HOW TO DEVELOP AND USE THE PRODUCT CONCEPT TABLE THROUGH EVALUATION OF ESTEEM FUNCTIONS

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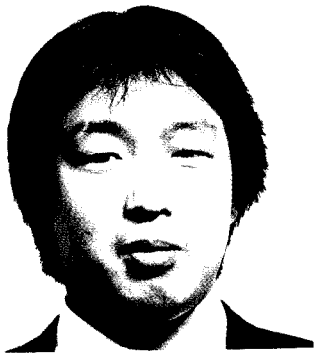

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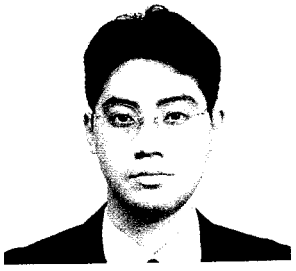

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ABSTRACT

This study has been carried out by considering a product concept as "a message from an enterprise message given to a product by searching the needs (subconscious) from the customers' side, deciding the benefits which will respond to them, and adding management policy" and to propose a new method for supporting the conceptualization of new products from the esteem function which are to be introduced into the existing market with existing and improved technologies. It's special features are to quantify and evaluate esteem function and to express the result by figures, to clarify the esteem function needed to be improved, and furthermore to summarize such information into a newly developed summary table. A methodology for integrated product conceptualization has been constructed through this study by being paired with "How to Develop and Use the Product Concept Table through Evaluation of Esteem Functions" which complement each other.

INTRODUCTION

This study has been carried out to analyze esteem function logically, and to make quantity them so as be able to supply information (Product Concept Table) for supporting the

conceptualization of products for new product development, and to promote the usage of this newly developed table.

METHOD FOR THIS STUDY

This study is constructed of 3 phases as shown in Figure 1. Its details will be given following this procedure, using a high grade ball-point pen as an example.

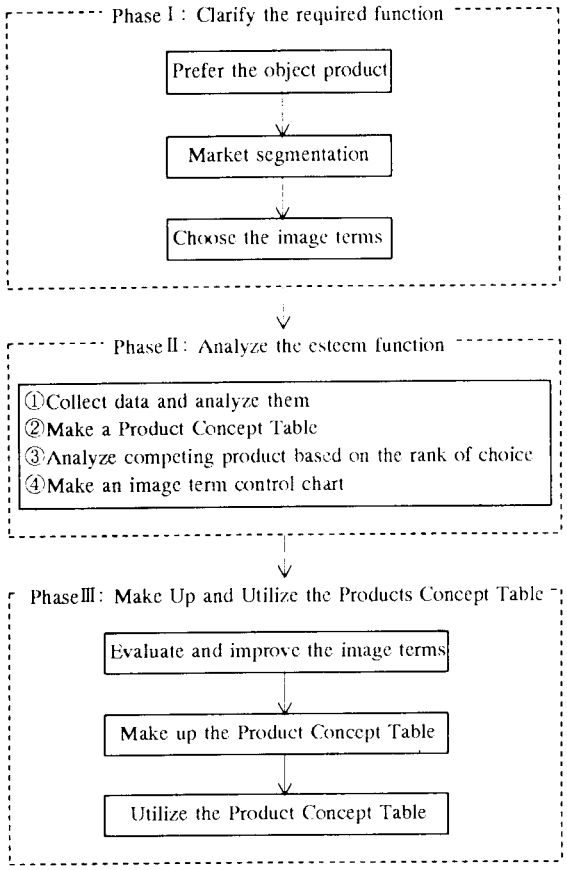

Figure 1 Outline of this Study

MAKING THE ESTEEM FUNCTION CONCRETE

(1) Prefer the object product group

We will consider here the case of developing a high grade ball point pen and take up 4 high grade ball point pen products (A,B,C,& D) which compete with each other and are considered to be advantageous for product conceptualization.

(2) Market segmentation

The consumers' desires are various, so it is necessary to divide the market into homogeneous consumer groups from some viewpoint, focus on some specific target, and make the marketing activities more efficient. Here, two sub-markets consisting of product groups which compete with each other from the standpoint of a homogeneous consumer group (=segment) and consumers will be set up. The following segments and markets (=sub-markets) were set up here.

Segment (object) : consumers in the twenties
Sub-market (purpose of use) : (a) personal use,
(b) gift use

(3) Choose the image terms

Image terms are used in this study to express the esteem function in the competing product group taken up here. Therefore, image terms which accurately express the image of the product taken up must be carefully chosen. The procedure is as follows.

Step 1

Extract as large amount of image terms as possible (a little over 3,000 terms were extracted in this study).

Step 2

About 60 image terms suitable for expressing the esteem function of the product group taken up are chosen.

