

Study on the Perceived Brand Image of Nongfu Spring based on UGC Data

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Abstract: Brand image is a key factor in attracting consumers, and User Generated Content (UGC) on e-commerce platforms accurately reflects consumers' perception and preferences for brand image to a certain extent. This paper takes the reviews of products sold on the JD platform as samples, and takes the reviews of Nongfu Spring products before 2023 as the research object. Through collecting UGC and using word frequency analysis, semantic network analysis, and emotion analysis in the ROST CM6.0 analysis software, this paper conducts a systematic study on the brand image perception of Nongfu Spring products. Research has found that consumers' perception of the image of Nongfu Spring products can be divided into three dimensions: product, service, and price. In addition, consumers show a positive emotional tone towards the product quality and logistics of Nongfu Spring products, and the factors that affect the negative emotions of Nongfu Spring include individual product issues and slow delivery. Finally, propose discussions and suggestions.

Keywords: Consumer, NongFu Spring, Brand image perception.

1. Introduction

1.1. Background to the study

With the development of the economy, people's demand for quality of life has become higher, and among the indicators of "clothing, food, housing and transport", "food" is more important. Food and drink are the mainstays. The beverage industry undoubtedly accounts for a large part of this.

According to China Light Industry Information Network data show that in 2021, beverage manufacturing industry operating income increased by 13.53% year-on-year. Among them, carbonated beverage manufacturing industry grew by 19.17%, bottled (canned) drinking water manufacturing industry grew by 12.18%, fruit and vegetable juice beverage manufacturing industry grew by 13.90%, dairy beverage and plant protein beverage manufacturing industry grew by 10.93%, solid beverage manufacturing industry grew by 14.95%, tea beverage and other soft drink manufacturing industry grew by 12.01%.

Based on brand image perception theory, this paper takes the user-generated content (UGC) of Nongfu Spring on the Jingdong platform as the basis from two dimensions: cognitive and emotional image. Using word frequency analysis methods, the aggregated text data is analysed as a whole and high frequency words are counted. Semantic network analysis is conducted on the review texts to specifically study the relationships between words. Finally, a sentiment analysis is conducted on the brand image of Nongfu Spring to obtain the perceived image of the Nongfu Spring brand from the consumer's perspective and to make relevant suggestions on how the brand image can be managed.

1.2. Significance of the study

With the upgrading of national consumption and health needs, China's beverage consumption is showing a trend towards healthier, more functional and diversified development. Online shopping allows people to buy the products they want without leaving home. The need for some well-known companies to present their brand image more

appropriately presents challenges and opportunities for Chinese beverage brands. A good brand image can fully demonstrate the characteristics of a product, leave a good impression on consumers and build an ongoing consumer relationship with them.

The brand image of the beverage companies entering our market and the local beverage companies in China now have a certain migration phenomenon, which shows that they are adjusting or changing their brand image in order to capture the new needs of consumers.

Based on previous research on brand image evaluation, this paper reintegrates, refines and adds data to construct a new beverage brand image analysis. This study combines the rapid development factors of the consumer market, such as the Internet, the Internet of Things and smartphones, with the rapid development of companies. Changes in consumer behaviour, including the socio-economic environment, are analysed through specific examples and data processing methods, providing factual support and a theoretical basis for the study.

2. Related Concepts and Theories

2.1. Definition of a brand

The essence of a brand is that the brand's products, services or other advantages over its competitors delivers equal or greater value to its target audience.

Davidson, the author of the "brand iceberg theory", said that the symbol of a brand is only the top 15% of the iceberg, and the rest is the most promising part of the brand, which contains the values, culture and wisdom of the brand, which are hidden deeper and unseen[1].

Although branding is not the only key factor for companies to compete in the market, branding allows consumers to know who the product belongs to, where it comes from, whether it is trustworthy, affordable, and what makes it different from other similar products, and to decide whether they should buy it. Brands are a more efficient selection tool for the user, helping to shorten the shopping decision path and reducing risk: it is easy and convenient for the user to get the product

and experience they want directly through the brand.

2.2. Brand image overview

Brand image refers to the characteristics and qualities that a company or a brand exhibits in the market and public perception, reflecting the public's perception and evaluation of a brand, especially by consumers.

