Research on Image Modeling Design of Oxygenator under the Guidance of Symbolic Semantic Thinking

Jianning Su, Jing Li, Yun Lv and Ruisheng Bai
School of Design Art, LanZhou University of Technology, Lanzhou, GanSu, 730050, China
E-mail: sujn@lut.cn

Abstract. Based on the core theory of Semeiology, the transmission mechanism that product as an information carrier is simulated. From the perspective of symbolic semantics, on the basis of analyzing the signified and signifier of product image, the semantic and symbol of product image are excavated, and the fuzzy set analysis method in Kansei Engineering is used to establish the quantitative correlation mechanism for abstract image semantics and concrete image symbols. Taking the oxygenator design of Lan Fei Co., Ltd. as an example, it helps the enterprise to grasp consumer’s image demand accurately, guides it to complete the image form design of the oxygenator and enhances the competitiveness of the enterprise.

1. Introduction
The design concept of People-centered, such as Without Thought, Human-computer Interaction Design, Emotional Design and so on, is prevalent in the design community, which greatly reflect the direction after change of product design in the prevailing circumstance. At the same time, it also reflects the escalating demand of consumer which from rational demand to perceptual demand and from functional demand to spiritual demand[1]. Therefore, as the product developer, the enterprise should change the design strategy, deeply excavate the product image, fully understand the consumer's perceptual image demand, give play to the information transmission function of the product, and use it as the carrier of communication with users. The enterprise brand identification degree and the user loyalty are established on the basis of satisfying the perceptual image demand of users[2], as shown in figure 1.
By obtaining the brand semantic, functional semantic and user demand semantic information of the product, the enterprise carries on the comprehensive processing to the information in the design activity, instructs the product design, and then satisfies the user's demand. A series of activities such as aesthetic consciousness, perception, experience and so on are carried out by users before purchasing products, and the understanding and trust of product developer are gradually established. The product as the carrier of information has successfully made the communication between product developer (enterprise) and product receiver (user) become possible.

2. Symbolic semantic and product image

Each product has unique attributes, and only after interacting with the product can we understand its function, usage scenario, operation mode and so on. Thus, before using the product, it can only rely on visual perception to recognize the product, thus forming a preliminary impression on the product. These perceptible elements such as material, color, shape, structure, etc. are the image symbols that make up the image of the product[3]. Symbol is the beginning of conveying the meaning of information, which is also a kind of medium and means with ideographic function[4]. F De saussure, a semiotics researcher, believes that symbols are composed of signified and signifier. The signified is the meaning and purpose of the symbol, that is, the internal meaning of the signifier, while the signifier is the form used by the symbol, that is, the specific material image[5]. There are inevitable connections and similarities between symbols and its semantics, product image symbols and semantics, as shown in figure 2.

Symbolic semantics not only make the symbolic symbols easier to understand and enrich the function of symbol communication, but also realize the expectation that users use symbols to express themselves. The product image semantic information also has the same status and function in the closed loop in which the product is used as the carrier of information so that the enterprise can communicate effectively with the user. In figure 2, the product signified contains the image semantics
assigned by the user, product and enterprise, and image symbols that can reflect this semantic information. The signifier of the product refers to obtaining the image of product by coding the semantics and symbols through the design activity and this product image is the meaning and purpose of the product.

Hualiang Xiao[6], Jiao Ma[7], Yuxiao Zhou[8] and others studied product image form design based on Semiology. Chuang[9], Nagamachi[10], Yunfan Zhang[11] and others obtained image semantics to guide product design based on Semiology. On the whole, in the research of product image, scholars focus on the research of user's demand image, but lack of discussion on the relationship between image semantics and form elements. On the basis of the existing research results and the idea of symbolic semantics and, this paper will carry on the experiment and discussion to the image form design of oxygenerator, and excavate its multi-dimensional image in depth by using the method of Kansei Engineering. The correlation mechanism between image semantics and image symbol is established to guide the image form design of oxygenerator.

3. Analyzing image semantics of oxygenerator

The related data survey shows that with the change of human living environment and the improvement of health awareness of consumer, people's demand for this medical product, oxygenerator, has been actually increasing, and its consumers have been extended from hospital patients and elders to white-collar workers, students, pregnant women, outdoor players, drivers, etc. The universality of consumer and the diversity of image demand bring challenges to the design of oxygenerator. Because of the special function of oxygenerator, the product image becomes more and more important. Under the premise of completing the basic efficiency of the oxygenerator, the developer of the product needs to weaken the depression that the oxygenerator brings to the user, and then meet the consumer's demand for perceptual image of the oxygenerator. The oxygenerator as a carrier of symbolic information, refers to three major parts of its image, as shown in figure 3.

