

Value Improvement Example of Restaurant Lighting System by Introducing the Evaluation of the Brainwave Effect

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ABSTRACT

There has been few VE applications in the service industry, since the evaluation from the customer sensibility must be prioritized in the service industry. Therefore, in Saizeriya Co., Ltd. (hereinafter Saizeriya), the assessment method was introduced to quantify the customer sensibility by measuring the brain wave. Consequently, this method enabled to measure the sensible impression by customers quantitatively.

In this paper, the restaurant lighting was focused and suggested the breakthrough example of the improvement of the lighting by using the assessment method that the customer sensibility is quantified by the brain wave analysis of the customers.

Keywords: Food service industry, lighting, brain wave measurement

INTRODUCTION

VE has not generally been applied in the food service industry in Japan. There have been few applications, even in the general service industry. Although there are some applications in the factories of the service industry, VE has not been applied for intangible matters like the restaurant environment or the customer service. This is due to the difficulties that the customer feelings generally vary by the individual sensibility.

In Saizeriya a new evaluation method by introducing a new value formula with the Kano's model has been applied to evaluate the customer sensibility. In this method, the value index is obtained by the customer questionnaires. However, it is difficult to apply this method for the assessment of the individual sensibility like the feeling to the restaurant lighting. The restaurant exterior could be evaluated as a whole impression. The interior lighting, however, varies seat by seat and the level of the customer satisfaction becomes wider.

Therefore, it is very important for the service industry to establish the revaluation methodology for the individual impression and VE can be applied even to the service industry.

SAIZERIYA'S CHALLENGES TO IMPROVE VALUES

Business overview

Saizeriya is the Italian food service chain operating 1,000 restaurants in Japan and 250 in Asian countries. The vertical merchandising has been introduced and all processes including vegetable cultivation, production in factories, logistics and service are covered. Only in Japan, the number of annual customers is 113 million and 300 million dishes are served.

Since 2013, VE has been applied to the business and various VE workshops have been carried out for example, "Cut the kitchen area in half", "Value improvement of cooking methods", etc. In the factories, it is relatively easy to apply VE, because there are many precedents reported in the past. However, in the service field, it is normally difficult to apply the VE methodology as it is. Therefore, the new VE applications for intangible values like the restaurant service and space have been studied and applied.

Brainwaves measurement

In Saizeriya, the study to measure the level of delicious taste by the brainwaves has been carried out. The brain wave has been applied by using to quantify the sensibility how a human feels when he/she looks a delicious-looking dish and when he/she eats it.

The brainwaves measurement enables to assess the indexes of interest, preference, stress, concentration and drowsiness. Only from the customer questionnaire, various factors affects the answers and it is difficult to get the results only for the objects. On the other hand, the brain wave measurement is the useful method to measure the sensibility of the moment when the customers look at the objects.

We use a sensitive analyzer made by Dentsusciencejam

<http://www.dentsusciencejam.com/kansei/> *Japanese only



Figure1: State of the measurement and result

The background of the implementation of the brain measurement to the VE workshop

It was an urgent task to improve the environment of the customer tables. In the customer tables of Saizeriya, the equipment colors like the wall paper and the customer tables/seats are standardized. However, the customers felt the different impressions by restaurant-by-restaurant. It became clear that one of the reasons of this difference was caused by the lighting. In order to standardize and improve the restaurant impression, the VE workshop for the lighting was conducted. The goal of this workshop was not to improve the performance of the lights themselves but to enhance the environmental value created by the lights.

There are two objectives of the workshop. The first objective is that food looks more delicious due to the lights. The second objective is that the customers feel more comfortable while seated due to the lights. It is, however, difficult to quantitatively evaluate the customer impressions or

feelings. There is much variation in the customer sensitiveness and it is almost impossible to determine the optimum lighting intensity

Customer questionnaires have been widely utilized to collect the customer opinions. However, the results of the questionnaires contain much information from various factors not only from the lighting but from the wall paper or the noise at the restaurants. It is impossible to focus just on the effect of the lighting.

In this work, the brain wave measurement which has been used for the menu development in Saizeriya was applied to the lighting system. The brain wave measurement enables to capture the impression of the moment when the customer has taken a look at the lights and to measure how the brain feels when the customer was staying at the restaurant for a long time. Thus, the level of the customer impression can be measured quantitatively by using the brain wave measurement.

