

## **A New Evaluation Method of Interaction Effects Using Compound Added Functions and the Analysis on its Relationship to the Attributes of Potential Customers**

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### **ABSTRACT**

At the 2004 SAVE Conference, the authors have proposed a method for evaluating the interaction effects produced by compounding added functions monetarily using the 3 indices of the amount of the interaction effects: the ratio of the interaction effects, and the rate of recognizing the interaction effects, and clarified its usefulness. In this study, they further analyze the difference in the scale of effectiveness of interaction effects caused by attribute differences of potential customers, and clarify the relationship between the attributes of potential customers and the interaction effects. They demonstrate that leveraging the relationship between the potential users and the interaction effects can help calculate predicted selling price, which is the key to establish a strategic product concept-making, a standard selling price and a target cost.

**Keywords:** evaluation method, interaction effects, added functions

### **1. Introduction**

The objects of this study are the many existing durable consumer goods among competing products. Although their general sales prices are fundamentally determined from their relative supplies and demands, they are basically determined by adding strategic elements to the forecasted sales prices by evaluating the functions (include the basic and attractive functions) of similar product categories. However, studies on evaluations of added functions for product differentiation are still immature, and sufficient theoretical developments have not been made. This study pays attention to these added functions, especially to the effects of compounding the added functions, and examines the method for evaluating and utilizing them.

Here, a concept of “negative compounded effects” has been newly presented in addition to the positive compounded effects which are the results of contemporary studies (Harada and Tanaka [2001a]). These studies utilize the interaction effects, which are produced by the compounding of added functions to the setting of the sales prices or the utilization to the structuring of the added functions in the initial stages of new product developments. They have been integrated to be proposed as the amounts of the interaction effects, the ratios of the amounts of the interaction effects, and the rates of recognizing the interaction effects and have clarified how to utilize them.

Through a clear understanding of the relationship between customer attributes and

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scale of interaction effects of added functions, potential customers can be easily segmented. Also, it is possible to make a product concept incorporating the most strategic added function for each segment.

## 2. The Steps of a Preceding Study and This Study

We had proposed the method for evaluating the individual added functions of potential customers using the linear method for integrating information (Harada and Tanaka [2001b]). And the existence of a positive compound function by the compounding of added functions has been clarified (Harada and Tanaka [2001a]). However, nothing has been touched upon concerning negative compound effects.

There exist many negative compound effects as well as positive effects, so this study grasps the compounding of both as compound effects, and considers their effective utilization at the initial stage of new product development.

As the steps for this study, we first investigated the actual state of selected particular added functions and measured the amount of the function evaluations of the added functions concerned. Next, a new technique has been proposed for measuring and evaluating these positive and negative effects from 3 points of view (the monetary amounts of the interaction effects, the ratio of the amounts of the interaction effects, and the rates of recognizing the interaction effects) by the compounding of the added functions, and considers clarifying its effectiveness.

## 3. The Method for this Study

### 3.1 *The Selection of the Particular Product and Functions*

The particular product taken up in this study was considered to be a mature product, and had numerous competing products, and many added functions for product differentiation. To be more specific, it was a domestic kitchenware with the following 3 added functions. The 1st level added function was “add heat to the food material” and improvements were made to the contemporary methods to a higher level. The 2nd added function was “ease cleaning” which was a lower level function of “suck up smoke”, and improves the function level of contemporary methods to a higher level. The 3rd was “wash and dry tableware” and was a new added function. The exterior view and special features of the structure materializing this product and added functions are as shown in Figure 1 (from documents furnished by the manufacturer).

### 3.2 *The Method for the Investigation of the Actual Situation: 2 Point Evaluation Method*

We used the 2 point evaluation method in which we presented a monetary value a (amount to be purchased) up to which we surely are willing to pay, and a monetary value b (the amount not to be purchased) above which we surely are willing not to pay. The form is as shown in Figure 2.

As mentioned above, we can avoid, by using the 2 point evaluation method, hesitating to evaluate monetarily or to present an extremely low evaluation amount thinking that this will help purchase at as low a price as possible. It is assumed here that the evaluation value of a particular potential customer is evenly distributed. Therefore,

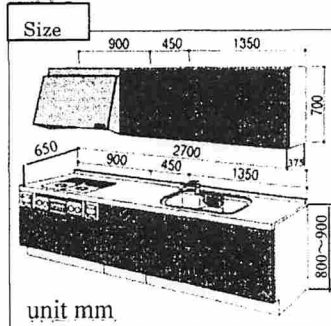
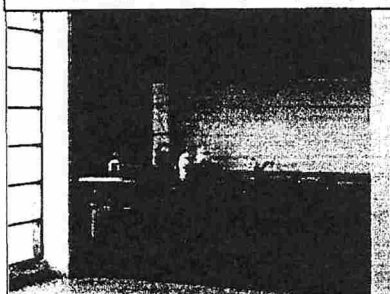
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the relation between the probability density of the amount of evaluation of the potential customers and the purchasing will for this amount can be shown as in Figure 3.