Figure 3. Image semantic analysis of oxygenerator.

The first part is about the semantic meaning of consumer demand image due to the different background of consumers, that is, different demand sources such as economic semantics, cultural semantics, spiritual semantics and so on. The second part is the image semantics of the products, such as corporate culture, enterprise value, enterprise concept and so on, and the third part is the product image semantics, such as the function, the use scene, the physical nature and so on. Based on the three directions of image semantic analysis, in-depth mining is carried out through oral interview, on-the-spot investigation, second-hand data investigation, network and literature review, etc. Then, according to the product semantic representation method based on natural language processing and by extracting the theme word (Subject Heading Terms, SHT)[12] which represents the image semantics that affect the shape of the oxygenerator, 195 words of the representative oxygenerator image semantics are
obtained. Based on the analysis of meanings, 17 typical image semantics were obtained by selecting the expert group members according to their experience. Finally, it is divided into several categories through expert discussion. The classification principle is the influence degree of category attribute and image semantics, and then four categories are obtained, as shown in table 1.

Table 1. Image semantic classification.

| Classify     | Meaning and quantity | Representative image semantic vocabulary |
|--------------|----------------------|------------------------------------------|
| 1            | material correlation(4) | lightweight | superior | environmental-friendly | stable |
| 2            | performance correlation(4) | specialty | safe | durable | portable |
| 3            | morphologic correlation(6) | like | exquisite | concise | symmetrical round cute |
| 4            | color correlation(3) | casual | personalized | technological | |

4. Extracting image symbols of oxygenerator

The image symbol, which represents the image semantics of oxygenerator, is the design element of product image form design. Which is mainly reflected in the product image. As a result, product research is needed to collect mainstream oxygenerator brands through the Internet, magazines, periodicals, oxygenerator brochures, physical sales outlets, etc. (Haiyang House, Invikang, Kaiya, Haigui, Xinsong, etc.) and a number of niche but characteristic brands (such as Taishuai, Juren, etc.) product samples, a total of 90. Then, 30 initial samples were obtained by referring to the sales ranking and network clicks and analyzing 90 samples. Finally, the sample typicality is discussed by the members of the expert group, and the most representative product samples are selected, as shown in table 2.

Table 2. Representative samples of oxygenerator.

| No. | Product sample | No. | Product sample | No. | Product sample | No. | Product sample |
|-----|----------------|-----|----------------|-----|----------------|-----|----------------|
| S1  | ![Sample S1]   | S2  | ![Sample S2]   | S3  | ![Sample S3]   | S4  | ![Sample S4]   |
| S5  | ![Sample S5]   | S6  | ![Sample S6]   | S7  | ![Sample S7]   | S8  | ![Sample S8]   |
| S9  | ![Sample S9]   | S10 | ![Sample S10]  | S11 | ![Sample S11]  |     |                |

In order to obtain image symbol elements, representative samples need to be deconstructed. At first, the image symbols of each sample are decomposed by means of morphological analysis[13] based on the model composition of the oxygenerator. Then, through the induction of image symbols of 11 samples, 15 image symbols, that is, the main design elements of oxygenerator are obtained. Finally, 11 image symbols are selected which have a great influence on the shape of oxygenerator, as shown in table 3.

Table 3. Image symbols of oxygenerator.

| No. | Image symbol | Specific description | No. | Image symbol | Specific description |
|-----|--------------|----------------------|-----|--------------|----------------------|
| E1  | plastic      | polishing dull polish| E7  | side profile | straight arc         |
5. Extracting image symbols of enterprise

In order to ensure the integrity and consistency of the image form of the oxygenerator, the enterprise personality image form symbol was extracted and incorporated into the design of the oxygenerator, so that the enterprise personality was represented. Through in-depth investigation and analysis of enterprise characteristics and product image, the most representative sample (S12, S13, S14) is selected as the basis for extracting image form symbols (E12, E13, E14), as shown in table 4.