There is a casual relationship between brand image, the brand's behaviour and activities will influence the shaping of the brand image, which in turn promotes the brand's development and market competitiveness. People's perception of brand image initially focuses on various tangible and intangible manifestations that influence brand image, such as product features, name, price, packaging, reputation, etc[2]. A good brand image can help a company establish a good brand image and reputation, increase brand awareness, enhance consumer loyalty and trust in the brand, and promote sales and market share.

For enterprises, brands need to analyze their advantages and characteristics according to existing resources, integrate these advantages with brand positioning, combine enterprise development goals, promote the development of enterprises, make customers recognize and accept the characteristics of the brand, and finally achieve brand promotion success[3].

For consumers, brand image has the function of differentiating products. Nowadays, many companies produce the same products, but with very similar intrinsic quality, appearance, functionality and longevity. It is difficult for consumers to distinguish between them and the only thing they can rely on is the brand image. If a company's products are recognised by the majority, then the sale of that product is guaranteed.

In this era of deep global connectivity on the internet, a brand with a prominent and memorable presence will stand out. Many once popular brands, industries and companies are gradually disappearing or fading out of the consumer market. It can be said that branding is an important factor for the primary vitality and core competitiveness of a company[4].

Nowadays, many companies have a deeper understanding of the value of brand image, but it is mainly limited to market brand research, interacting through the internet or other means of communication, enhancing their own products or increasing their promotional avenues to make their brand memorable[5]. For a company, there is really nothing wrong with this, but in today's society, the range of goods has become very rich and consumers have more choices. As a result, the relationship between product and consumer is no longer set in stone; it is now a time of mutual choice. This is why the brand image and its relationship with the consumer market needs to improve itself and become more impressive.

2.3. Brand image design for beverages

The purpose of brand design is to enable consumers to recognize and perceive through the design of the brand, so as to produce a brand image[6]. The brand image of a beverage focuses on the following points:

Brand logo: Usually including elements such as brand name, logo pattern and logo colour scheme, which need to be simple, easily recognisable and unique to make the brand stand out in the market.

Packaging design: It needs to be attractive, in harmony with the brand image and easily recognisable. Packaging materials, colour matching, font choice and product shape all need to take into account the needs and cultural background of the

target consumer.

Advertising: The form of advertising can include television, newspapers, outdoor advertising and other forms, and needs to be carefully planned and produced in conjunction with the characteristics of the brand image and the needs of the target consumers.

Promotions: Increase brand loyalty and awareness by allowing consumers to enjoy more discounts and benefits. Promotional activities can include discounts, full discounts, gifts and other forms, and need to be designed according to the product characteristics and the needs of the target market.

2.4. Status of domestic research on brand image

In the study of domestic brand image, it can be divided into the following two main sections.

Partly based on advertising and marketing theory, relevant theories from the design discipline are used to conduct specific targeted research and interpretation of brand visual image design or corporate image. For example, Chinese scholar Li Manyu (2000) pointed out that the establishment of a brand image needs to be based on quality products, excellent entrepreneurs as the soul, good management as the guarantee, and profound corporate culture as the soil[7]. Wang (2008) argues that brand influence should be exerted in terms of product positioning, market segmentation, product packaging and design, display and presentation, service, CI, VI strategy, CS strategy and brand strategy, and discusses product promotion strategies in terms of corporate image and product awareness[8]. Compared to Li Manyu's study, Wang's analysis of brand image is more detailed and comprehensive. However, based on the comprehensive findings of domestic brand image research, there is still room for improvement from a systematic perspective.

The other part is to deepen the existing research results from abroad and use their relatively mature theories or brand image models for more in-depth research and design. For example, Luo Ziming's (2001) research points out that brand image has five characteristics: multidimensional combination, complexity and diversity, relative stability, plasticity and vulnerability. It also further subdivides brand image into five aspects: brand perception, brand association, brand value, product attribute perception, and brand loyalty[9]. Zhang Yi (2017) focused on four dimensions of brand-related research: product, brand, price and promotion. The brand dimensions were subdivided into three areas: brand perception, brand emotion and brand personality[10]. There are similarities between Zhang Yi's and Luo Ziming's studies in that they both start from the product dimension and focus on brand perception and characteristics, both drawing on relevant foreign theories for more in-depth theoretical research and guiding practice.

