An Evaluation Method of a Service Business model using Wants Chain Analysis

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Abstract

We proposed a novel evaluation method for a service business model by incorporating customer's quantified wants to the method. In this method, values which customers feel to provide service are transformed into "WANTS" that they have. The Wants Chain Analysis (WCA), a design and structuring method of business based on system thinking, is applied for visualizing WANTs. And the Analytic Hierarchy Process (AHP), a quantifying method for subjective selections of stakeholders, is also applied for quantifying stakeholders' WANTs.

We applied this proposed method to an example of actual service, and effectiveness of proposed method was confirmed.

Keywords:
Wants Chain Analysis, Analytic Hierarchy Process, quantitative analysis, satisfaction of wants

1 INTRODUCTION

In recent years, consumer's values have changed and diversified in the most of industrialized counties. These phenomena put services providers in the awkward position when they develop new services for fitting just to the values which customers' feel. One of key problems for services providers here is how to quantify values that customers feel for provided services. If services providers can evaluate rightly their services provisions models with a quantified method, they can construct services models suitable to their customers' needs. A questionnaire investigation is a commonly-used method to analyze and quantify customers' need. However it is not suited to use in a development process of service because it requires a much time and budget. In the Value Engineering for product development, value is defined as the function of product divided by the cost of the product [1]. However, a service, not a product, has a various functions and a quantification of these function are difficult. A value of service is Customers' values can be translated to their WANTs, if Maslow's hierarchy of needs theory [2] is applied where WANTs are "needs or wants". This study focuses on WANTs and proposes a concept design method for a business model [3]. Therefore, it is useful to use WANTs instead of value. There is a clear requirement for a suitable evaluation method to quantify the customer's WANTs for a developing new service.

The proposed model is conceptually rooted on two methods; the Wants Chain Analysis (WCA) [4][5] and Analytic Hierarchy Process (AHP) [6]. WCA, a design and structuring method of business based on system thinking, is for visualizing and structuring relations among all stakeholders and their WANTs in a service model. AHP, a quantifying method for subjective selections of stakeholders, is for quantifying stakeholders' WANTs. WCA and AHP should be applied complementarily for this evaluation model. Because WCA visualizes stakeholders' WANTs and their classifications, but it does not quantify the size or volume of WANTs. A quantification of WANTs is difficult because the WANTs are subjective itself. Therefore, the AHP, a subjective decision method, is applied to the method for quantification of the WANTs which the WCA visualizes and structures in a certain service design.

As mentioned above, in this research, WANTs are quantified by applying the concept of AHP to WCA. And we propose a quantitative evaluating method of business model by using quantified WCA.

2 EXISTING KNOWLEDGE

2.1 Want Chain Analysis (WCA)

WCA is a method that analyzes and visualizes relationships among stakeholders [4]. WCA is based on CVCA (Customer Value Chain Analysis) [7]. In WCA, we consider not only things that are considered by CVCA but also stakeholder's WANTs. Fig. 1 shows an example of WCA. In WCA, WANTs are divided into 4 classes. Classification of WANTs is shown in Table 1.
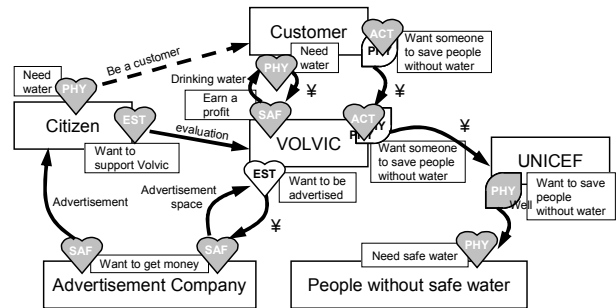

Fig. 1 Example of WCA

Table 1 Classification of WANTs

		Object of Needs	
		Self	Others
Subject of Needs	Self	α I want to feed myself	γ I want to feed another person
	Others	β I want someone to feed me	δ I want someone to feed others

The procedure of WCA is shown below.

