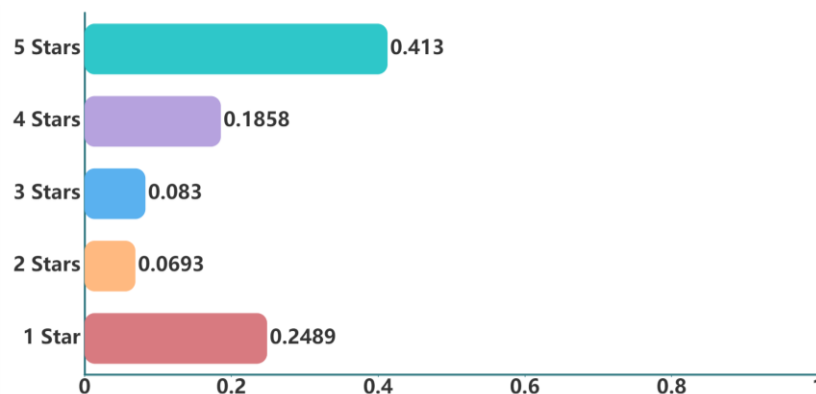

Figure 3.1.1 Stars ratings of microwave online market at all levels

From the above figure, it can be calculated that the comprehensive score of the online market of microwave is 3.44, and the favorable rate and unfavorable rate of microwave can be obtained as follows:
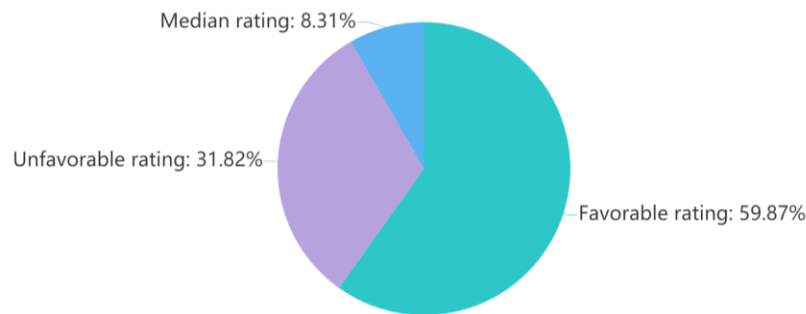

Figure 3.1.2 Proportion of favorable and unfavorable ratings

As can be seen from the above figure, the favorable rate is 59.87%, and the unfavorable rate is 31.82%. Thus, from 2004 to 2015, the online market of microwave has a low favorable rate, and the unfavorable rate is as high as 31.82%. Through data screening, we get the sales of microwave in each year as follows:
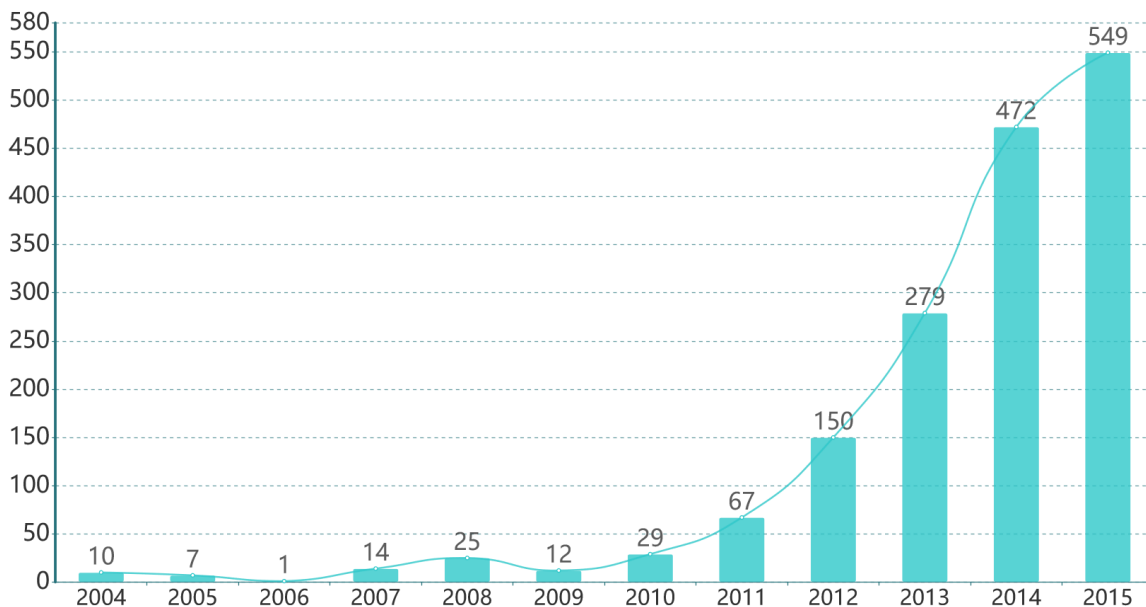