2.5. Current status of brand image design for beverages in China

Beverages are a variety of liquids used to quench thirst, quench the heat, moisten the throat and add nutrients. Beverages include water-based beverages, carbonated beverages, fruit and vegetable juice beverages, functional beverages, dairy beverages, tea beverages, coffee beverages and sports drinks. According to the national economic statistics classification standard, the beverage industry can be divided into carbonated beverage manufacturing, bottled (canned) drinking water manufacturing, functional beverages,

tea beverages, etc[11].

The beverage industry is developing rapidly in China, and the consumption of beverages everywhere is rising year by year, and the emergence of new types of beverages has led to different preferences among consumers. So there will be more companies joining the beverage industry to produce different brands. However, influenced by well-known brands, some beverage companies tend to imitate those well-known brands to design their own brand image, which makes it difficult for consumers to identify these differences, resulting in the phenomenon of "piracy", and finally having to rely on low prices to gain market share. This is undoubtedly a major blow to China's beverage enterprises.

Despite the rapid development of the beverage industry in China, many beverage companies either do not pay attention to brand image design or the brand strategy they design is still unclear. Therefore, many companies need to recognise the importance of brand image and create a suitable brand image for their products, establishing the right brand concept and giving the right brand emotion to their products to make them stand out from the crowd, which is the main element of beverage brand image design[12].

3. Changes in the Consumer Market

3.1. Analysis of the current state of the beverage industry today

In recent years, competitive trends in the beverage market by category have reflected people's pursuit of nutrition and health. According to the growth of each category in the beverage industry, the most rapid growth rate between 2012 and 2014 was in the order of dairy and vegetable protein drinks, drinking water and tea drinks; from the gross margin revenue situation from February to June 2014, the categories that accounted for a higher percentage were carbonated beverages, drinking water and vegetable protein drinks; at the same time, tea drinks, vegetable protein drinks and drinking water, all of these categories are moving in the nutritional and healthy direction[13].

In the case of the improvement of consumers' health awareness and the increasingly updated alternatives to carbonated drinks, the emergence of soda and sparkling water has made carbonated beverages gradually lose part of the market, as well as the health impact of fruit and vegetable juice products, cold-pressed hydraulic fruit and vegetable juice stands out, highlighting the freshness of the product, with a "short shelf life, natural health, no additives" and other characteristics of outstanding features, attracting a wave of consumer demand.

3.2. Consumer profile analysis

The changes in the consumption of consumer groups in the context of consumer upgrading are mainly manifested in the following ways:

1. The pursuit of fashion and personalisation. Consumers want the products they buy to reflect different appearances and characteristics. Younger consumers are increasingly willing to pay for good design products. A brand identity design that satisfies consumers is a good design, impressive and increases the number of times they return.

2. Consume for your own health. More consumers are beginning to pay attention to the nutritional value and composition of drinks, and drinks with added sugar, preservatives and other harmful substances are gradually

losing their market. On the contrary, healthy, natural and organic beverages are more popular.

3. The sources of consumer acceptance of brands have become diverse. Relying on the rise of short video platforms, consumers are more likely to be influenced by those overwhelming advertisements. A prominent product brand image will make a deep impression, but of course the prerequisite for this is excellent product quality.

4. Price sensitivity has diminished. As income levels rise, consumers are paying more attention to the quality and experience of the product. Therefore, the beverage industry needs to focus on improving product value, rather than just relying on low prices to capture the market.

3.3. Impact on the beverage industry in the context of consumer upgrading

With China's rapid economic development and rising consumption levels, consumers are demanding higher and higher quality of life, a trend known as 'consumption upgrading'.

In terms of theoretical research, Chinese scholar Li Jian argues that the current discussion on consumer upgrading is not a simple shift from "Basic necessities of life" to "Luxury"[14]. In the era of consumer upgrading, users have more and more space to choose, and they prefer products with "More distinctive" among similar products.

So in this, the consumer is the top priority. While there are many factors that influence the market, the consumer is still at the heart of it. When consumers support a brand, that brand will have an advantage in the marketplace and vice versa. Below I examine the role of brand image from data obtained from consumers.

4. Research Data and Analysis

4.1. Research methodology and sample selection

4.1.1. Research methodology

Literature research method: According to the research direction and content of the thesis, collect relevant theoretical literature in the knowledge network and various databases, and summarise, analyse and identify them, in order to understand the background, status quo, change and development trend of the research object. The specific initiatives of Nongfu Spring's communication strategy are analysed with reference to relevant communication theories. To make a study of the design of the brand image of Nongfu Spring, and to provide its own insights based on the original research.