A: Conduct of CVCA

A-1: The stakeholders relevant to the product or service are enumerated and written in graphic chart.

A-2:   Substances that are exchanged between stakeholders such as information and money are written in graphic chart using arrow symbol.

B: filling up of WANTs

About each stakeholder's exchange, WANTs that caused actions are written in the start point of arrow symbol.

C: Evaluation of Satisfaction

A satisfaction state of each WANTs is checked. The condition of satisfaction is different with classification of each WANTs. Details of condition are omitted from this paper.

Through this evaluation, if all WANTs are satisfied, the product or service that is intended to analysis is effective. If there is some unsatisfied WANTs, the product or service is insufficiency.

2.2   Knowledge of WANTs

In Maslow's classification, the WANTs are classified into 5 (+2) Levels [2]. Fig. 2 shows the classification of WANTs.
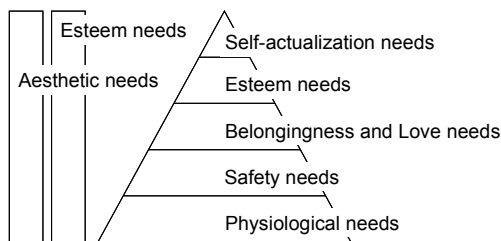

Fig. 2 Maslow's classification of WANTs

This Maslow's classification is not proof strictly, but used widely because of its simplicity. In a part to use in engineering, this classification is useful and effective. In Maslow's classification, each WANTs are making the layered structure. However, "desires to know and understand" and "aesthetic needs" are independent of others. These 2 WANTs exist always regardless of other WANTs. In the layered structure, "Physiological needs" is a lowest level and "self-actualization needs" is a highest level. If low-level WANTs are satisfied, high-level WANTs are increasing. As just described, WANTs have amplitude and the amplitude is changed by situation.

These relationships between low-level WANTs and high-level WANTs are not strict. Satisfaction of low-level WANTs and increase of high-level WANTs advance gradually, and do not show a digital behaviour. Therefore, low-level WANTs and high-level WANTs may exist in same time. The transition behaviour of WANTs is shown in Fig. 3.
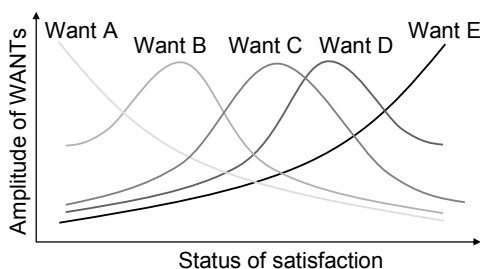

Fig. 3 Transition behaviour of WANTs

These WANTs are satisfied when the state corresponding to WANTs is acquired by some action. In this paper, the rate of the WANTs that is satisfied with some action is called "Satisfaction of WANT". The relationship between "Satisfaction of WANT" and action is changed by "amplitude of WANT". For example, there are 2 persons, the one of them wants to get a hundred on a test, the other one wants to get a fifty on a test. If they get a fifty on a test, the former does not satisfy the "WANT" but, the latter satisfy the "WANT". As just described, same "Satisfaction of WANT" are not obtained by same action.

When stakeholder has many WANTs, the satisfaction of stakeholder is decided in consideration of each degree of WANTs satisfaction synthetically [8]. In this paper, to distinguish from "satisfaction of each WANTs", "stakeholder's satisfaction" is called "Overall Satisfaction".

The influences of "satisfaction of each WANTs" to "Overall Satisfaction" are not same. For example, when we buy water, "Want to drink water" is satisfied and "Want to save money" is not satisfied. However, the influence of "want to drink water" satisfaction is larger than the influence of "want to save money", Therefore, the "overall satisfaction" is increase. In this paper, the influence of "satisfaction of each WANTs" to "Overall Satisfaction" in called "Importance degree of WANTs".

2.3   Analytic Hierarchy Process

AHP is a tool which can be logically made decisions by combining a subjective judgment and systems approach [6]. An example that applied AHP to the purchase of the car is shown in Fig. 4.