**Figure 1 - The Structure of a Particular Product and Added Functions**

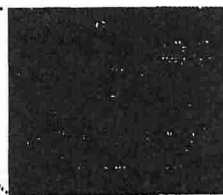
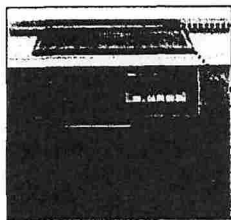
The exterior view of a standard kitchenware of I type

Layout: I type  
(Straight type as in the photograph)



Width: 2700 mm  
Depth: 650 mm  
Ordinary folding door  
Ordinary range hood

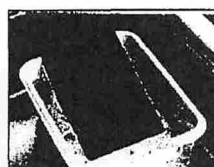
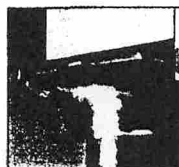
Added function 1 (Add heat to the food material)



<Special features of the IH cooking heater>

- Aspects regarding safety, such as the prevention of empty heating are substantial.
- The plate plane is flat so cleaning is easy and it looks carefree.
- The cooking time is shortened by the good heat efficiency.
- The cost of electricity is about the same as that of gas.

Added function 2 (Ease cleaning)

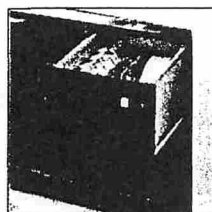


<The special feature of the range hood easy to clean>

- It is easy to remove oil stains by wiping with water.
- The front cover can be easily opened, and it is easy to clean and remove the filter.
- It looks carefree.

The size was similar

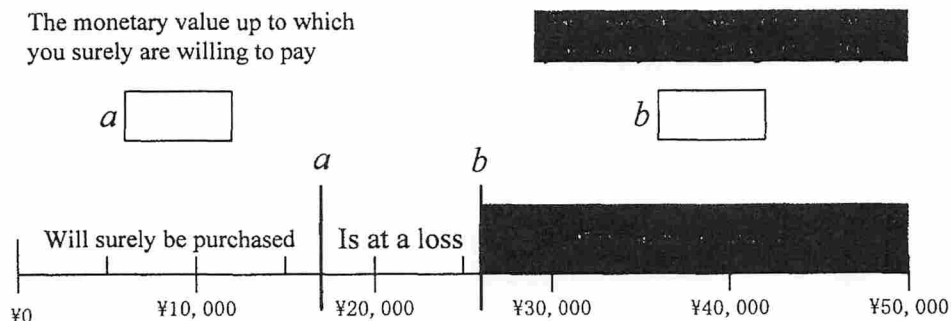
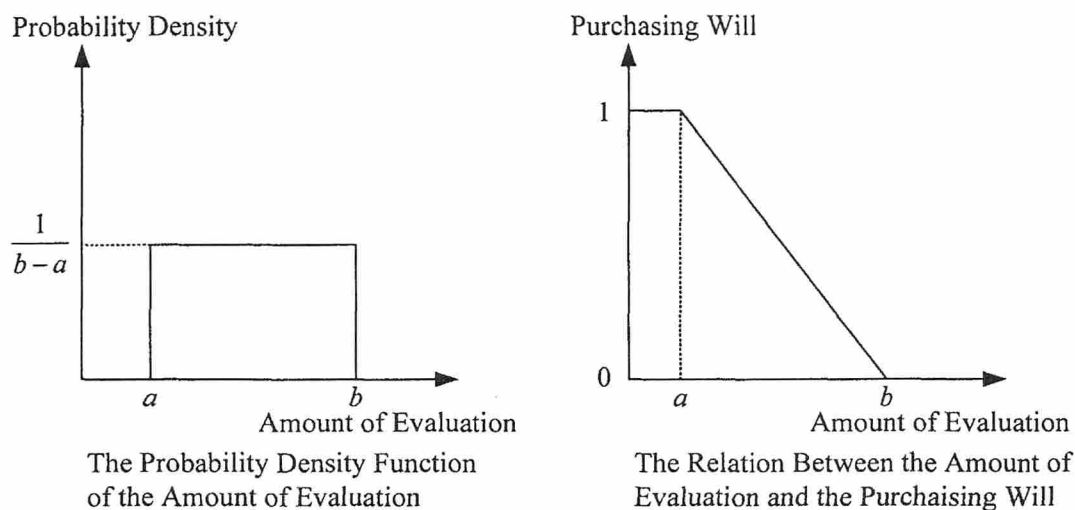
Added function 3 (Wash and dry dinnerware)



Width: 448 mm  
Depth: 595 mm  
Height: 450mm

<The special features of the dinnerware washer and dryer>

- Washes and dries dinnerware automatically
- Can put in and out dinnerware with an easy posture without bending forward.
- Has a water-saving effect (about 1/5 the amount of water used when washing by hand)
- Rinses with hot water 80 degrees centigrade, and so is sanitary.
- Has some cost of electricity.

**Figure 2 - Investigation Form for the 2 Point Evaluation Method****Figure 3 - The Relation Between the Amount of Evaluation and the Purchasing Will of Individual Potential Customers**

Furthermore, we asked for answers by using the following questioning form to grasp the amount of evaluation of the interaction effects by compounding the added functions.