Textual analysis: It is the process of digging from the surface to the depths of a text to discover deeper meanings. The strength of text analysis lies in its ability to access the psychological perception of the subject of study. This paper uses ROST CM6.0 software to distinguish and effectively extract high-frequency and emotive words related to the text. ROST CM6.0 supports customised dictionary functions and has been widely used in research areas such as management, sociology and information science[15].

Word frequency analysis: By counting and analysing words, phrases or keywords that appear more frequently in the text, in order to understand the theme, emotional tendency or linguistic style of the text, etc. Through it, the effective information hidden in the brand image of Nongfu Spring can

be found, and the regularity in the vocabulary can be found with the help of semantic network analysis, emotional analysis and other methods .

Semantic network analysis: It constructs a graphical semantic network model by abstracting words or phrases in a text into nodes and the features such as themes, emotional tendencies and linguistic styles in the text are analysed through the semantic network model. This approach deconstructs the semantic paths between the syntax and concepts of the web's textual content, thereby identifying the associations and meanings of the text's vocabulary.

Sentiment analysis: Natural language processing and machine learning techniques are used to identify, extract and quantify sentiment information in text. Text is typically categorised as positive, negative or neutral sentiment. This technique can be applied in various fields such as social media monitoring, brand reputation management, marketing research and many more.

4.1.2. Sample selection

In terms of the channels for obtaining data, the Jingdong e-commerce platform is used as the source of data. Jingdong has a wide range of products to meet the diverse needs of consumers. Jingdong focused on customer service experience and establishes a sound customer service mechanism and perfect after-sales service. Jingdong has a high level of supply chain management. And it has implemented an intelligent and real-time supply chain management system. Jingdong is also very fast in terms of logistics, with a nationwide logistics and distribution network that enables delivery within 24 hours. It also provides third-party logistics services such as "Jingdong

Logistics".

This paper takes Nongfu Spring as the brand research object, uses the consumer-generated data on the Jingdong platform as the data research object, and analyzes the perception of Nongfu Spring's brand image based on UGC data using text analysis, word frequency analysis, semantic network analysis, sentiment analysis and other relevant theoretical methods.

Reviews for the Jingdong Nongfu Spring product sales, prior to 19 February 2023, were obtained as data using the Octopus collector, collecting data including: review, reviewer name, review time, and purchase date.

4.2. Analysis of results

4.2.1. Word frequency analysis of the perceived brand image of Nongfu Spring

The word frequency analysis mainly collected buyers' comments and then used ROST CM6.0 software to refine the words that appeared more frequently in the comments. This resulted in the words that were perceived as the brand image of Nongfu Spring.

Firstly, reviews of products purchased from the Jingdong e-commerce platform under Nongfu Spring were collected, and more than 15,000 buyer reviews were collected using ROST CM6.0 for overall word frequency analysis, so as to cognize the overall product image of Nongfu Spring in the eyes of consumers, and then discover the brand image perception of Nongfu Spring's consumers. The top 30 high-frequency words were summarized and summarized, with the removal of some The top 30 high-frequency words were summarised and the meaningless words were removed.

Table 1. High frequency words for the perceived brand image of Nongfu Spring

Serial number	High Frequency Words	Serial number	High Frequency Words
1	Taste	16	Satisfaction
2	Nongfu Spring	17	Quality
3	Delicious	18	Mineral water
4	Packaging	19	Services
5	Taste	20	Energy
6	Beverages	21	Cheap
7	Convenient	22	Rest assured
8	Delivery	23	Offers
9	Logistics	24	Child
10	Courier	25	Trust
11	Nutrition	26	Shipping
12	Taste	27	Good review
13	Speed	28	Value for money
14	Repurchase	29	Health
15	Ingredients	30	Movement

The main findings are as follows: consumers are more concerned about the taste and speed of delivery and the price of Farmers' Spring products in three main categories, with specific word frequency analysis as follows:

High frequency words for product types: including "taste", "packaging", "flavour", "taste", "health", etc. "healthy" and other words that refer to product quality, product taste, product packaging, product function and product usefulness. Related comments include "Tastes very sweet, especially good in tea" "The taste of Nongfu Spring is very sweet compared to other mineral waters, which undermines a lot of so-called branded mineral waters" "The taste is very good, sweet and smooth. It is also very smooth to drink and the

mineral water can be consumed directly", etc., reflecting consumers' concern and satisfaction with Nongfu Spring products.