Table 4. Enterprise sample and Image symbol.

| Enterprise sample | Image symbol |
|-------------------|--------------|
| S12               | airplanes    |
| S13               |               |
| S14               | E12 form      |
|                   | wings of flight|
|                   | military medal|
|                   | blue          |
|                   | E13 colour    |
|                   | military green|
|                   | E14 material  |
|                   | mental        |

Through the analysis of table 4, we can see that the corporate image symbols mainly include material (metal), color (blue and green), form (aircraft, wings, medals), while the corporate personality symbol elements mainly depend on the form. Through the interpretation and symbolic transformation of the form, the enterprise image symbol is obtained, as shown in table 5.

Table 5. Image symbol transformation of enterprises.

| The most symbolic image form | Image form sample | Image symbol transformation |
|-----------------------------|-------------------|-----------------------------|
| airplane                    |                   | simplification              |
| military quality            |                   | deformation                 |
| logo                        |                   | scattered reorganization     |
The aircraft form is not only beautiful, but also has distinct individuality and recognition. Simplification of its shape can obtain visual form symbols as the morphological basis of enterprise image form; LanFei is a military enterprise, so the medal of honor, which represents the quality of military industry, is also the representative of its individual image symbol, which can be used in image form design. The third image symbol is the enterprise logo. LanFei's logo has a strong recognition, so the decomposition and reorganization of its elements can help people effectively use its morphology to strengthen brand identification.

6. Establishing quantifiable relevance model between samples and image symbols
In order to ensure the accuracy and readability of the image form of the oxygenator, it is necessary to establish a quantitative correlation mechanism between the samples and the image symbols in order to guide the image form design of the oxygenator accurately and effectively. The fuzzy set theory analysis method provides a systematic computing tool to express this kind of information in language. In this study, the fuzzy clustering analysis method[13] is used to establish the correlation model. Let $M_1$ be the matrix relation between oxygenator sample and image semantic, $M_2$ the matrix relation between image semantics and image symbol, $x$ the sample of oxygenator, $y$ the image semantic, $z$ the image symbol, then the relation is expressed as:

$$M_1 = \{uM_1(x, y) | x \in X, y \in Y\}$$

$$M_2 = \{uM_2(y, z) | y \in Y, z \in Z\}$$

$$M = M_1 \cdot M_2 = \{\max \min(uM_1(x, y), uM_2(y, z)) | x \in X, y \in Y, z \in Z\}$$

The first step is to create the SD questionnaire of image semantics and representative oxygenator samples. SD questionnaires were distributed to 10 designers, 15 consumers and 10 business employees. One invalid questionnaire was abandoned and 34 valid questionnaires were obtained. A uniform registration of the survey data is performed and the mean of each image semantics for each sample is calculated, as shown in Table 6.