1st, 2 point evaluation was carried out for standard kitchenware and its individual added functions.

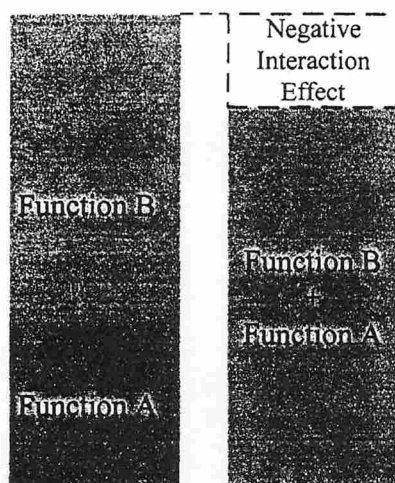
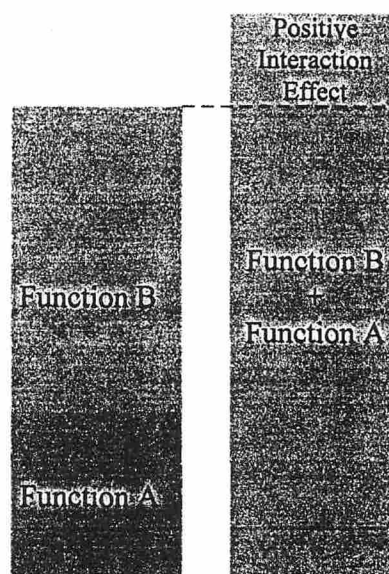
2ndly, evaluation was carried out collectively for the standard kitchenware with all the 3 added functions mentioned above added (will be called a high function kitchenware).

3rdly, a particular added function X was removed and substituted by a function of a contemporary level and evaluated collectively.

4thly, 2 particular added functions X and Y were removed and substituted by functions of contemporary levels and evaluated collectively.

5thly, 3 particular added functions X, Y and Z were removed and substituted by functions of contemporary levels (actually a standard kitchenware) and evaluated collectively.

An internet homepage was used for this investigation for housewives of 20 to 40 years old. And 128 effective answers were obtained.

**Figure 4 - Negative Interaction Effect****Figure 5 - Positive Interaction Effect**

#### **4. The Method of Evaluating Interaction effects by Compounding Added Functions**

##### *4.1 The Definition of Positive Interaction Effects and Negative Interaction Effects*

When plural added functions are combined and included in a new product, it has been made clear by a preceding study (Tanaka and Okuhara and Hirose [2004]) that some kind of interaction effects (compounded effects) can be seen. “Positive interaction effects” mean that new functions that can be recognized as useful by potential customers are produced as multiple effects.

However, we wish to pay attention here that potential customers are diverse, and there exists not only potential customers who recognize positive interaction effects, but many who do not. According to the preceding study mentioned above, when two added functions are compounded and evaluated collectively, about 70% of the potential customers tend to evaluate lower than the sum of the evaluations of the 2 individual added functions. As one of the reasons for this, it is observed that the evaluations are made by the potential customers by considering the reduction of cost by compounding the added functions.

This phenomenon is called the “negative interaction effect” in this study. The conceptual figure of these 2 interaction effects can be shown as in Figures 4 and 5.

##### *4.2 The Method for Evaluating Interaction Effects by Using Simple Averages*

###### *4.2.1 The Method for Calculating the Monetary Amount of Interaction Effects*

Here, we will mention the method for calculating the monetary amount of interaction effects which are indices showing the magnitude of the interaction effects which potential customers feel when added functions are compounded.

The preceding study mentioned above clearly showed the method for calculating the

monetary amount of positive interaction effects (compounded effects) from the relation between the sum of the monetary evaluated amount of the added functions and the purchasing. This should be called the strict method, and can be said to be a reasonable method for grasping the positive interaction effects of individual potential customers. However, when looked at from a practical business point of view, this method uses the epitomization of uniform distributions and grasps the monetary amount of interaction effects as areas, so the procedure of calculation becomes somewhat complex (Tanaka and Okuhara and Hirose [2004]).

So, a simplified method of obtaining the simple averages of the amounts of interaction effects was utilized in this paper. The reason was that there were no large differences among the evaluated amounts by the strict method and the simplified method so it was considered that the simplified method was considered to be allowable. (the simplified method will be unsatisfactory if there are significant differences).

The method for evaluating the interaction effects by the simplified method is as follows. The interaction effects in case of compounding 2 functions will be mentioned. Let the amount evaluated for the added function 1 mentioned above by the potential customer  $i$  be  $(a_{i1}, b_{i1})$ , for the added function 2 mentioned above be  $(a_{i2}, b_{i2})$  and the collective amount for the compounded added functions 1 and 2 be  $(a_i, b_i)$ , then the amount of interaction effects  $Z$  by the potential customer  $i$  for the 2 functions can be expressed as follows.

$$Z_i = \frac{a_i + b_i}{2} - \left( \frac{a_{i1} + b_{i1}}{2} + \frac{a_{i2} + b_{i2}}{2} \right) \quad (1)$$

When  $Z \geq 0$ , it can be considered that the potential customers have recognized positive interaction effects, while on the contrary when  $Z < 0$ , it can be considered that the potential customers have recognized negative interaction effects.