Step 3

If the selected image terms are biased towards a certain image group, then the esteem function of the product group taken up cannot be expressed in a well-balanced way. So, a language image scale is made, and the selected image terms are re-selected so as to be taken up in a well balanced manner.

A language image scale is made by dividing a plane by 2 orthogonally crossing coordinates into 4 quadrants, and further making a 3×3 square cells (scales) for each quadrant.

Step 4

A "product image term study" is carried out toward customers, etc. to see whether the image terms are suitable for expressing the esteem function of the competing product group taken up. As a result, image terms suitable for expressing the object product are (finally) chosen. The 19 terms were chosen in this study as suitable for evaluating the product group taken up in this study.

ANALYSIS OF THE ESTEEM FUNCTION

COLLECTION AND ANALYSIS OF THE CONSUMER CHOICE DATA

A "study on the choice (of customers)" as to what degree customers etc. evaluate each image term chosen for each product in the competing product group taken up was made and data on the rank of choice for each product in the competing product group were collected. Furthermore, in this study, the customers, etc. were asked to imagine an ideal product to let it be a standard for comparing the individual products, and also studied how much the customers, etc. evaluated the individual image terms for the ideal product. These show the degree of requirement (degree of importance) of the customers, etc. toward each image term.

It is necessary to normalize the studied data so that it will be possible to process them statistically. Here, data on the rank scaling data were normalized by the normalizing ranking method and other scaling data were also normalized based on the distance of the normalizing ranking method.

MAKING AN IMAGE TERM SYSTEM CHART

Factor analysis is carried out for the normalized data to obtain the amount of factor load and the contribution rate, and these are placed on a plane diagram as the horizontal and vertical axes together with the individual image terms so as to clarify the structure of the esteem function of the product taken up. This is called an image term system chart in this study. It becomes possible through this image term system chart to clarify the image structure of the product taken up as well as how much each image term affects the product taken up.

Now, the factor loading variate shows the correlation coefficient of each image term to each factor, and shows whether each image term has a positive or negative effect to each factor together with its amount. And the contribution rate shows the percentage of a factor made up of each image term on the esteem function of the overall product.

ANALYSIS OF COMPETING PRODUCTS BASED ON THE RANK OF CHOICE

The choice rank data studied by the "study on the choice of customers", etc., are normalized, and these are considered as the objective variables and the corresponding evaluated data for the individual image terms are normalized and are considered as explanatory variables in carrying out multiple regression analysis. The partial correlation coefficients of the individual image terms are obtained to clarify the effect of these image terms on the rank of choice of the product taken up.

MAKING AN IMAGE TERM CONTROL CHART

An image term value control chart (abbreviated as an image term control chart) is made here to analyze the degree of balance of the achievement of the image as expressed by the individual image terms and to clarify the direction for any improvement. The degrees of the individual image terms expressing the esteem function for the overall ideal product obtained by the "(customer) choice study", etc., are expressed in percentages and are considered as the importance (I) of the individual image terms. Furthermore, the degrees of the individual image terms expressing the esteem function for the overall new product being developed are also expressed in percentages and are considered as the degree of achievement (P) of the individual image terms. This importance is taken as the vertical axis of the value control chart, and the degree of achievement is taken as the horizontal axis of the value control chart, and the individual image terms for the new product being developed are plotted on the chart. The plotted points must as a rule be inside the appropriate value range.

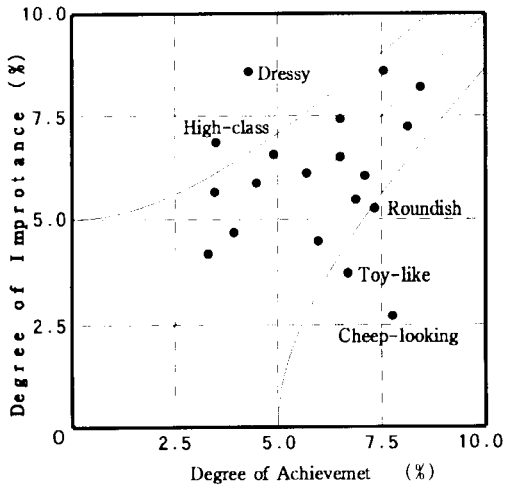

Figure 2 Image Term Control Chart (Product A for Gift Use)

The appropriate value range is as shown in Figure 2, which shows as reference the image terms for product A (gift use). The appropriate value range is shown within the oblique lines.

In the example shown in Figure 2, the degrees of achievement for the image terms "dressy" and "high-class" should be higher but their values are low, while the degrees of achievement of the image terms "cheap-looking", "toy-like", and "roundish" should be lower but their values are shown to be high.