IMPROVEMENT EXAMPLE OF THE RESTAURANT LIGHTINGS BY THE VE APPLICATION

Current status of the restaurant lighting

Since SAIZERIYA is one of the chain restaurants, the lighting has been standardized to give the customers the same impression at any stores. However, even if only the illumination intensity is adjusted, there are some differences in the customer sensibility to the brightness store-by-store. Furthermore, since the lighting system has been changed from incandescent lamps to LED, the standard of the brightness has not been maintained at many restaurants.

Considering this situation, various efforts have been made to give better impression to the customers by changing the design of the lights. Various functions of the lighting system have not been taken into account and the lights have been used just for illuminating.



Figure 2: Current lighting system examples of light variation and overlapping

VE application plan

A VE initiative to study the appropriate lighting for the fast casual restaurants like SAIZERIYA was implemented. The investigation was conducted to find the function of the current lighting and to discover the missing function in the SAIZERIYA lighting. The following two goals were found to achieve.

1. Design standards with the definitions of the light functions
2. Design drawings of the lighting systems for model restaurants

The limiting condition was that the cost would not exceed the current lighting system.

FAST Modeling

The model restaurant was determined and the function definition was carried out based on the lighting system of the model restaurant. Element was defined as the position of the lights. There was an additional project owner request that any missing function in the SAIZERIYA lighting system should be considered as needed. Therefore, the discovered functions from the observation of the competitors' lighting were added and sorted out.

The FAST Diagram is shown in Figure 3. The six key functions were derived from this diagram.

- F1: Provide high quality space
- F2: Provide individual space
- F3: Show objects
- F4: Attract objects
- F5: Increase ratio of recognition of objects
- F6: Increase ratio of awareness of objects

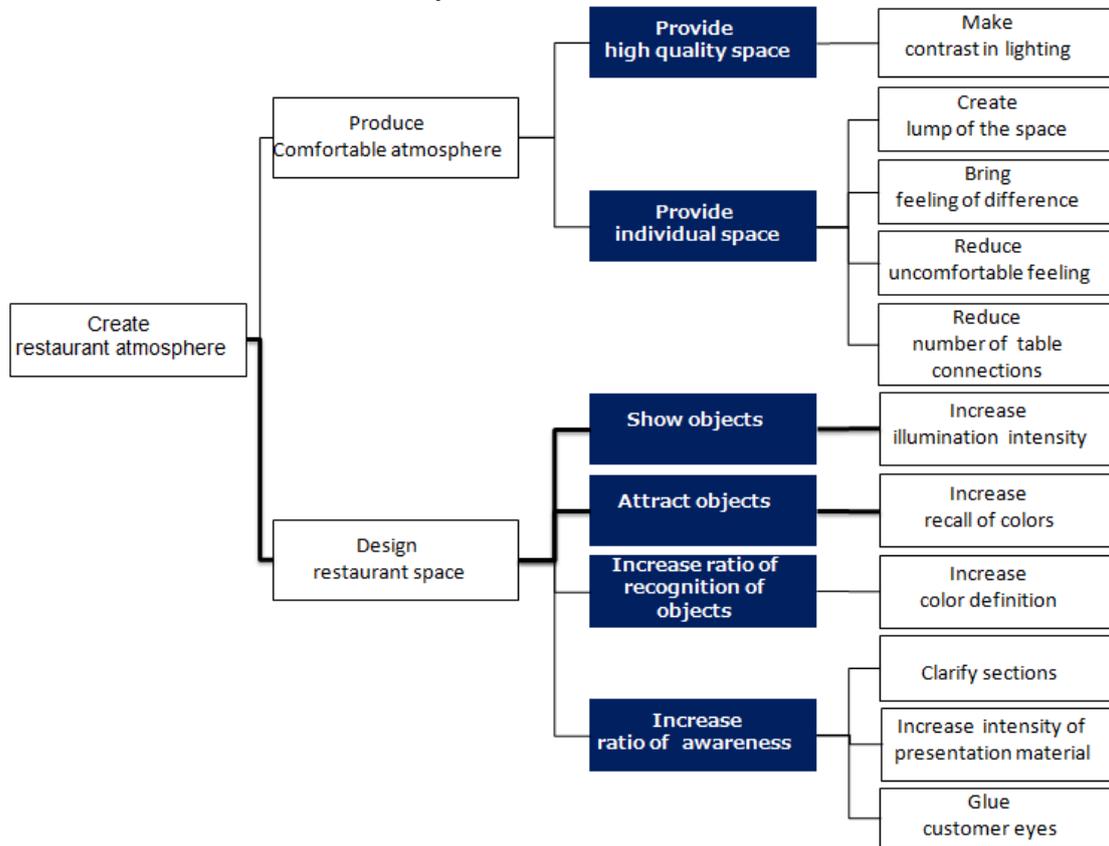


Figure 3: FAST Diagram of the restaurant lighting

A performance grade list was used to assess the functions. The performance index was set for each function. The indexes were shown below (Figure 4: A performance grade list).