A-Type: $0.64 \times 0.75 + 0.26 \times 0.83 + 0.1 \times 0.17 = 0.71$ →Optimum Solution
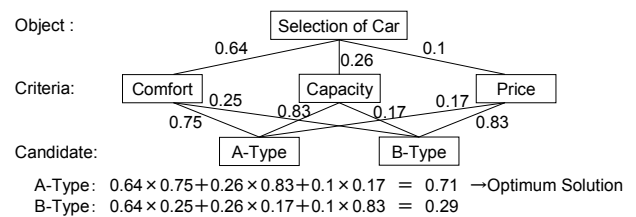B-Type: $0.64 \times 0.25 + 0.26 \times 0.17 + 0.1 \times 0.83 = 0.29$

Fig. 4 Example of AHP –Purchase of the Car-

At first, problems to be solved are dissolved into 3 hierarchies, Object, Criteria and Candidates. Object is the problem which it is going to solve. In the example of "purchase of car", Object is "Selection of Car". Criteria are things that should be considered for decision such as "Comfort", "Capacity", "Price" and so on. Candidates are alternatives of decision such as types of vehicle.

Next, the relationship of each hierarchy is decided by pair comparison method. The relationship is expressed by "numerical weight". By using pair comparison method, even if quantification is a difficult, relationship can be clarified. In Fig. 4, there are some numerical examples of weight. About the object of "selection of car", the weight of criteria is, comfort: 0.64, capacity: 0.26, price: 0.1. A summation of all weights should be 1.

Finally, priority of each candidate is calculated using relationship of each hierarchy. The candidate that has highest priority is selected for optimum solution. In the example of Fig.4, the vehicle type-A is selected by AHP as optimum solution.

Through this process, making decisions logically is possible using AHP.

3   INTRODUCTION OF PROPOSED METHOD

3.1   Quantification of WANTs using AHP

In this section, we introduce the method of AHP to WCA.

Objective quantification is difficult for the element of WANTs described in section 2.2. This is because that WANTs itself are subjective. On the other hand, AHP described in 2.3 can carry out appropriate decision-making with a logical procedure and subjective judgment. In this paper, Quantification of WANTs is performed by AHP.

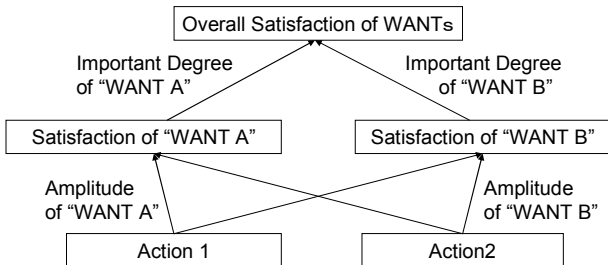Fig. 5 shows the model of "Overall Satisfaction of WANTs".

Fig.5 Model of "Overall Satisfaction of WANTs"

"Overall satisfaction of WANTs" is calculated from "Satisfaction of WANTs" and "Important degree of WANTs". And "Satisfaction of WANT" is calculated from "Amplitude of WANT" and "Action".

"Important degree of WANT" and "Amplitude of WANT" is determined by a pair comparison method.

The procedure of calculation of "Overall Satisfaction of WANTs" is shown below.

A: Enumeration of WANTs

The WANTs of intended stakeholder is enumerated.

B: Derivation of "Amplitude of WANT"

The "Amplitude of WANT" is derived by a pair comparison method as shown in Fig.6.

Fig. 6 Example of Derivation of "Amplitude of WANT"

C: Calculation of "Satisfaction of WANT"

The "Satisfaction of WANT" is calculated from "Amplitude of WANT" and "Action". The "Satisfaction of WANT" is denoted by the following formula.

$$S_w = B_w / A_w \qquad (1)$$

Where S_w is "Satisfaction of WANTs", B_w is a income and outgo of intended WANTs and A_w is "Amplitude of WANT". For example, in "Desire for food", the "Satisfaction of WANT" is calculated by following formula.