For example, when a potential customer has evaluated a much higher level function for the function “give heat to the food materials” so as to become (¥50,000, ¥150,000), and for the function “wash and dry dinnerware” as (¥100,000, ¥150,000), and evaluated the combination of the 2 added functions as (¥250,000, ¥300,000), then this potential customer can be considered as evaluating a positive interaction effect of ¥50,000 from Equation (1).

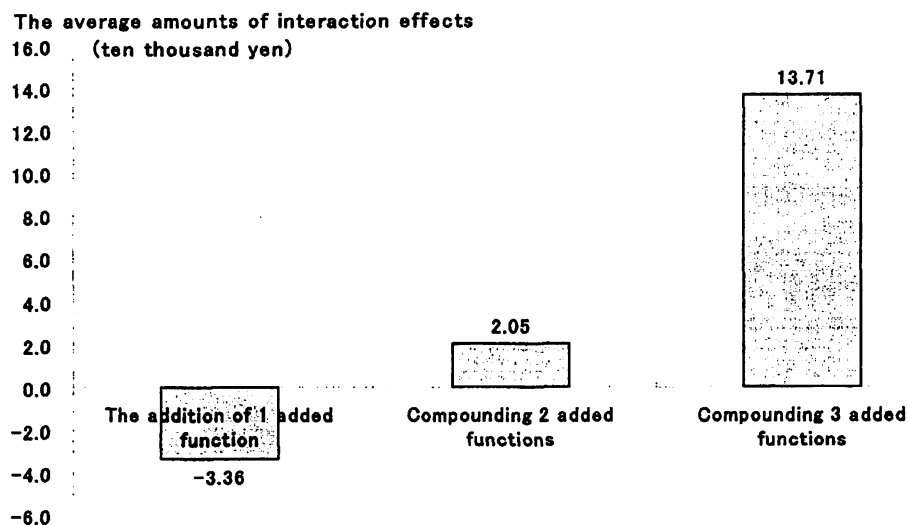
As can be seen from above, we can obtain the amount of the average interaction effect  $Z$  for a total of  $n$  potential customers concerning food processing from Equation (2).

$$Z = \sum_{i=1}^n \frac{Z_i}{n} \quad (2)$$

In the applied example, when the average amounts of interaction effects are obtained for the addition of 1 added function, and the compounding of 2 added functions and 3 added functions, the result became as in Figure 6.

The positive interaction effects for compounding the 3 added functions, that is all the 3 added functions are added, appear very conspicuously in Figure 7. On the other hand, the amount for the average amount of interaction effects by the addition of 1 added

Figure 6 - The Average Amount of Interaction Effects in This Case Study



function show a negative value. This is probably because the potential customers feel that the evaluation decreases largely as the added functions are removed 1 by 1 from the amount of situation (?) in which all the added functions are complete (a high function kitchenware).

Furthermore, when a histogram showing the frequency of the amount of the interaction effects are made from a particular range in the amount of evaluation (a range of ¥500,000 for the applied case study) using the amount interaction effects for individual potential customers actually surveyed, the distribution of the amount of interaction effects can be grasped visually. Figure 7-9 show the histograms for the distributions of the amounts of interaction effects for the cases of adding 1 added function, and the e of 2 and 3 added functions.

As the number of added functions decrease from the compounding of 3 added functions to the compounding of 2 added functions and further to the addition of 1 added function, it can be seen that the axis of the distribution tends to shift to the left (the amounts of the interaction effects become smaller).

Calculating the amounts of interaction effects in such an analysis shows in concrete terms the desirable degree of the compounding of the added functions. So they become useful information for decision-making in strategic sales pricing and strategic added function structuring.

#### 4.2.2 The Method for Calculating the Monetary Amount Ratio of the Interaction Effects

The monetary amounts of the interaction effects are important indices for grasping the interaction effects of the potential customers, but there are variations in the evaluated amounts of the potential customers themselves and there can also be seen rather large differences in the amounts of the interaction effects. So an index to compare and analyze them becomes necessary. A new index called the monetary amount ratio of