		inferior ← → excellent											Present F	Target F	
Function	Area	Index	1	2	3	4	5	6	7	8	9				
F1	Provide high quality space	The ratio of the bright-dark change on walls	nothing		●					▲		Becoming clear	3	7	
F2	Provide individual space	The differences in illumination intensity by guest seats	nothing		●		▲						3	5	
		Glare	dazzling		●					▲		Not dazzling	3	8	
F3	Show objects	Minimum illumination intensity					100	▲				200	●	9	5
F4	Attract objects	Color rendering index (CRI)	60				80	●	90	95	▲	100		5	8
F5	Increase ratio of recognition of objects	Recognition time to read characters							●	▲				7	7
F6	Increase ratio of awareness	The number how often customers look around for an hour	30		●		15			▲		0		3	7

Figure 4: A performance grade list

An approach chart was drawn by obtaining these indexes and the costs. It became clear that F4, F1, F2 was prioritized in order. F4, especially, has never been considered before and became clear to be prioritized. Then, the getting ideas were preceded in F4, F1, and F2.

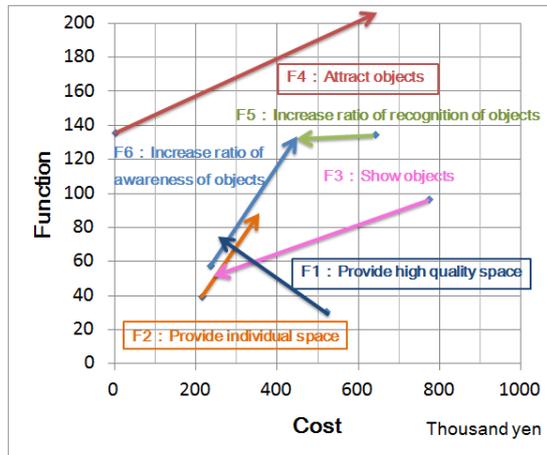


Figure 5: Approach Chart

Coming up ideas and rough evaluation

The ideas were come up with for F4, F1, F2 and the rough evaluation was conducted and categorized by the KJ method.

As the result, it was found that the following matters were important to show the dishes more attractive,

1. Color rendering should be higher.
2. Color temperature and illumination intensity should be appropriately set place-by-place.

In the past, the illumination intensity has been checked just horizontally. However, it became clear that the vertical illumination intensity is also important. Therefore, this fact was included in the improvement proposal.

Furthermore, it was found that reducing the uncomfortable feelings was important to satisfy the customers. Therefore, a new methodology using brain wave was introduced to eliminate the uncomfortable feelings for the lighting positions.

Proposals

We developed four tools which were based on the ideas.

1. Light standards for lighting intensity, color temperature and color rendering
2. List of lighting equipment to identify positions and enhance functions
3. Procedures to meet the lighting standards for positions without any problems
4. Tools to ensure lighting quality by confirming the 3-D design

Design drawings for a model restaurant were prepared based of these four tools.

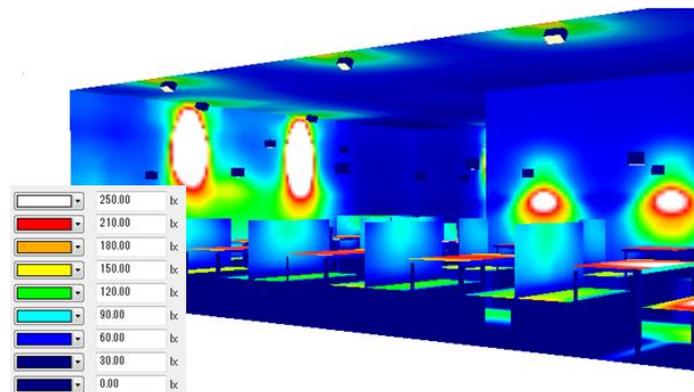


Figure 6: Example of using 3-D design

Next, the brain wave was measured to assess if the numerical value of this proposal is appropriate.

Detail assessment

The numerical value used in the function assessment was determined from the feelings of the team members. Although these members were familiar with the themes, there seems to be no evidences in some cases. Therefore, the brain wave was measured to ensure if the assessment index is appropriate.