(Satisfaction of desire for food)

= (Amount of eaten food) / (Amplitude of desire for food)

D: Derivation of "Important degree of WANT"

The "Important degree of WANT" is derived by a pair comparison method. This procedure is almost same as procedure B.

E: Calculation of "Overall Satisfaction of WANTs"

The "Overall Satisfaction of WANTs" is denoted by the following formula.

$$Q = \sum_i w_i s_i \qquad (2)$$

Where Q is "Overall Satisfaction of WANTs", w_i is "Important degree of WANT" of want "i", S_i is "Satisfaction of WANT" of want "i".

3.2 Procedure of proposed method

In this section, the procedure of proposed method is described. By using proposed method, it becomes possible to evaluate a service quantitatively. This proposed method is based on quantitative WCA described in section 3.1.

The procedure of proposed method is shown below.

A: Analysis of intended service using conventional WCA

Conventional WCA of intended service is performed. The result of this process called "Proposed Model (PM)"

B: Derivation of a present service model

The new part of intended service is eliminated and the present service is derived from PM. The result of this process called "Existing Model (EM)"

C: Calculation of "Overall Satisfaction of WANTs"

Using method described in section 3.1, the "Overall Satisfactions of WANTs" are calculated for all stakeholders. This process should be performed to PM and EM

D: Calculation of increment of "Overall Satisfaction of WANTs"

The increment of "Overall Satisfaction of WANTs" is calculated from taking a difference of PM and EM. This process should be performed to every stakeholder.

E: Evaluation of the intended service

If all increments of "Overall Satisfaction of WANTs" of all stakeholders are positive, the intended service is effective.

Furthermore, when there is a competitive service, we can judge which service is more effective to perform the additional procedures.

The additional procedure is shown below.

A': Analysis of competitive service using WCA

Conventional WCA of competitive service is performed. The result of this process called "Competitive Model (CM)"

B': Check of a present service model

The new part of competitive service is eliminated and the present service is derived from CM. The result of this process should be same as EM.

C': Calculation of "Overall Satisfaction of WANTs"

"Overall Satisfactions of WANTs" are calculated for all stakeholders in CM.

D': Calculation of increment of "Overall Satisfaction of WANTs"

The increment of "Overall Satisfaction of WANTs" is calculated from taking a difference of CM and EM. This process should be performed to every stakeholder.

E': Evaluation of the competitive service

If all increments of "Overall Satisfaction of WANTs" of all stakeholders are positive, the competitive service is effective.

F: Comparison between intended service and competitive service

Both of increment of "Overall Satisfaction of WANTs" calculated by procedure D and D' are increment from EM. Therefore, it is possible to compare the intended service with competitive service by comparing increment of each service. The increments of main customers' "Overall Satisfaction of WANTs" are compared between intended service and competitive service. If the "Overall Satisfaction of WANTs" of intended service is larger than competitive service, the intended service is more effective than the competitive service.

4　VALIDATION OF PROPOSED METHOD

4.1　Procedure of validation

In this chapter, we apply proposed method to existing example of service.

Example of service used for verification is "Table for Two" program [9].

"Table for Two" program (TFT) is a restaurant service model that intermediates restaurant guests to donate a part of their usual meal fees for starving children in Africa. This model is based on restaurant customers' altruistic wants to help children in needy. The customer of advanced nations has a problem resulting from food satiation, such as overweight. On the other hand, there are many starving children in Africa. In this program, the customer in advanced nations eats healthier TFT meals, and US\$0.25 per meal is donated to TFT. A child in need receives a healthy school lunch from TFT.

As a competitive service, a conventional donation program of food is considered.

The example settings of each service are shown in Table *. In the TFT program, funds for donation are generated by decreasing quantity of meal. In the conventional donation program, funds for donation are generated by increasing price of meal. The validation of proposed method will be performed based on Table 2.