Figure 7 - The Histogram for Compounding 3 Added Functions

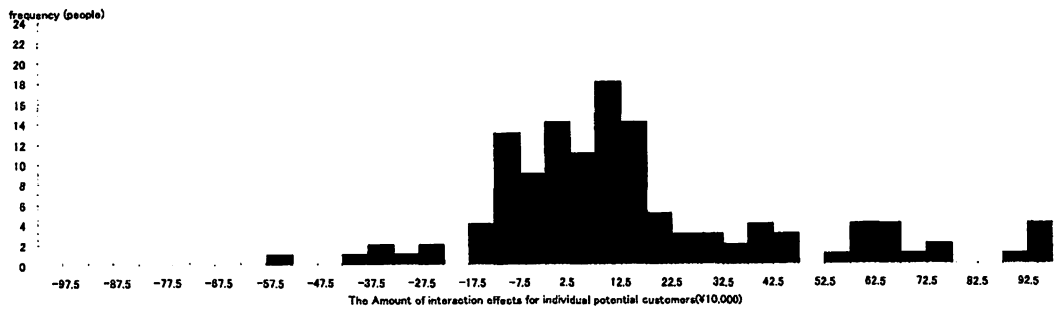


Figure 8 - The Histogram for Compounding 2 Added Functions

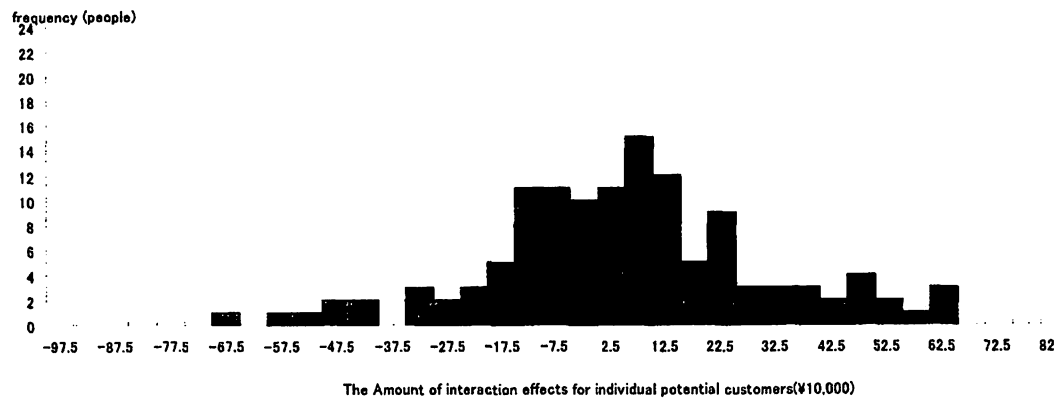
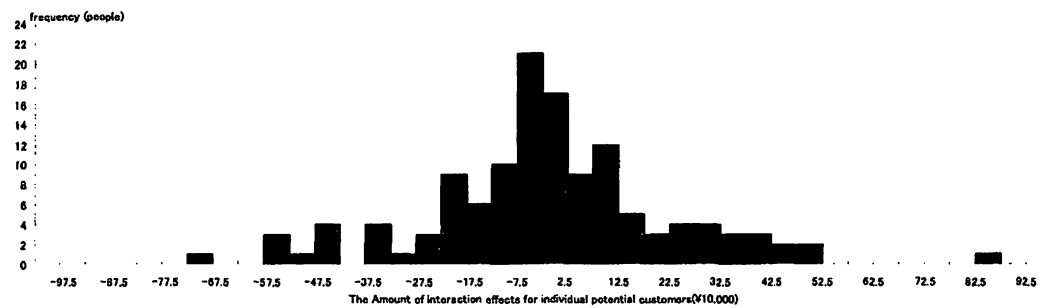


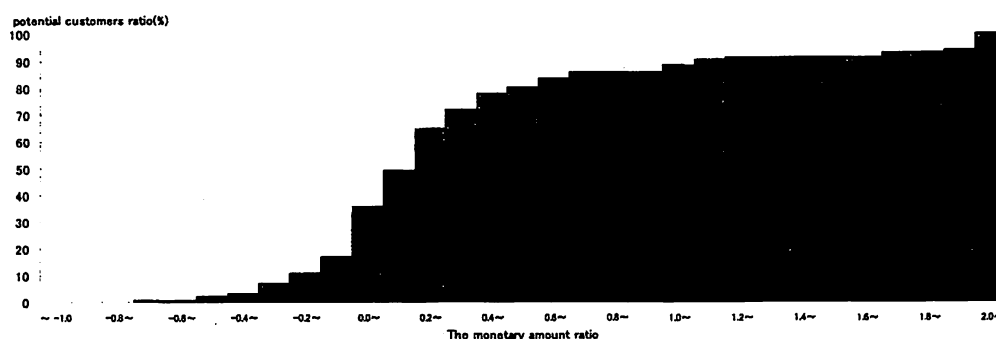
Figure 9 - The Histogram for the Addition of 1 Added Function



the interaction effects was devised in this study as the index. This shows the ratio between the amount ratio of the sum of the individual evaluations of plural added functions by particular potential customers and the afore-mentioned monetary amounts of the interaction effects. When this is measured and analyzed for individual potential customers or all the potential customers investigated a more effective utilization of the interaction effects can be done.



**Figure 10 - The Cumulative Distribution  
of the Monetary Amount Ratio When 3 Added Functions are Compounded**



Let us explain this by providing an example of the compounding of 2 functions. Let the evaluated amount for the added function 1 of the potential customer  $i$  be  $(a_{i1}, b_{i1})$ , and the evaluated amount for the added function 2 of the potential customer  $i$  be  $(a_{i2}, b_{i2})$ , and the amount ratio of the interaction effects  $Z_i$ , then the monetary amount ratio of the interaction effects can be expressed by the following Equation (3).

$$r_i = \frac{Z_i}{\frac{a_{i1} + b_{i1}}{2} + \frac{a_{i2} + b_{i2}}{2}} \quad (3)$$

By calculating the monetary amount ratios of the interaction effects, it is possible to grasp the monetary amounts of the positive and negative interaction effects of the individual potential customers as their ratios to the total amount of individual evaluated values by compounding the added functions.