Color rendering which is the index of F4 has been known as an indicator and proved that it is effective. Therefore, the following three indexes in F1 and F2 were confirmed by the brain wave.

1. Impressions when there are the bright and dark places on the walls
 - Currently, no difference
 - There is much difference of the bright and dark walls due to the current aisle narrowness
 - The aisle is dark even though there is no bright and dark difference on the walls.
2. Change the lighting intensity around faces
 - Since currently, there is no bright and dark difference, create the difference.
 - Proposal
3. Glare
 - Currently, there are some cases that customers may see the light sources
 - Proposal: conceal the light sources

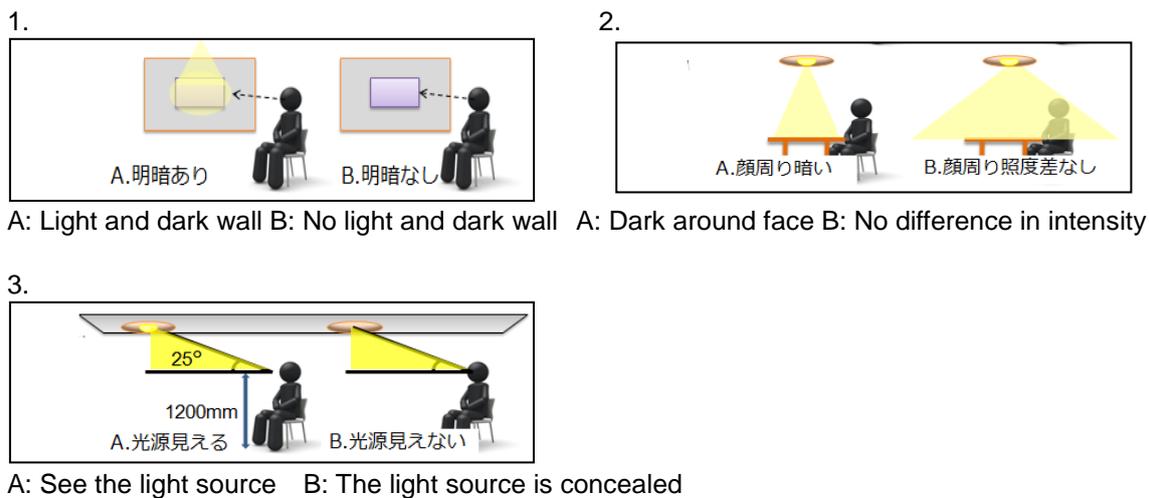


Figure 7: Procedure to measure the brain wave

Brain wave response may change with external stimulation like music or voice to which customers listen. Therefore, the measurement was carried out before opening the restaurant in which there was no noise. The examinees were one female and two males. Considering the other noise, a sensitive analyzer was used for the measurement of the brain wave. The examinees wore a head camera which enabled the brainwave to be measured with what they were looking at.

There are five indicators which can be measured by the sensitive analyzer. In this work, we used two indicators, “stress” and “interest”. The “favorite” indicator is influenced by things other than the lights. Therefore, this indicator was eliminated from the evaluation, since it would change when the examinees look at the menu with their favorite dishes. Measuring “stress” and “interest” indicators, the following assumptions were set.

1. Increase stress and interest there is an impact (memorable experience)
2. Decrease stress and increase interest take it positive
3. Increase stress and decrease interest take it negative

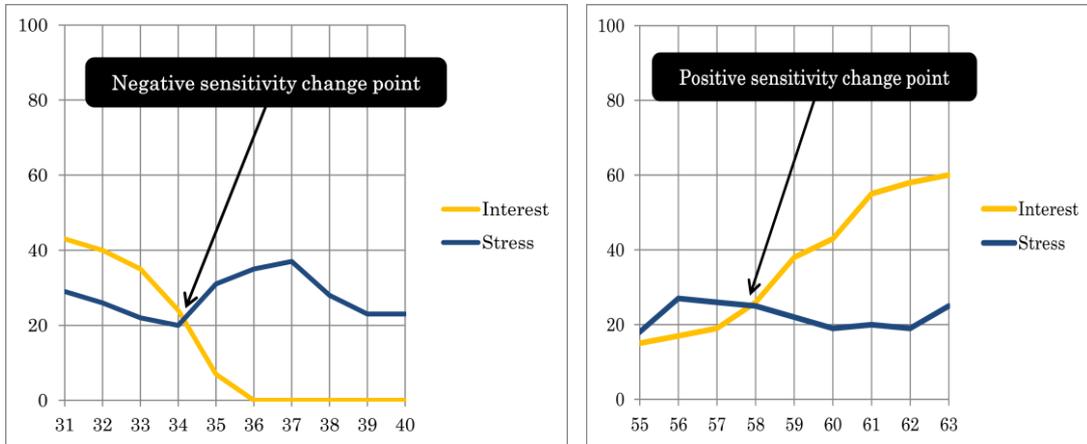


Figure 8: Negative point and Positive point

Consequently, more positive feelings was appeared when the proposed lighting was applied compared to other conditions. Although the assessment value was determined by the inference, it was found that the brain wave assessment could give the right value. It was endorsed that this proposal was expected to increase the function of the lighting system.