High frequency words for service types: including "express", "logistics", "speed" and other words that refer to merchant services and logistics services. Comments are mostly about the speed of the delivery of the products and the advantages of delivering them to your door. As well as the merchant's good attitude and excellent quality of service. This indicates that consumers have a deep impression of Nongfu Spring product delivery.

High frequency words for price types: these include words such as "good value" and "cheap", which refer to words about

product price, value for money and promotions. Related comments include "good value for money if you buy the whole case", "reasonable price, very affordable", "good value for money, great offers, big brand, trustworthy", etc., indicating that Nongfu Spring The price of the product is more affordable.

4.2.2. A study of the migration phenomenon of the brand image of Nongfu Spring

By sorting the collected comments by year in the analysis, the phenomenon of brand image migration can be observed.

Table 2. High frequency words for brand image perception for each year until 2019 to 2023

Serial number	2019 and before	2020	2021	2022	2023
1	Taste	Taste	Taste	Taste	Nongfu Spring
2	Delicious	Taste	Delicious	Nongfu Spring	Taste
3	Beverages	Delicious	Taste	Delicious	Packaging
4	Taste	Beverages	Beverages	Taste	Convenient
5	Nongfu Spring	Nongfu Spring	Nongfu Spring	Packaging	Logistics
6	Logistics	Nutrition	Taste	Beverages	Purchase
7	Taste	Energy	Packaging	Purchase	Delicious
8	Packaging	Ingredients	Purchase	Convenient	Soon
9	Courier	Packaging	Nutrition	Logistics	Taste
10	Cheap	Taste	Logistics	Taste	Courier
11	Soon	Purchase	Ingredients	Soon	Speed
12	Delivery	Convenient	Convenient	Courier	Quality
13	Summer	Logistics	Energy	Nutrition	Delivery
14	Convenient	Summer	Courier	Repurchase	Satisfaction
15	Speed	Cheap	Cheap	Speed	worthwhile
16	Honey Peach	Sugar free	Soon	Ingredients	Fruit juices
17	Purchase	Soon	worthwhile	Delivery	Nutrition
18	Value for money	Delivery	Delivery	Quality	Repurchase
19	Oolong Tea	worthwhile	Summer	Satisfaction	Beverages
20	Home	Speed	Movement	Mineral water	Services
21	Offers	Repurchase	Sugar free	Soda	Mineral water
22	Home delivery	Supplementary	Speed	Cheap	Rest assured
23	Satisfaction	Quench your thirst	Honey Peach	Energy	Make tea
24	Fit for purpose	Suitable for	Services	Summer	Child
25	Quench your thirst	Honey Peach	Suitable for	Suitable for	Ingredients
26	Affordable	Value for money	Repurchase	Rest assured	Trust
27	worthwhile	Mineral water	Supplementary	Services	Shopping
28	Refreshing	Vitamins	Affordable	Child	Shipping
29	Vitamins	Satisfaction	Quality	Home delivery	Affordable
30	Services	Movement	Mineral water	Offers	Attitude

The evolution of high-frequency words in 2019 and up to 2023 shows that consumers are paying more attention to the quality of the product itself, where taste and texture are important, and to the packaging and logistical outer packaging of the product itself, as well as to the speed and quality of logistics.

The increase in the ranking of "Farmers' Spring" shows that consumers are placing more and more importance on brand recognition, the increase in the ranking of "logistics" shows that consumers are paying more attention to the transportation of products, and the increase in the ranking of "children" shows that young people are becoming the main consumers, and consumers are buying products for children. The rise in the ranking of "children" shows that young people are becoming the main consumers and that consumers are buying Nongfu Spring products for their children.

4.2.3. Semantic network analysis

While word frequency analysis can reflect key features by

distilling data and uncovering underlying information, it cannot reflect the deeper relationships of the text reflected by words in a particular context at a particular location, whereas semantic network analysis can visualise the relationships between elements by constructing a network diagram of conceptual and semantic relationships[16].

First of all, the collected comment data was divided into words according to the preset word list, then high frequency words were extracted according to the high frequency word list, then the meaningless words were filtered, after that the co-occurrence matrix word list of line feature words and high frequency words were extracted, and by analysing the features into the VNA file, then the VNA file was imported into NetDraw software and appropriate adjustments were made, and finally a semantic network analysis map of the brand image of Nongfu Spring was generated with Semantic network analysis diagram.