For example, when a potential customer evaluated individually a much higher level for a much improved function level of "heat food materials" as (¥50,000, ¥150,000), and for "wash and dry dinnerware" as (¥100,000, ¥150,000), and as (¥250,000, ¥300,000) for the combination of the 2 functions, then this potential customer has recognized a positive interaction effect of ¥50,000, so the monetary amount ratio of the interaction effects becomes 0.22 from Equation (3).

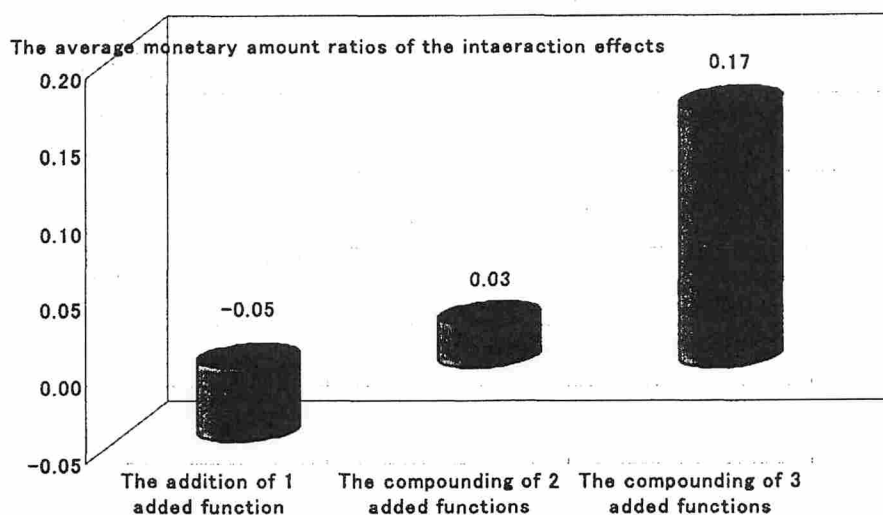
When a potential customer has recognized negative interaction effects, the monetary amount ratio of the interaction effects will of course take a negative value.

While the monetary amounts of the interaction effects express the magnitude of the monetary amounts, the monetary amount ratios express the degrees of the interaction effects.

Figure 10 shows the cumulative distribution of the monetary amount ratio calculated for individual potential customers when the added functions are compounded.

Potential customers are concentrated near -0.2 - 0.2. This means that the monetary amounts of the interaction effects recognized by the potential customers are about 20% larger than the values evaluated individually for the respective added functions for both

**Figure 11** - The Average Monetary Amount Ratios of the Interaction Effects for the Addition of 1 Added Function, and the Compounding of 2 and 3 Added Functions



positive and negative, and it becomes necessary to utilize this in setting the strategic sales price, etc.

Furthermore, if we utilize this way of thinking to the whole potential customers who have answered effectively, it will be possible to calculate the average monetary amount ratios. The average monetary amount ratio  $R$  is expressed by the following Equation (4).

$$R = \frac{\sum_{i=1}^n Z_i}{\sum_{i=1}^n \left( \frac{a_{i1} + b_{i1}}{2} + \frac{a_{i2} + b_{i2}}{2} \right)} \quad (4)$$

By calculating the average monetary amount ratio  $R$ , the ratio of the interaction effects to the evaluated amount of all potential customers investigated. When the average monetary amount ratios are shown for the addition of 1 added function, and the compounding of 2 and 3 added functions, they become as shown in Figure 11.

From Figure 11, it can be seen that for the average monetary amount ratios of the interaction effects for the investigated potential customers as a whole, an approximately 17% positive average monetary amount of the interaction effects have been recognized for the total evaluated values of the individual added functions when the 3 added functions are compounded. And it can be seen that negative interaction effects of about 5% has been produced.

#### 4.2.3 The Calculation of the Recognized Ratios of the Interaction Effects

Next, it is also necessary to know how many potential customers among all the potential customers who answered effectively will show how large monetary amount ratios of the interaction effects. The index to express this will be called the recognized

ratio of the interaction effects. This will be shown as the ratio of the potential customers ( $r_i \geq 0$ ) who showed positive interaction function ratios to the whole potential customers who answered effectively.

The  $L$  will be shown as follows.

$$L = \frac{n_{r_i \geq 0}}{n} \quad (5)$$

where

$n_{r_i \geq 0}$  : number of potential customers ( $r_i \geq 0$ )

$n$  : number of whole potential customers who answered effectively

When the recognized ratio of the interaction effects are calculated for an addition of 1 added function, and the compounding of 2 and 3 added functions, they are as shown in Figure 12.