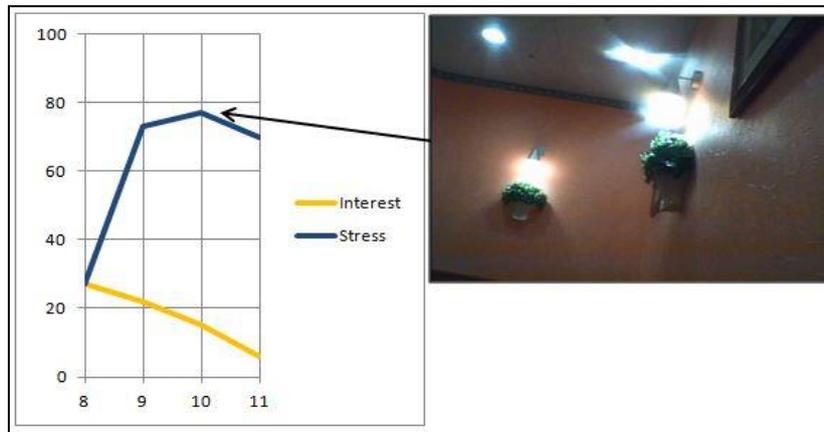


Figure 9: Research participant sees the light sources. He feels Stress.

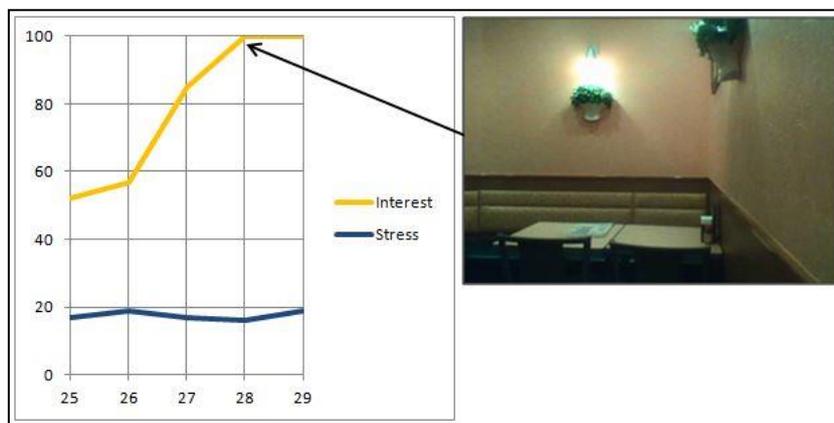


Figure 10: Research participant sees Light and dark wall. He takes it positive.

Future works

In this work, an additional function in the lighting system that attracts subjects was found and enables to improve the function significantly. Also, the lighting standard which stabilizes the customer impressions was provided. Finally, the design drawing which was applied to an actual restaurant was prepared. The value enhancement of the proposal was 136% and the economical merit would be \$2.0 million for 250 new restaurants. This proposal will contribute on the increase of the customer positive impressions. Currently, a new restaurant with this proposal is under designing. If it is possible to provide more comfortableness to the customers, the residence time will increase and the order numbers will increase. Therefore, it is expected to get more sales by providing the comfortable restaurants.

Since the brain wave measurement was applied to the detail evaluation, the new methodology was proposed to accelerate the VE activities even in the service industry. This method was so innovative as immeasurable factors like sensibility can be quantified. Of course, there are some exceptions that various factors are influenced each other. These exceptions will be solved in future with more applications. If more indicators like "favorite" and "comfortable" can be applied, VE will be applied more in the service industry.

CONCLUSION

VE has not been widely applied in the service industry, because there was no method to measure the human feelings. In this work, it was found that the brain wave measurement is effective to quantify the human sensibility. This method is innovative to expand VE applications to the service industry. Even though there are still various issues to be solved, the more methods should be developed for the further VE applications to the service industry.

REFERENCE

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