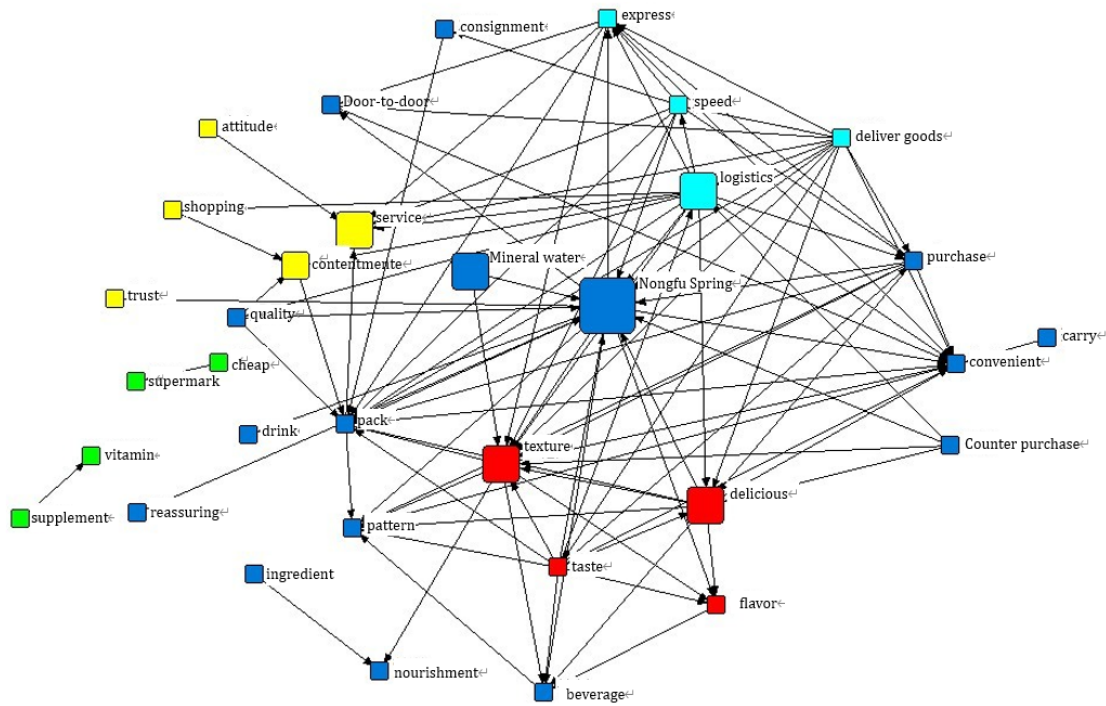


Figure 1. Semantic network analysis

As can be seen in the vicinity of Nongshansanquan, "packaging", "logistics" and "taste" are the most frequently associated, showing a trichotomy, with the links revolving around the core of Nongshansanquan, in terms of hierarchy. The closer the word is to the central node (Nongfu Spring), the closer it is to the image of Nongfu Spring itself, while the

connection of lines indicates the frequency of appearances together.

For further analysis of the semantic network, word frequencies were coded and categorised based on the previous study and the co-word matrix as follows

Table 3. Semantic network hierarchy diagram

Serial number	Dimensionality	Word combinations	Word Frequency	
1	Product Properties	Ingredients Nutrition	1440	
		Farmer's Spring Taste	1262	
		Taste Taste	1020	
		Good Drinking Farmer's Spring	921	
		Taste Good	892	
		Drinking		
		Farmer's Spring Packaging	849	
		Taste Packaging	814	
		Taste Farmer's Spring	776	
		Taste Drink	662	
		Quality Packaging	425	
2	Value Price	Cheap Supermarkets	482	
		Repurchase Farmers' Spring	478	
		Repurchase Good Drinking	380	
		Offers Discounts	310	
3	Logistics Services	Home delivery	1109	
		Delivery Farmers' Spring	853	
		Logistics Packaging	769	
		Logistics Farmers' Spring	740	
		Delivery Convenience	724	
		Logistics Speed	599	
		Delivery Purchase	574	
		Attitude Service	531	
		Purchase Convenience	476	
		Logistics Satisfactory	415	

As a whole, the semantic network graph can be divided into three parts, corresponding to the three parts of the previous

word frequency analysis, which are service, price and logistics. The price part has a different tendency to comment

because of the different pricing of different products. In summary, there is a certain degree of reliability.