|       | S1   | S2   | S3   | S4   | S5   | S6   | S7   | S8   | S9   | S10  | S11  |
|-------|------|------|------|------|------|------|------|------|------|------|------|
| like  | 2.706| 2.029| 2.765| 1.882| 1.941| 2.088| 1.765| 2.029| 1.941| 2.235| 2.706|
| lightweight | 5.441| 1.706| 2.382| 3.535| 5.441| 6.118| 3.059| 5.412| 1.853| 3.824| 5.059|
| specialty | 4.176| 1.971| 3.765| 3.529| 2.206| 2.118| 1.824| 2.000| 5.382| 2.647| 3.235|
| exquisite | 3.735| 1.941| 3.382| 1.853| 2.029| 3.824| 2.059| 2.118| 3.588| 1.794| 2.824|
| concise  | 2.765| 1.794| 2.206| 2.000| 2.147| 2.059| 5.059| 3.253| 3.767| 1.735| 3.882|
| casual   | 1.941| 3.824| 2.265| 5.647| 6.059| 2.000| 5.735| 5.559| 2.059| 4.971| 2.441|
| superior | 4.059| 2.324| 4.029| 2.029| 2.029| 1.912| 1.647| 1.882| 4.735| 2.324| 3.971|
| round    | 2.147| 3.824| 4.353| 6.059| 5.647| 1.912| 5.176| 2.941| 2.029| 2.088| 4.735|
| safe     | 2.206| 1.824| 2.206| 3.794| 2.059| 2.265| 4.735| 3.441| 2.059| 1.882| 2.324|
| durable  | 3.412| 2.471| 1.971| 2.088| 2.118| 2.059| 4.000| 2.088| 4.353| 1.824| 2.647|
| Environmental-friendly | 3.559| 2.618| 2.000| 1.941| 1.882| 3.912| 1.824| 4.853| 4.529| 2.500| 3.735|
| portable | 5.500| 1.941| 1.971| 6.088| 5.971| 5.235| 5.441| 5.676| 2.265| 3.029| 3.941|
| technological | 5.529| 2.529| 4.794| 6.029| 3.912| 5.941| 2.853| 1.882| 4.412| 3.853| 5.412|
| cute     | 4.118| 4.000| 4.765| 5.971| 6.059| 5.294| 6.088| 5.412| 1.971| 3.882| 5.471|
| personalized | 5.588| 2.382| 2.500| 2.029| 2.853| 5.353| 4.147| 2.382| 3.294| 3.206| 4.500|
| stable   | 2.735| 2.324| 1.882| 2.265| 1.882| 2.088| 5.353| 2.647| 3.118| 2.147| 2.500|
| symmetrical | 1.941| 1.971| 1.971| 4.971| 6.059| 1.824| 3.294| 1.853| 3.000| 1.676| 1.941|
The image semantic mean value of each sample is less than 4, which indicates that the sample has the connotation of a certain image semantics. As in the mean statistics of S1 image semantics in the table, those<4 are like (2.706), exquisite (3.735), concise (2.765), casual (1.941), round (2.147), safe (2.206), durable (3.412), Environmental-friendly (3.559), stable (2.735), symmetrical (1.941). Through numerical comparison, the smallest number represents the strongest image semantics, so it can be concluded that the strongest image semantics of S1 are casual (1.941) and symmetrical (1.941). On the horizontal side, we can get the smallest numerical value by comparing the numerical values, thus we can get the most representative one of the 11 samples in a certain image semantics. For example, S2 (1.706) is the least valued sample in lightweight, so it can be seen that the strongest consumer perception of lightweight is the sample 2. In order to import data into fuzzy mathematics calculation, table 6 data is normalized. Import the normalized data into the formula (1) get the fuzzy matrix $M_i$ between the sample and the image semantics, that is, the relationship between the sample and the image semantics:

$$
M_i = \begin{pmatrix}
0.387 & 0.290 & 0.395 & 0.269 & 0.277 & 0.298 & 0.252 & 0.290 & 0.277 & 0.319 & 0.387 \\
0.777 & 0.244 & 0.340 & 0.765 & 0.777 & 0.874 & 0.437 & 0.773 & 0.265 & 0.546 & 0.723 \\
0.597 & 0.282 & 0.538 & 0.504 & 0.315 & 0.303 & 0.261 & 0.286 & 0.769 & 0.378 & 0.462 \\
0.534 & 0.277 & 0.483 & 0.265 & 0.290 & 0.546 & 0.294 & 0.303 & 0.513 & 0.256 & 0.403 \\
0.391 & 0.332 & 0.269 & 0.324 & 0.269 & 0.298 & 0.765 & 0.378 & 0.445 & 0.307 & 0.357 \\
0.277 & 0.282 & 0.282 & 0.710 & 0.866 & 0.261 & 0.471 & 0.265 & 0.429 & 0.239 & 0.277 \\
\end{pmatrix}
$$

In the second step, the SD questionnaire of image semantics and image symbols of the oxygenerator is made. SD questionnaires were distributed to 10 designers, 15 consumers and 10 business employees. Four invalid questionnaires were abandoned and 31 valid questionnaires were obtained. The survey data are recorded and the mean values of each image semantics of each image symbol are calculated as shown in table 7(a) and 7(b).

| like  | lightweight | specialty | exquisite | concise | casual | superior | round | safe |
|------|-------------|-----------|-----------|---------|--------|-----------|-------|------|
| E1   | 1.806       | 1.387     | 4.129     | 4.903   | 5.548  | 2.000     | 4.323 | 3.871| 1.935|
| E2   | 3.871       | 5.581     | 5.387     | 5.548   | 3.290  | 5.355     | 2.742 | 5.742| 5.484|
| E3   | 2.000       | 5.258     | 2.032     | 3.581   | 3.516  | 3.161     | 4.516 | 3.516| 1.452|
| E4   | 2.000       | 2.935     | 1.968     | 2.290   | 3.032  | 2.968     | 4.226 | 5.323| 1.774|
| E5   | 1.774       | 2.032     | 2.226     | 5.839   | 3.161  | 2.613     | 1.903 | 5.968| 2.419|
| E6   | 1.355       | 2.613     | 5.839     | 5.129   | 1.419  | 2.355     | 5.968 | 1.516| 4.484|
| E7   | 1.839       | 2.484     | 5.968     | 2.806   | 2.226  | 4.677     | 6.323 | 2.194| 3.129|
| E8   | 1.806       | 6.516     | 4.129     | 2.258   | 2.000  | 2.226     | 4.516 | 1.903| 4.516|
| E9   | 1.516       | 1.452     | 4.516     | 5.194   | 6.419  | 4.806     | 6.387 | 4.516| 5.065|
| E10  | 4.484       | 2.323     | 4.806     | 5.290   | 1.419  | 2.032     | 5.968 | 6.581| 5.710|
| E11  | 4.097       | 5.065     | 5.581     | 5.645   | 6.452  | 5.935     | 5.968 | 6.419| 5.968|