Figure 3.1.3 Annual reviews of microwave online market

From the figure above, we can see that from 2004 to 2012, the overall growth trend is relatively obvious. Through statistics of sales growth from 2010 to 2012, we can get the average annual growth rate of 132.20%. After 2012, the sales growth rate of microwave began to slow down gradually. In 2013, the sales growth was 86%, in 2014, 69.18%, and in 2015, 16.31%. Then, we screen the sales in 2012, 2013 and 2014 as follows:
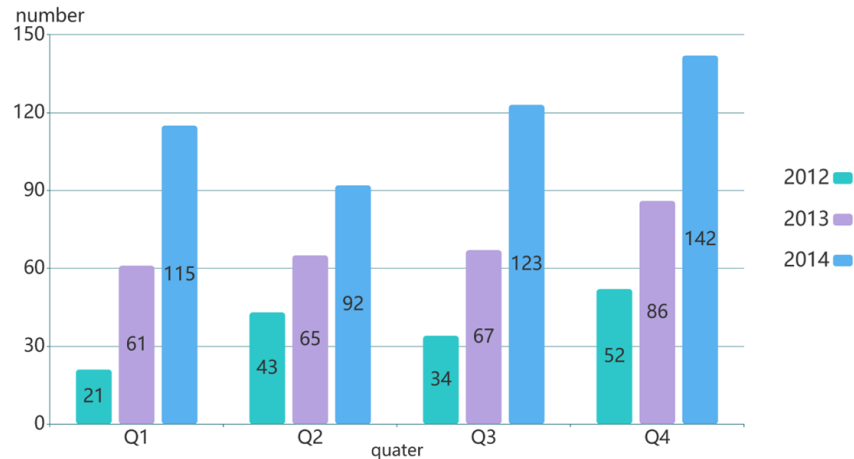
Figure 3.1.4 Sales volume in each quarter of 2012~2014

As can be seen from the above figure. It can be seen clearly that in the same year, the growth rate of each quarter remained basically the same, with an average growth of 12.83% and 8.5 in 2013, and an average growth of 15.72% and 14 in 2014. It can be seen that microwave are non-seasonal commodities. Therefore, we get the change of favorable and unfavorable ratings of each quarter in 2012 and 2013 through screening, as shown in the following figure:
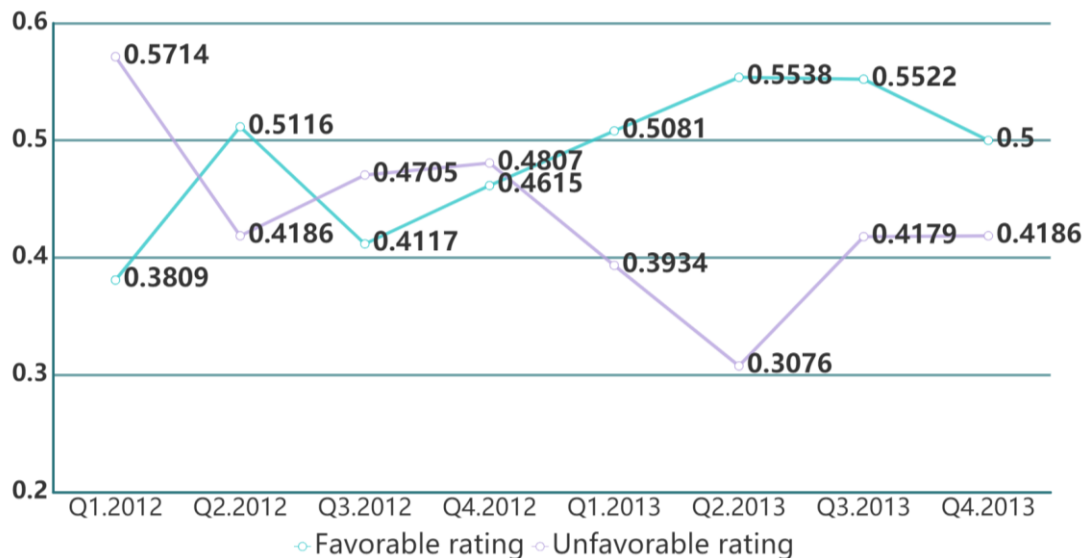