Table 2 Settings of each service

	Table for Two Program (PM)	Conventional Donation Program (CM)	Usual meal (EM)
Price of meal	\$5.00	\$5.25	\$5.00
Donation per meal	\$0.25	\$0.25	-
Quantity of meal	Smaller	Usual	Usual

4.2　Application of proposed method

In this section, we perform the proposed method according to a procedure described in section 3.2

A: Analysis of intended service using conventional WCA

The result of this procedure is shown in Fig. 7.

B: Derivation of a present service model

The result of this procedure is shown in Fig. 8.

C: Calculation of "Overall Satisfaction of WANTs"

"Children in Africa" and "TFT" do not exist in EM. It is obvious that increment of "Overall Satisfaction of

WANTs" is positive. Therefore, calculation about "Overall satisfaction of WANTs" is performed about "Customer" and "Restaurant / Cafe".
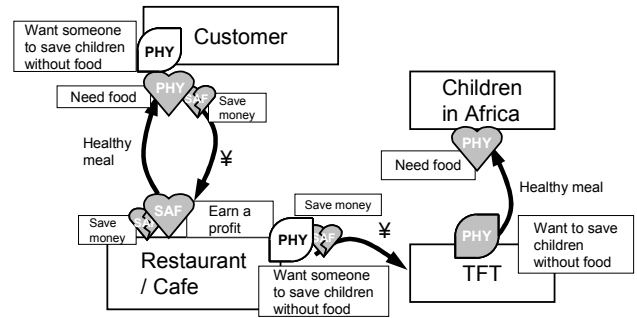
Fig. 7 Result of WCA about "Table for Two" (PM)
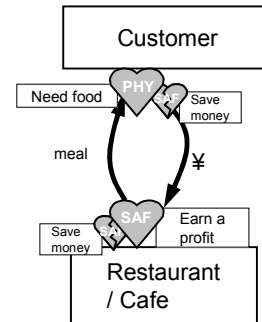
Fig. 8 Result of WCA about Present Service Model (EM)

The result of calculation about Customer of PM and EM is shown in Fig. 9 and 10.

0.22 ((\$5-\$0.25)/0.58) + 0.13 ((-\$5)/0.28) + 0.65 (\$0.25/0.14) = 0.64

a) Model of "Overall Satisfaction of WANTs"

	Need food	Save money	Save Children	Average	Weight
Need food	1	3	3	2.08	*0.58*
Save money	1/3	1	3	1	*0.28*
Save children	1/3	1/3	1	0.48	*0.14*
sum	-	-	-	3.56	(1)

b) Derivation of "Amplitude of WANT"

	Need food	Save money	Save Children	Average	Weight
Need food	1	3	1/5	0.84	*0.22*
Save money	1/3	1	1/3	0.48	*0.13*
Save children	5	3	1	2.47	*0.65*
sum	-	-	-	3.87	(1)

b) Derivation of "Importance degree of WANT"

Fig. 9 Calculation about Customer of PM

0.75 ((\$5-\$0.25)/0.75) + 0.25 ((-\$5)/0.25) = 0

a) Model of "Overall Satisfaction of WANTs"

	Need food	Save money	Average	Weight
Need food	1	3	2.08	*0.75*
Save money	1/3	1	0.48	*0.25*
sum	-	-	3.56	(1)

b) Derivation of "Amplitude of WANT"

	Need food	Save money	Average	Weight
Need food	1	3	2.08	*0.75*
Save money	1/3	1	0.48	*0.25*
sum	-	-	3.56	(1)

b) Derivation of "Importance degree of WANT"

Fig. 10 Calculation about Customer of EM

The result of calculation about Restaurant / Cafe of PM and EM is shown in Fig. 11 and 12.