| durable | Environmental friendly | portable | technological | cute | personalized | stable | symmetrical |
|---------|-------------------------|----------|---------------|-----|--------------|--------|-------------|
| E1      | 2.581                   | 4.581    | 1.548         | 5.097| 5.323        | 5.194  | 1.968       | 6.452|
| E2      | 5.774                   | 4.097    | 3.355         | 2.355| 5.419        | 5.032  | 5.419       | 5.581|
| E3      | 1.935                   | 6.097    | 3.355         | 5.581| 5.548        | 3.806  | 1.677       | 4.710|
| E4      | 2.032                   | 5.355    | 1.581         | 6.097| 3.935        | 2.935  | 4.323       | 1.806|
| E5      | 3.742                   | 5.387    | 1.452         | 3.871| 6.258        | 2.839  | 1.903       | 2.871|
| E6      | 5.742                   | 6.484    | 3.742         | 6.484| 1.903        | 1.935  | 4.161       | 1.548|
If the image semantic mean of the image symbol is less than 4, the image semantics of the image symbol can be determined horizontally. As in the table E1 mean value<4 are like (1.806), lightweight (1.387), casual (2), round (3.871), safe (1.935), durable (2.581), portable (1.548), stable (1.968). Through the comparison, the smallest value shows that the image semantics is the most significant. So the most obvious image semantics of E1 is lightweight (1.387). In the same way, we can get the smallest longitudinal value by comparing the numerical values. And then get the image symbols which contribute the most to a certain image semantics of 11 image symbols. Taking "lightweight" as an example, E1 (1.387) is the image symbol with the least numerical value, so consumers think that E1 (plastic) is the image symbol which has the greatest contribution to the image semantic "lightweight". In order to import the data into the calculation of fuzzy mathematics, the data in table 7 is normalized. The data is imported into the formula (2) the fuzzy matrix M₂ between image symbol and image semantics is obtained:

$$M_2 = \begin{bmatrix}
0.258 & 0.198 & 0.590 & 0.700 & \cdots & 0.281 & 0.922 \\
0.553 & 0.797 & 0.770 & 0.793 & \cdots & 0.774 & 0.797 \\
0.286 & 0.751 & 0.290 & 0.512 & \cdots & 0.240 & 0.673 \\
0.286 & 0.419 & 0.281 & 0.327 & \cdots & 0.618 & 0.258 \\
0.253 & 0.290 & 0.318 & 0.834 & \cdots & 0.272 & 0.410 \\
0.194 & 0.373 & 0.834 & 0.733 & \cdots & 0.594 & 0.221 \\
0.263 & 0.355 & 0.835 & 0.401 & \cdots & 0.650 & 0.276 \\
0.258 & 0.931 & 0.590 & 0.323 & \cdots & 0.853 & 0.276 \\
0.217 & 0.207 & 0.645 & 0.742 & \cdots & 0.645 & 0.719 \\
0.641 & 0.332 & 0.687 & 0.756 & \cdots & 0.719 & 0.917 \\
0.585 & 0.724 & 0.797 & 0.806 & \cdots & 0.912 & 0.848 \\
\end{bmatrix}$$

In the third step, the statistical operation of fuzzy clustering is carried out to establish the quantitative correlation between image symbols and samples. Firstly, the fuzzy relation matrix M₁ of oxygenerator samples and image semantics and the fuzzy matrix M₂ of image semantics and image symbols are introduced into formula (3). The contribution matrix of image symbol to sample is obtained. To facilitate observation and comparison of data, the matrix M is converted into a table of image symbols' contribution to product samples, as shown in table 8.