MAKING AND UTILIZING A PRODUCT CONCEPT TABLE

EVALUATE AND IMPROVE IMAGE TERMS

The evaluation of the individual image terms are done based on the partial correlation coefficients obtained for individual products and the evaluation values obtained from the image term control chart and the evaluation values obtained from a "study on beauty appearance" for the image terms, and also a table on the direction of improvement is made. The procedure is as follows.

Step 1 Calculate the contribution of the image term

The degrees of the contribution of the major beauty appearance elements (they were considered here to be the 3 elements shape, color, and material) constituting the individual image terms in the "study on beauty appearance", etc., to the individual image terms are shown in percentages. Here, they are shown by " ○ ", " △ ", and " − ". For the case taken up here, " ○ " marked for the individual image terms are for answers which 80% or more consumers, etc., answered that they gave a feeling of beauty for the individual beauty elements, " △ " for 60 ~ 80%, and " " for 60% or less.

Step 2 Clarify the effect of individual image terms on the product

The amounts of effect of individual image terms on the esteem function of the product taken up are clarified by their partial correlation coefficients. Those image terms with high correlation coefficients can be said to have a large effect on the product taken up. For the case here, they were classified according to the 80% significance level, and were shown by " ・ ", " + ", and " − " marks. For the case taken up here, " ・ " mark means for not so much effect on the esteem function of the overall product, " + " mark means for have a positive effect on the esteem function of the overall product, and " " mark means for have a negative effect on the esteem function of the overall product.

Step 3 Calculate and evaluate the degree of ideal of the image terms

The evaluated values of the individual image terms of an ideal product and those of the product being under development are compared to calculate the degree of conformance (called the degree of ideal) of the individual image terms to the evaluated values of the ideal product. Therefore, the data are obtained from the "choice study" of the consumers, etc.

$$\text{Degree of ideal of individual image terms} = \left(\frac{\text{Evaluation value for the product taken up}}{\text{Evaluation value for the ideal product}} - 1\right) \times 100$$

The values of the degree of ideal of the individual image terms are classified and judged according to following evaluations.

Evaluation A : Dispersion of degree of ideal is more than ± 5 point
Evaluation B : Dispersion of degree of ideal is more than ± 15 point
Evaluation C : Dispersion of degree of ideal is more than ± 30 point
Evaluation D : Dispersion of degree of ideal is more than ± 50 point
Evaluation E : Dispersion of degree of ideal is less than ± 50 point

The evaluations expressed by A, B, C, D, and E show the degrees of dispersion from the evaluation values of the image terms for the ideal product. The ± in here shows the following. For example, + E means "The image ** is excessive" and − E means that "The image ** is insufficient".

Step 4 Clarify the direction for improving the image terms

It is necessary to show the direction for improving the individual image terms according to their degrees of ideal. The arrow marks for

improvement show the contents shown as follows.

↑ : The image is insufficient and has a high priority for improvement
↗ : The image is insufficient and has a necessity for improvement
→ : No special need for improvement
↘ : The image is excessive and has a necessity for improvement
↓ : The image is excessive and has a high priority for improvement

And the evaluation of image terms and their direction for improvement are shown in Table 1, and their explanations and guides for improving the image terms are shown in Table 2.

Table 1 The Evaluation of Image Terms and Their Direction for Improvement

Image term	Shape	Color	Material	Effect	Evaluation	Direction
Adult-like	△	○	△	•	-C	↗
Dressy	○	○	–	•	-E	↑
Toy-like	○		△	–	+E	↓
Cheap-looking	–	–	○	•	+E	↓
Unique	○	○		•	-D	↑
Individualistic	○	○	–	•	-C	↗
Simple	○	△		•	+B	↘
Gorgeous-looking	–	○			-C	↗
Heavy-looking	△		△	•	-B	↗
Modern	○	○		•	-D	↗
Roundish	○				+E	↓
Sophisticated	○			•	-C	↗
High-class	△	○	○	•	-D	↑
Antique-like			△	•	A	→
Practical	○	–	–	•	A	→
Mechanical	○		△		+E	↓
Functional	○				+C	↘
Masculine		–		•	+D	↘
Strong-looking	△		○	•	A	→

Table 2 Guides for Improving the Image Terms

Image term	Guides for improvement
Adult-like	It is necessary to strengthen the color beauty and also the shape beauty and material beauty
Dressy	It is necessary to strengthen especially the shape beauty and color beauty
Toy-like	It is not accepted and it is necessary to improve the shape beauty with high priority and the material beauty is also necessary to be improved
Cheap-looking	It is necessary to especially put high priority effort on the material beauty (Give a high-grade feeling)
Unique	It is necessary to especially strengthen the shape beauty and color beauty with high priority
Individualistic	It is necessary to strengthen the shape beauty and color beauty with high priority (Make special feature clear)
Antique-like	Not necessary to be improved
Practical	Not necessary to be improved
Mechanical	It is excessive but is accepted, so further analysis is necessary
Functional	It is not being accepted so it is necessary to improve the shape beauty with high priority
Masculine	It is necessary to weaken it (so as to give a natural feeling of common use among men and women)
Strong-looking	Not necessary to be improved

MAKE A PRODUCT CONCEPT TABLE

Those information obtained through the above analyses are summarized into one table which will be called the "Product Concept Table". This Product Concept Table is an arrangement of information essential for clarifying and detailing the new product concept from the esteem function aspect so makes up an important part of the designer support system.