In terms of product attributes, the combination of "ingredients" and "nutrition" is the most frequent, indicating that consumers are very concerned about the quality of the product; "Nongfu Spring" The second ranking of "taste" indicates that consumers consider the taste of Nongfu Spring products to be good or bad, and that they are concerned about the product.

In terms of price, the combination of "cheap" and "supermarket" is the most frequent, however, it does not mean that consumers buy from supermarkets, after researching the data, it is found that consumers consider the Jingdong platform to be more convenient and cheaper than supermarkets; "repurchase " "Nongfu Spring" indicates that consumers recognize the Nongfu Spring brand and will buy it again.

In terms of logistics services, the most frequent combination of "delivery" and "door-to-door" indicates that Nongfu Spring's delivery services are very good, although it is possible that the service at the sub-site is good, while the rest are all opinions on Nongfu Spring's rapid logistics, etc.

The specific analysis from different years revealed that the semantic network analysis did not change much, probably because the image of the Nongfu Spring brand is relatively stable, indicating that consumers' perceptions have not changed a lot and the brand image is more stable. However, this also means that the brand image of Nongfu Spring has not undergone change and is easily obsolete in this Internet era, and some changes need to be made.

4.2.4. Sentiment analysis

Jingdong provides consumers with a channel to express their views on products through ratings and reviews, of which

the reviews have implicit characteristics. By using some of the data obtained through word frequency analysis and semantic network analysis, it is possible to systematically, comprehensively and effectively represent consumers' perception of the brand image of Nongfu Spring.

Consumers' emotional perceptions of Nongfu Spring products are an important part of Nongfu Spring's brand image perception. Studies have shown that consumers with positive emotions perceive products as excellent and attractive. Sentiment analysis as a research method responds to consumer evaluations efficiently and in real time. The sentiment analysis tool in ROST CM6.0 software was used to analyse the collected review data by first subjecting the text data to general line processing so that only one line was retained for repetitive lines and then sentiment analysis was performed. The analysed data had the comments scored to classify positive, neutral and negative sentiments and the analysis was tested to be valid with an accuracy rate of over 80%.

The results show that in general, consumers have positive sentiments towards Nongfu Spring's products, with few neutral and negative sentiments. The specific data is as follows: positive sentiment has a total of 16,374 sentences, accounting for 83.45% of the total; neutral sentiment has a total of 1,943 sentences accounting for 9.90%; negative sentiment has a total of 1,305 sentences accounting for 6.65%. This is relatively similar to the overall positive and negative rating rate of the Jingdong platform.

In the field of products and services, I believe that adjectives and tone words are more likely to express emotions, so based on the results of word frequency analysis, some words that are not related to emotional colour were eliminated, resulting in emotional words about the brand image of Nongfu Spring.

Table 4. Hierarchy chart for sentiment analysis

Emotional words	Frequency	Emotional words	Frequency	Emotional words	Frequency
Delicious	4164	Thank you	616	Hygiene	132
Convenient	3025	Good to see	338	Impact	94
worthwhile	1773	Comfortable	359	Trouble	90
Satisfaction	1708	Questions	356	Impurities	83
Rest assured	1184	Expectations	143	Patience	77
Suitable for	969	Waste	136	Conscience	76

In terms of sentiment analysis, the sentiment word attributes were defined using the "Sentiment Analysis Word Collection" published by the Knowledge Network. According to the ranking of word frequency analysis, the top sentiment words are all positive sentiment, with positive sentiment words such as "good drink" and "satisfied", and negative sentiment words such as "trouble" and "waste". "waste" and so on.

Sentiment words such as "good tasting" and "satisfied" appear more frequently, reflecting consumers' approval of Nongfu Spring products and satisfaction with the shopping process. In addition, there are specific sentiment words that appear on different platforms when purchasing different products, reflecting key events when consumers purchase the products. For example, "The delivery from Jingdong is really good! The courier came straight to my doorstep and then called me to come and pick it up! And recently there are many extra temporary workers delivering!" This shows how satisfied consumers are with the delivery on the Jingdong platform.