Table 8. The contribution of image symbols to samples.

|    | S1   | S2   | S3   | S4   | S5   | S6   | S7   | S8   | S9   | S10  | S11  |
|----|------|------|------|------|------|------|------|------|------|------|------|
| E1 | 4.653| 3.161| 3.923| 4.688| 4.528| 4.259| 4.659| 3.865| 4.363| 3.332| 4.757|
| E2 | 5.734| 4.044| 4.646| 6.156| 5.922| 5.256| 6.317| 5.374| 5.069| 4.355| 5.749|
| E3 | 4.822| 3.159| 3.820| 4.992| 4.828| 4.631| 4.617| 4.334| 4.070| 3.560| 4.901|
| E4 | 4.105| 2.887| 3.470| 4.292| 3.971| 3.837| 4.188| 3.643| 3.668| 3.095| 4.324|
| E5 | 4.090| 3.019| 3.581| 4.394| 4.190| 3.925| 4.391| 3.798| 3.684| 3.059| 4.345|
| E6 | 4.886| 3.017| 3.793| 4.489| 3.953| 4.288| 4.323| 3.958| 4.635| 3.376| 4.584|
| E7 | 4.942| 3.289| 3.936| 4.734| 4.300| 4.298| 4.701| 4.190| 4.753| 3.645| 4.790|
| E8 | 5.067| 3.077| 3.604| 4.900| 4.510| 4.600| 4.871| 4.595| 4.348| 3.557| 4.790|
| E9 | 5.941| 4.180| 4.934| 5.932| 5.615| 5.336| 6.323| 5.224| 5.678| 4.389| 6.037|
| E10| 6.077| 4.062| 5.038| 6.440| 6.054| 5.562| 6.227| 5.132| 5.181| 4.338| 6.041|
| E11| 6.942| 4.677| 5.445| 7.142| 6.768| 6.169| 7.349| 6.289| 6.350| 5.085| 6.859|

Through the systematic analysis of the data in table 8, the relationship between the sample and the image symbol can be obtained. Taking the whole column data of sample S2 as an example, through
numerical comparison, 2.887 is the smallest of the whole columns, indicating that the image symbol E4 (handle) is the largest contribution to sample S2 in accepting the evaluation of image semantics. As a result, when designing products such as lightweight oxygenerator, we should pay attention to the design of its handle.

7. Image modeling design of oxygenerator

Located in the actual project of oxygenerator design, the enterprise mainly develops a small oxygenerator with the image of "portable". First of all, the data analysis of 11 samples in table 6 shows that sample S2 (1.941) has the highest score. Secondly, the data of image semantics of sample S2 in longitudinal direction are sorted. In addition to "portable", the ahead three image semantics with higher scores are lightweight, concise and safe. Then, table 7 data is analyzed to obtain image symbols which have great semantic contribution to "portable", "lightweight", "concise" and "safe". Finally, based on the data from table 8, the importance ranking of image semantics and corresponding image symbols can be obtained: handle > front profile > move mode > grille profile > key operation > plastic > side profile > touch screen operation > monochrome > length-width-thickness ratio. At the same time, the relationship between each image semantics and image symbols can be clearly defined, as shown in Table 9.

Table 9. The relationship between the image symbols with the image of "portable" and the related image semantics.

|        | lightweight | concise | safe  | portable |
|--------|-------------|---------|-------|----------|
| E4     | 2.935       | 3.032   | 1.774 | 1.581    |
| E6     | 2.613       | 1.419   | 3.742 |          |
| E5     | 2.032       | 3.161   | 2.419 | 1.452    |
| E8     | 2.000       |         |       |          |
| E3     | 3.516       | 1.452   | 3.355 |          |
| E1     | 1.387       | 1.935   | 1.548 |          |
| E7     | 2.484       | 2.226   | 3.129 | 2.484    |
| E2     | 3.290       |         | 3.355 |          |
| E10    | 2.323       | 1.419   |       |          |
| E9     | 1.452       |         | 2.097 |          |