This Product Concept Table will contribute to an integrated product conceptualization by combining the Product Concept Tables for both the use and esteem function into a pair so as to compensate each other. Therefore, the Product Concept Table in this study only looks from one side. The form is as shown in Table 3.

UTILIZE THE PRODUCT CONCEPT TABLE

On information A

Information A is a systematic arrangement of the image terms for an ideal product for the competing product group taken up. It clarifies the major factors for the image terms which should be followed in developing a new product and the amount of the effect of the individual image terms on the factors.

In the case taken up here, the 1st factor (contribution rate about 30%) shows the necessity of giving an impression of high-grade feeling, and its main contents shows that the images of "adult-like" and "high-class" are strong, and that the images of "cheap-looking" and "toy-like" should be restrained as much as possible.

Furthermore, the cumulative contribution rate of factors 1 to 3 is about 68%, so it can be said that these 3 factors take up about 70% of the product selection factors of the customers in general. Therefore, the conceptualization of strategically taking in such an image into the product being developed is essential.

On information B

Information B is a systematic arrangement of image terms for the new product being developed (newly developed prototype or an existing product to be used as the base for an improved product, etc.). This is to be made for the new product taken up and is compared with information A to make the new product taken up to become individualistic. Its contents are similar to information A.

On information C

Information C is an analysis of whether the individual image terms constituting the esteem function of the new product taken up achieve the

Table 3 Outline of Form for a Product Concept Table

*** Product Concept Table ***		
Object product	Object segment	Object sub-market
〈 Systematic chart for ideal product image terms (information A) 〉		
〈 Systematic chart for image terms for product taken up concerned (information B) 〉		〈 Image term control chart (information C) 〉
〈 Evaluation and direction for improving image terms (information D) 〉		〈 Improvement policy for image terms (information E) 〉

required level of the customers, etc., and how much are their degrees by using the value control chart devised by one of the authors, Masayasu Tanaka. An example is shown here for analyzing an existing product A assuming that a new product is to be developed by improving this product A. In this case, if we make a control chart by taking q=5, those image terms which don't come within the appropriate value range are the 3 terms "cheap-looking", "toy-like", and "roundish" and are image terms necessary to be improved. However, for a q=6 value control chart, the sole image term needing improvement becomes "cheap-looking". The value of q depends on the degree of balance allowed for the achievement of the image terms and is decided from corporate policy regarding new product development.

On information D

Information D expresses the evaluations and the directions for improving the individual image terms. An example is shown here showing a "table of the evaluation and direction for improving the image terms" for an existing product A assuming that a new product is to be developed by improving this product A. According to this table, e.g. for the image term "toy-like", its evaluation of the degree of ideal shows a + E mark (the image term is excessive) and the degree of its effect shows a - E mark (gives a negative evaluation for the esteem function of the product as a whole), so the direction for improving this image term is (the image is excessive and has a high priority for being improved). Furthermore, from the beauty factor, "toy-like" shows that this image is strongly felt mainly from its shape.

On information E

Information E expresses the rules for improving the individual image terms based on information D by daily used words. This is a summarized information of the result of the Product Concept Table and has been devised so as to be convenient for anyone to understand the rules for improvement.

CONCLUSIONS

A new method from the esteem function aspect has been proposed in this study to support the conceptualization of new products using existing or improved technology to be introduced into an existing market. The advantages of this method are the following.

① The image of the product taken up as felt subconsciously by the consumers, etc., was able to be shown graphically in a systematic manner by a systematic image term chart. A systematic image chart can be made for the existing product competing with a new product being developed, the subconscious preference structure of the customers can be analyzed, and the conceptualization of strategically planned products will become possible.

② It was possible by obtaining the partial correlation coefficients to know which image terms are considered especially important and which image terms are not so important when the customers, etc., choose products. This makes it possible to know the measures for customers, etc., in choosing products in general from a competing product group in a segmented market.

③ It has become possible to clarify image terms needed to be improved and their degrees by making an image term control chart. It will be possible by applying this technique to analyze competing hit products and to search for the causes of becoming hit products, and also to improve the balance among the esteem function of a product being developed.

This new technique including such advantages has not yet been widely utilized, but it can be said that it is a very effective tool for developing new products with a large proportion of esteem function.

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