In terms of negative emotive words, the words "waste", "impurities" and "problems" appearing in the relevant reviews mainly reflect consumers' dissatisfaction with the quality of Nongfu Spring products, for example "The packaging is a bit damaged, I don't know if that's the reason, the water is also a bit impure, a bit disappointed." etc.

5. Research Findings and Discussion

5.1. Conclusion

Based on consumer review data from major e-commerce platforms, a systematic analysis of the brand image of Nongfu Spring products and consumers' perception of Nongfu Spring brand image was conducted using word frequency analysis, semantic network analysis and sentiment analysis.

The study of the perceived brand image of Nongfu Spring found that in terms of perceived image, consumers' perception of Nongfu Spring water is still based on product and service. Overall, the core in consumer comments is largely consistent with previous brand image predictions for Nongfu Spring, i.e.

Nongfu Spring has a better product, better taste and faster transport logistics. The perception dimensions mainly include product attributes, value price and merchant service. The results of the evolution of the noun high-frequency terms until 2019 to 2023 show that product effectiveness, brand image and logistics are important factors that continue to influence consumers' purchases of goods and are necessary for the importance of some younger groups.

Sentiment analysis further revealed that in terms of overall image perception, the overall image perception of Nongfu Spring is positive, with a relatively high proportion of overall positive ratings. Apart from dissatisfaction with some products that may be exceptional, consumers generally show positive emotional intentions and high levels of satisfaction, for example, perceiving Nongfu Spring products as delicious and quick to ship, indicating that consumers have a positive perception of Nongfu Spring's brand image. The negative perception factors for the product are mainly due to problems with the product itself, which production staff need to focus on and address, and sales staff need to get the after-sales service right.

5.2. Discussion and recommendations

The following points are suggested in relation to the findings of the study:

(1) Maintain and improve product quality: As beverage products are in direct contact with consumers, quality and safety issues are aspects that the beverage industry must take seriously. Brands should strengthen product quality management and safety control to ensure consumer trust in beverage brands.

(2) Launching different types of products for different groups: Consumers of Nongfu Spring are still very positive about its products, so the quality of its products must be guaranteed. The increase in the ranking of the high frequency word "kids" indicates that the product can be promoted to different groups, for example, sports drinks for young people.

(3) Improve brand image recognition: the current mineral water category in the eyes of consumers the first time to think of the brand is not necessarily Nongfu Spring, there are also Yi Bao, Everest Ice Spring and other brands, so you can try to make some changes to make their own brand more recognizable, so that consumers are familiar with.

(4) Strengthen the core values of the brand: Every brand should have its own unique core values, which are the basis for the long-term development of the brand. Beverage brands should find their own positioning and strengthen their brand core values through various means such as products and marketing.

(5) Seize marketing opportunities: Under new media conditions, most marketing has a certain storytelling and strong reading and viewing value. Storytelling with cultural connotation can help consumers identify with corporate values and realise the in-depth communication of brand image. Marketing is carried out through various channels such as e-commerce and offline shops. At the same time, through KOL cooperation and sponsorship activities to increase brand exposure and influence, enhance consumer awareness and goodwill towards the brand.

(6) Strengthening innovation capabilities: A brand not only needs to add more light elements to its products, but also needs to create positive attitudes throughout the brand, which is key to the brand's future development path. In the 2021 Farmers' Spring Sustainability Report, the concept of

sustainability is fully implemented and social responsibility is actively assumed. Detailed sustainability goals and routes are set out on three main issues: water stress, packaging and waste, and the product's carbon footprint.

However, this paper only collected the sales of the Nongfu Spring brand on the Jingdong platform and used word frequency analysis, semantic network analysis and sentiment analysis techniques to study and analyse consumers' product perception, brand image perception and sentiment perception. However, it is difficult to fully understand the shortcomings of the industry as a whole, and the influence of the author's subjective consciousness is inevitable in the analysis process such as filter word bank setting, high frequency word selection, emotion word extraction and semantic network analysis. If improvements are to be made, a systematic analysis of the perceptual images of Nongfu Spring is required based on computational science and a new type of data generated primarily by consumers over a larger sample space. The findings of this paper will be compared with subsequent empirical analyses to further explore the causal relationship between brand perception, emotional expression and behavioural intentions in order to validate and improve the accuracy and generalisability of the findings. Only by gaining a deeper understanding of consumers' true feelings can we make the beverage industry bigger and stronger, optimise the competitive market environment and ultimately achieve a healthy development of the beverage industry.

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