Figure 3.1.5 Favorable and unfavorable ratings in 2012-2013 quarters

It can be seen from the above figure that the microwave's favorable and unfavorable ratings fluctuated obviously from 2012 to 2013. Even in the first quarter, the third quarter and the fourth quarter of 2012, the unfavorable ratings were higher than the favorable ratings. However, according to Figure 3.1.4, there is no significant change in the growth rate from 2012 to 2013, but the positive and negative rates fluctuate greatly. **Therefore, it can be concluded that the favorable and unfavorable rates of microwave do not affect the sales volume of microwave.**

2. Survey results of microwave online market

2.1 To produce microwave of different volumes

2.1.1 Relevant measures of product attributes

Similarly, the word frequency related to the properties of microwave is calculated, the cloud chart of word frequency is as follows:
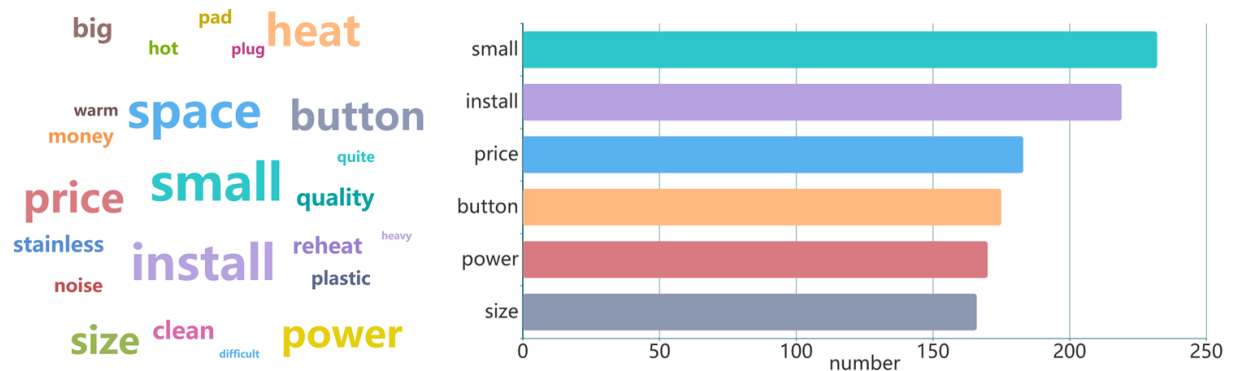

Figure 3.2.1 The word frequency cloud of microwave

According to the characteristics of different word frequency combination products of word frequency cloud, for example, power-word and heat-word can reflect that users care about the heating power of the microwave, stainless-word and plastic-word can reflect that users care about the material of the microwave, etc. It can be concluded that the main indicators that users of microwave most care about are: power, price, installation difficulty, material texture and size.

2.1.2 Normalized to standard measure

According to the statistics of word frequency related to the above indexes, the highest word frequency index reflected by users in all 1615 comments is the size of microwave oven, with 1973 times of frequency, followed by power of microwave oven, price of microwave oven, installation division of microwave oven, with 1070 times, 662 times, 737 times of frequency, and 552 times of word frequency of material texture of microwave.

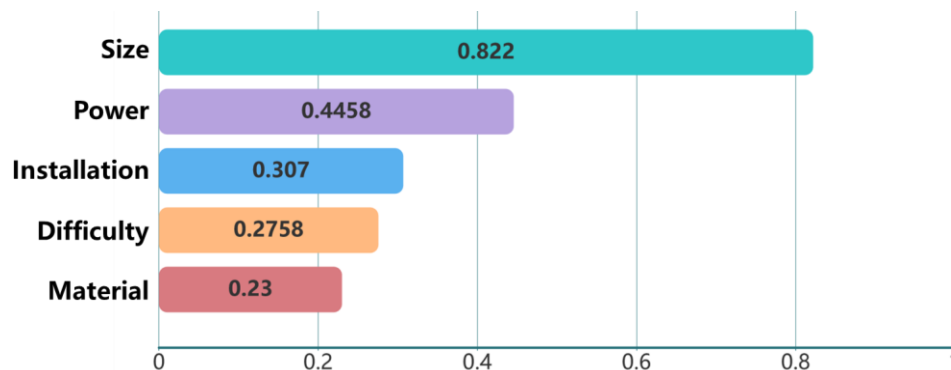After normalizing the frequency of the above indicators, the statistics are as follows:

Figure 3.2.2 Normalization treatment of attribute measure of pacifier

As can be seen from the above figure, most users care more about the size of the microwave, while only a few users care about the material of the microwave. From the above data, the equivalent radar chart of five standard factors affecting the sales volume of microwave can be obtained:
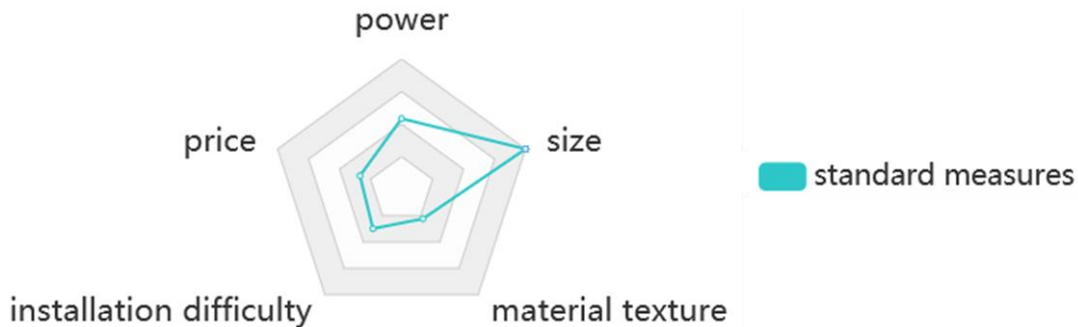

Figure 3.2.3 Standard measures radar chart of microwave

2.1.3 The online market of microwave is unstable and needs long-term feedback

By analyzing the data in microwave.tsv table, we can get the purchase of products and specific user feedback in the five years from 2011 to 2015. According to the analysis of word frequency related to commodity attributes, we can get the attention degree of users to different indicators in different years. The data is as follows:
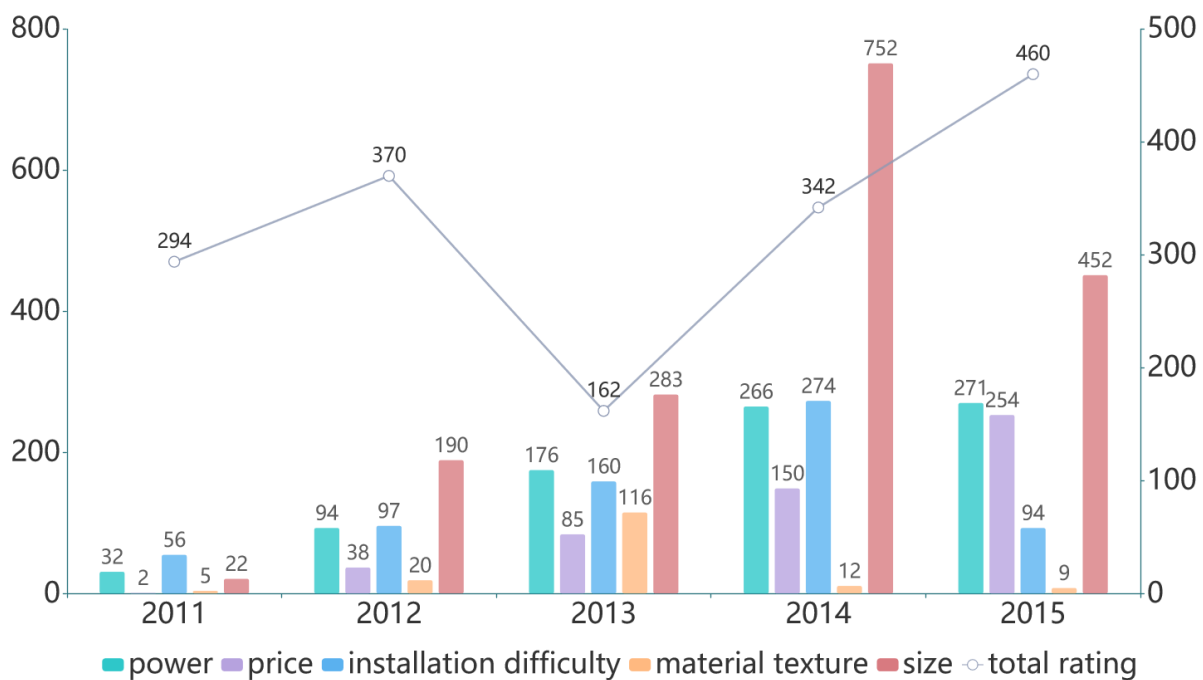

Figure 3.2.4 Frequency of words related to different attributes of microwave from 2011~2015

The broken line chart above reflects the trend chart of the total rating fed back by users in five years. It can be seen that the trend is generally unstable.