**Figure 12 - The Recognized Ratio of the Interaction Effects for the Addition of 1 Added Function, and the Compounding of 2 and 3 Added Functions**

|                                      | The Recognized Ratio of the Interaction effects |
|--------------------------------------|---|
| The addition of 1 added function     | 0.38  |
| The compounding of 2 added functions | 0.52  |
| The compounding of 3 added functions | 0.64  |

When the number of added functions to be compounded becomes small, the recognized ratio of the interaction effects seems to decrease but the rate seems to be small. This is a very important point, and even for the case of adding 1 added function, 38% of the potential customers recognize positive interaction effects. By utilizing face sheets, etc., it will become possible to set profitable sales prices and added function structures against competing companies if it is possible to specify the potential customers of which segment recognize positive interaction effects even for small numbers of added functions.

## **5. An Overall Consideration of the Analysis of the Interaction Effects and the Applied Case Example**

Detailed evaluations of the kitchenware were carried out by the face sheet used in the investigation of the actual situation. The contents of the face seat are as follows.

Q1 Married or Single

Q2 Kind of residence

c1: House of my name

c2: House of family name

- c3: Housing Corporation's apartment
- c4: Rental luxury apartment
- c5: Rental apartment
- c6: Company house
- c7: Others
- Q3 Kind of occupation
  - c1: Company employee
  - c2: Independent enterprise
  - c3: Civil servant c4: Student
  - c5: Housewife
  - c6: Others
- Q4 Actual age
- Q5 Area of kitchen
  - c1: 3.09m<sup>2</sup> or less
  - c2: 3.09-6.09m<sup>2</sup> or less
  - c3: 6.19-9.29m<sup>2</sup> or less
  - c4: 9.29-12.39m<sup>2</sup> or less
  - c5: 12.39-15.48m<sup>2</sup> or less
  - c6: 15.48m<sup>2</sup> or more
- Q6 Satisfaction to area of kitchen
  - c1: Very satisfaction
  - c2: Satisfaction
  - c3: Usually
  - c4: Dissatisfaction
  - c5: Very Dissatisfaction
- Q7 Satisfaction to equipment of kitchen
- Q8 Income
  - c1: ¥2,000,000 or less
  - c2: ¥2,000,000 ~ ¥4,000,000 or less
  - c3: ¥4,000,000 ~ ¥6,000,000 or less
  - c4: ¥6,000,000 ~ ¥8,000,000 or less
  - c5: ¥8,000,000 ~ ¥10,000,000 or less
  - c6: ¥10,000,000 ~ ¥12,000,000 or less
  - c7: ¥12,000,000 ~ ¥15,000,000 or less
  - c8: ¥15,000,000 or more
- Q9 Age
- Q10 Number of people of families

### *5.1 Analysis of Relation between Amount of Interaction Effect and Potential Customer*

The data obtained by the surveys are analyzed by multiple regression analysis, and which items influenced the amount of interaction effect is clarified.

Table 1 shows which items influence the amount of interaction effect.

Income and age influences the effect of three kinds of amount of interaction. The kind of occupation, the area of kitchen and the number family members influence both the amount of interaction effect of 1 added function and 2 added functions. The kind of the residence influences only the amount of interaction effect of 3 added functions. The satisfaction for kitchen equipment influences only the amount of 1 added functions

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Table 2-4 show the results of multiple regression analysis.

**Table 1 - Item that Influence Amount of Interaction Effect**

| contents of the face seat               | 1 added | 2 added | 3 added |
|---|---------|---------|---------|
| Q1 Married or Single                    |         |         |         |
| Q2 Kind of Residence                    |         |         | ○       |
| Q3 Kind of Occupation                   | ○       | ○       |         |
| Q4 Actual Age                           |         |         |         |
| Q5 Area of Kitchen                      | ○       | ○       |         |
| Q6 Satisfaction to Area of Kitchen      |         |         |         |
| Q7 Satisfaction to Equipment of Kitchen |         | ○       |         |
| Q8 Income                               | ○       | ○       | ○       |
| Q9 Age                                  | ○       | ○       | ○       |
| Q10 Number of People in Families        | ○       | ○       |         |

**Table 2 - Multiple Regression Analysis Results Predicting 1 Added Function**

| name of predictor variable   | regression coefficient |        |       |       |       |        |       |
|------------------------------|------------------------|--------|-------|-------|-------|--------|-------|
| Constant                     | -5.12                  |        |       |       |       |        |       |
| kind of occupation           | c1                     | c2     | c3    | c4    | c5    | c6     |       |
|                              | 0.00                   | -38.62 | -3.95 | 8.22  | 5.87  | 8.83   |       |
| area of kitchen              | c1                     | c2     | c3    | c4    | c5    | c6     |       |
|                              | 0.00                   | 1.11   | 4.64  | -7.89 | 17.45 | -18.05 |       |
| Income                       | c1                     | c2     | c3    | c4    | c5    | c6     | c7    |
|                              | 0.00                   | 9.627  | 14.33 | 10.89 | 26.28 | 10.07  | 36.45 |
| Age                          | -0.83                  |        |       |       |       |        |       |
| number of people in families | 2.73                   |        |       |       |       |        |       |