We can see that the "portable" value (1.581) of the handle by referring to the ranking of the importance of image symbols in table 9 and combining the values of the image symbols in the relevant image semantics of the "portable" image is the smallest. So, during the handle design process, the portability should be mostly considered but the safety, lightweight and concise semantic might be slightly considered. Similarly, through analysis data can confirm that when designing an oxygenerator such as a "portable" one, we should focus on the simplicity of the side profile, the front profile, the grille profile, and the color matching elements, and the design of the material and the length-width-thickness ratio is mainly concerned with lightness, the most important thing about keystroke design is security, handle and moveable design should emphasize portability. The enterprise image symbols (aircraft, medal, logo) extracted from table 5 are integrated into the styling design by using the design aesthetics rule, and the design scheme of the oxygenerator is obtained. The 2D scheme is transformed into 3D model by solidworks software, and the keyshot software to complete the image styling design rendering picture of portable oxygenerator, as shown in figure 4.
In the design process of the oxygenerator, the aircraft form with both aesthetic and enterprise personality is chosen as the styling element. Considering the simplicity of the handle, the side profile and the front profile, the aircraft shape is simplified and deformed to connect the oxygen outlet and the intake port, and the wing shape is naturally transformed into the grille contour line and extended to the side profile, which is harmonious and beautiful. The proportion is adjusted by the "Trisection" and "Golden Section Search" to meet the aesthetic needs of the users. Handle design is concise and in line with man-machine requirement. At the same time the whole oxygenerator uses blue plastic, light color and light texture, in line with the user's needs for portability. After expert evaluation, the design of the oxygenerator has met the demand for "portable" image in the overall styling, and directly reflects the brand identification of LanFei.

8. Conclusions
Product image styling design not only conforms to the development of the times, but also accurately explains the new requirements put forward by consumers to product developers and the new expectations for product design under the new consumer environment. When developing new products, enterprises not only pay attention to costs and technology, but also attentively explore products as a carrier of information synthesis. The discussion of product image is helpful to the development and design of product image styling. Under the guidance of the thought of symbolic semantics, through the deep probing and analysis of image semantics and image symbols of oxygenerator samples in this paper, the correlation model between oxygenerator samples and image symbols is established by fuzzy set analysis method. At last, referring to quantifiable data, the image styling design of portable oxygenerator of Lanzhou Flight Control Co., Ltd. was successfully completed by integrating the unique brand image symbol of enterprise, which proves the feasibility of the product image styling design process and the validity of the model about product image extraction and correlation.

References
[1] (us)Klaus Kripendorf. Design: a shift in semantics [M]. Beijing: China Construction Industry Press, 2017.
[2] Chun Ouyang. Product brand meaning continuation and innovation [J]. Art Education, 2015, (11): 142-143.
[3] Jianning Su, Zhijun Liu, Peng Wang. Research progress of product family form design method based on perceptual image [J]. Mechanical Design, 2017, 34 (11): 112-116.
[4] Yi Zhang, Jingwen Du, Ying Zhang. Research on the Construction of perceptual Image of Chinese Furniture from the Perspective of symbolic semantics [J]. Design, 2018, (21): 18-19.

[5] Linghao Zhang. Semiotic product design method [M]. Beijing: China Construction Industry Publishing House, 2011.

[6] Hualiang Xiao, Li Lin, Longhua Yan, Chen Zhiang. Tourism souvenir design based on design semiotics analysis and evolution of silver ornaments of Miao nationality [J]. Packaging Engineering, 2018, 39 (14): 221-226.

[7] Jiao Ma, Bin Zhang. Research on the extraction and innovation design of the color-paste paper-cut symbol of the city of china[j]. Packaging Engineering, 2018, 39 (12): 249-253.

[8] Yuxiao Zhou, Shijian Luo, Chen Gencai. Icon design based on design semiotics [J]. Journal of computer-aided Design and Graphics, 2012, 24 (10): 1319-1328.

[9] Chuang M C, Ma Y C. Expressing the expected product images in product design of micro-electronic products[J]. International Journal of Industrial Ergonomics, 2001, 27(4): 233-245.

[10] Nagmachi M. Kansei engineering: a new ergonomic consumer-oriented technology for product development[J]. International Journal of Industrial Ergonomics, 1995, 15(1): 3-11.

[11] Yunfan Zhang, Zhuo Liu. Product family styling design based on brand image gene extraction [J]. Mechanical Design, 2018, 35 (3): 105-109.

[12] Zaolin Lu, Fritz Frenkler. Research on the design of new energy automobile model based on product semantic analysis[J]. Mechanical, 2017, 34 (3): 111-116.

[13] Meiyu Zhou. Sensibility and design[M]. Shanghai: Shanghai Science and Technology Press, 2011.