That is to say, there is a significant gap between user feedback and user purchase every year, reflecting the immature online market of microwave. According to the above data, take the last 4 years with more data. The following radar chart can be obtained by normalizing the frequency of each measure:
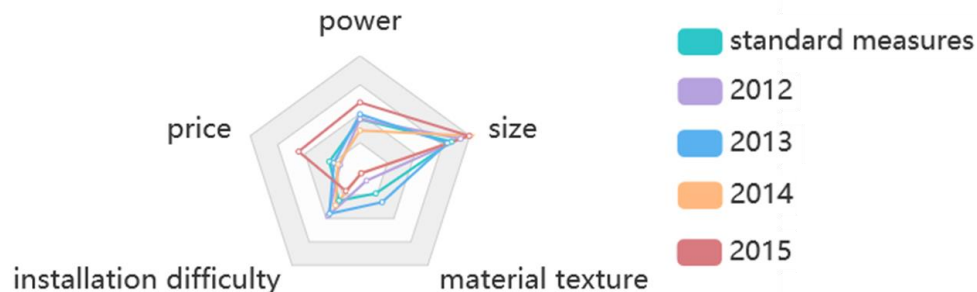

Figure 3.2.5 Measures of 2012~2015 radar chart of microwave

It can be seen from the radar chart over the past four years that users in the online market are not particularly concerned about the microwave except size, and users always take the size of the microwave as the first consideration target, so it reflects that the most important thing for online users to purchase the microwave is the size of the microwave, so the subsequent online market of the microwave should be combined with the needs of users We want to produce different size and volume microwave, and observe the stability of online market for a long time.

IV. Conclusion of investigation report

In view of the problems and requirements of the marketing director of Sunshine company, we have investigated the market data and come to the following conclusions: first, in addition to the small impact of the microwave on the market feedback, the hairdryer and infant pacifier have more or less impact on the product's praise rate; second, the change in the sales volume of hair dryer can reflect the change in the online market reputation of hairdryer, But infant pacifiers and microwave ovens can't; third, by improving the product's praise rate and paying attention to the change of users' demand for the product, it can indicate the success of the product; fourth, when users see some low star high score comments, it is possible for them to write related comments; Fifth, the emotional color of comments is based on the rating stars of users, that is to say, the better the comments of customers, the higher the score, and vice versa.

Through the analysis of the online market data of hair dryer, infant pacifier and microwave, the following conclusions are obtained: the market comprehensive rating of hair dryer and infant pacifier is relatively high, while the market comprehensive rating of microwave is relatively low. And through the analysis of the sales data and praise rate of each quarter from 2012 to 2014, we can see that the praise rate and poor praise rate of the hair dryer will fluctuate from time to time and the fluctuation will have a great impact on the sales situation; the praise rate of the infant pacifier will basically remain at 81% up and down, and there is no big fluctuation and the change of the sales volume of the product does not change the praise rate, so it is said that The high praise

rate of pacifier will not affect the sales volume of the product; the change of sales volume of microwave from 2004 to 2015 is not as great as that of hair dryer and infant's pacifier, but the change of high praise rate and low praise rate of each quarter from 2012 to 2013 is great, but the change of sales volume of microwave is not great. Therefore, the high praise rate of microwave will affect the sales situation of microwave very small. Therefore, when selling hair dryer, keeping a high praise rate can improve the sales volume of hair dryer, while infant pacifier and microwave oven do not need to pay special attention to the product rating because of their relatively small impact on the review.

Through the analysis of the sales volume between each quarter, we can see that the growth of microwave ovens is relatively stable every quarter, while the hair dryer and infant pacifier will react to the season. The sales volume of hair dryer in summer and autumn is low, and the sales volume in spring and winter is high, which belongs to seasonal product. Therefore, when selling hair dryer, we can improve the sales volume in off-season by means of season promotion. In summer, the sales volume of infant pacifiers always declines. In other times, the sales volume growth is relatively stable, which means that the sales volume of infant pacifiers will decline seasonally in summer. Therefore, when selling infant pacifiers, some targeted measures should be taken in summer to reduce the sales decline.

Through the word frequency statistical analysis of all comments on the hair dryer, we can see that the user's preference for the hair dryer will change with the change of time, so we should pay more attention to the user's comments and make corresponding strategies; By analyzing the word frequency of the microwave oven, we can see that the online market of the microwave oven is not stable, and most of the users pay attention to the size of the microwave oven, so we should The microwave of different sizes are provided for users to choose and continuously pay attention to the market changes. By analyzing the word frequency of infant pacifiers, it is concluded that users' demand for products mainly changes from price and size to safety and bottle appropriateness. Therefore, we need to ensure that other indicators of infant pacifiers reach the market level, and we need to focus on improving the safety and the bottle appropriateness of infant pacifiers.