Coefficient of determinant  $R^2=0.212$

**Table 3 - Multiple Regression Analysis Results Predicting 2 Added Function**

| name of predictor variable           | regression coefficient |        |       |       |       |        |       |
|--------------------------------------|------------------------|--------|-------|-------|-------|--------|-------|
| Constant                             | -37.52                 |        |       |       |       |        |       |
| kind of occupation                   | c1                     | c2     | c3    | c4    | c5    | c6     |       |
|                                      | 0.00                   | -49.39 | 13.21 | 27.98 | 2.71  | 13.95  |       |
| area of kitchen                      | c1                     | c2     | c3    | c4    | c5    | c6     |       |
|                                      | 0.00                   | 10.12  | 14.07 | 3.22  | 33.80 | -15.96 |       |
| satisfaction to equipment of kitchen | c1                     | c2     | c3    | c4    | c5    |        |       |
|                                      | 0.00                   | 27.55  | 4.44  | 16.86 | 22.62 |        |       |
| Income                               | c1                     | c2     | c3    | c4    | c5    | c6     | c7    |
|                                      | 0.00                   | 25.05  | 24.75 | 19.37 | 38.84 | 22.93  | 46.34 |
| Age                                  | -0.80                  |        |       |       |       |        |       |
| number of people in families         | 3.21                   |        |       |       |       |        |       |

Coefficient of determinant  $R^2=0.277$

**Table 4 - Multiple Regression Analysis Results Predicting 3 Added Function**

| name of predictor variable | regression coefficient |       |       |       |       |       |        |
|----------------------------|------------------------|-------|-------|-------|-------|-------|--------|
| Constant                   | 0.34                   |       |       |       |       |       |        |
| kind of residence          | c1                     | c2    | c3    | c4    | c5    | c6    | c7     |
|                            | 0.00                   | 15.44 | 20.48 | -7.18 | 16.81 | 5.78  | -28.71 |
| Income                     | c1                     | c2    | c3    | c4    | c5    | c6    | c7     |
|                            | 0.00                   | 21.75 | 33.64 | 32.28 | 44.34 | 28.29 | 57.16  |
| Age                        | -0.87                  |       |       |       |       |       |        |

Coefficient of determinant  $R^2=0.175$

The expected value of amount of interaction effect of 1 added function is ¥-1.84, if the kind of residence is “house of my name” and kind of occupation is “housewife” and area of kitchen is “6.19 m<sup>2</sup>” and satisfaction to equipment of kitchen is “satisfactory” and income is “¥6,000,000” and age is “35 years” and number of people in family is “4”.

$$\hat{y} = -5.12 + 5.87 + 4.64 + 10.90 - 0.83 \times 35 + 2.73 \times 4 = -1.84$$

It calculates similarly. The expected value of amount of interaction effect of 2 added function is ¥11.03.

$$\hat{y} = -37.52 + 2.72 + 14.07 + 27.55 + 19.37 - 0.80 \times 35 + 3.21 \times 4 = 11.03$$

The expected value of amount of interaction effect of 2 added function is ¥2.17.

$$\hat{y} = 0.34 + 0.00 + 32.28 - 0.87 \times 35 = 2.17$$

### 5.2 Considerations on This Case Example

The following can be said as the considerations from the result of analyzing the investigated potential customers as a whole or according to age and income. What is common throughout is that the compounding of 3 added functions show very large positive interaction effects for the amounts and the recognition rates of the interaction effects. This probably is, of course, due to the generation of a new added function by the compounding of two added functions. It may also be considered that the potential customers giving effective answers greatly recognize the effect of the addition of all these added functions, that is, a system effect. Therefore, manufacturers should recognize this point and clarify what customers should be the target, and set the strategic sales price and the structuring of the added functions. Furthermore, the amount of the interaction effect became predictable by the customer's condition or needs.

## 6. Conclusions

This study pays attention the added functions, especially compounded added functions, utilized often as differentiating strategies against competing products and has proposed a new evaluating method clarifying its usefulness. That is, referring to the method of evaluating the positive interaction effects, as clarified in the preceding study, the way of considering negative interaction effects has been clarified, and these have been unified into the 3 indices: the monetary amounts of interaction effects, the interaction effect ratio, and the recognition rate of the interaction effects. These were made to be helpful in setting the strategic sales price or structuring the added functions during the initial stage of new product development by utilizing them to fit the purpose. The main points are the following 3:

First is to calculate and utilize the monetary amount of the interaction effects by compounding the added functions. This makes it possible to grasp monetarily the interaction effects incorporated into the product in mind by compounding the added

functions, so if we segment the targeted potential customers, then this can be utilized to set the sales prices of the added functions, the structuring of the added functions, or the setting of the target cost which are acceptable to them.

Secondly, by calculating the ratio of the monetary amount of the interaction effects, the ratio, not the monetary amounts of the interaction effects, can be measured for the segmented potential customer groups (target). If these ratios can be known, they will become useful information in additional strategies for added functions or the setting of the sales prices, etc.

Finally, it will become possible to predict the amount of interaction effects so that the target becomes clear, and they can be utilized in setting the sales prices and the target costs during the making of the product concept.

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