PM
restaurant
$0.20 \, (-(\$5-\$0.25)-\$0.25)/0.43 + 0.20 \, (\, (-\$5)/0.43 \,) + 0.60 \, (\, \$0.25/0.14 \,) = \boxed{1.07}$

Overall Satisfaction of WANTs
0.20   0.20   0.60

(-(\$5-\$0.25)-\$0.25)/0.43   \$5/0.43   \$0.25/0.14

Satisfaction of "Save money"   Satisfaction of "Earn a profit"   Satisfaction of "Save Children"

0.43   0.43   0.14

- (\$5 - \$0.25)   \$5   -\$0.25   \$0.25

Provide food   Get money   Pay money

a) Model of "Overall Satisfaction of WANTs

	Save money	Earn a profit	Save Children	Average	Weight
Save money	1	1	3	1.44	*0.43*
Get money	1	1	3	1.44	*0.43*
Save children	1/3	1/3	1	0.48	*0.14*
sum	-	-	-	3.36	(1)

b) Derivation of "Amplitude of WANT"

	Save money	Earn a profit	Save Children	Average	Weight
Save money	1	1	1/3	0.69	*0.20*
Get money	1	1	1/3	0.69	*0.20*
Save children	3	3	1	2.08	*0.60*
sum	-	-	-	3.46	(1)

b) Derivation of "Importance degree of WANT"

Fig. 11 Calculation about Restaurant / Café of PM

$0.5 \, (\, -\$5/0.5 \,) + 0.5 \, (\, \$5/0.5 \,) = \boxed{0}$
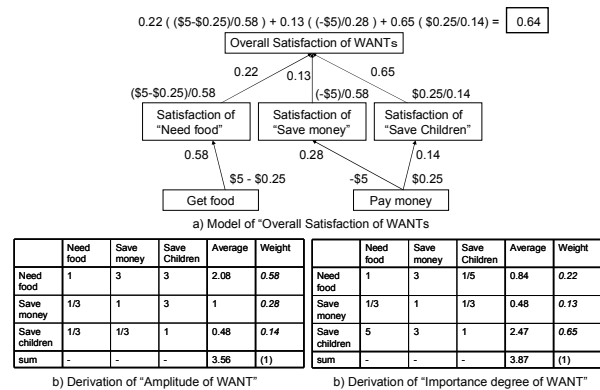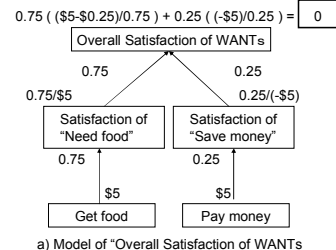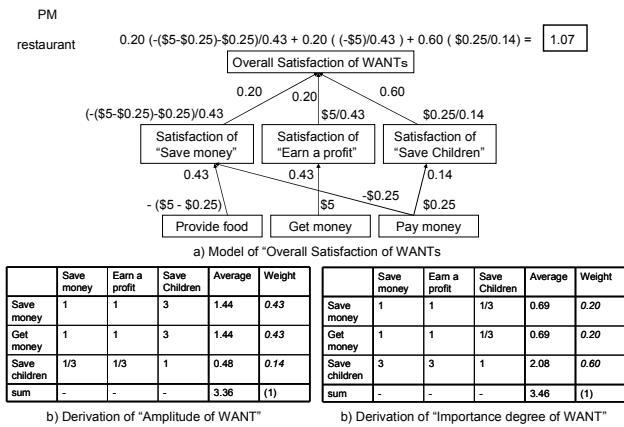
Overall Satisfaction of WANTs
0.5   0.5

-\$5/0.5   \$5/0.5

Satisfaction of "Save money"   Satisfaction of "Get money"

0.5   0.5

-\$5   \$5

Provide food   Get money

a) Model of "Overall Satisfaction of WANTs"

	Save money	Get money	Average	Weight
Save money	1	1	1	*0.5*
Get money	1	1	1	*0.5*
sum	-	-	2	(1)

b) Derivation of "Amplitude of WANT"

	Save money	Get money	Average	Weight
Save money	1	1	1	*0.5*
Get money	1	1	1	*0.5*
sum	-	-	3.56	(1)

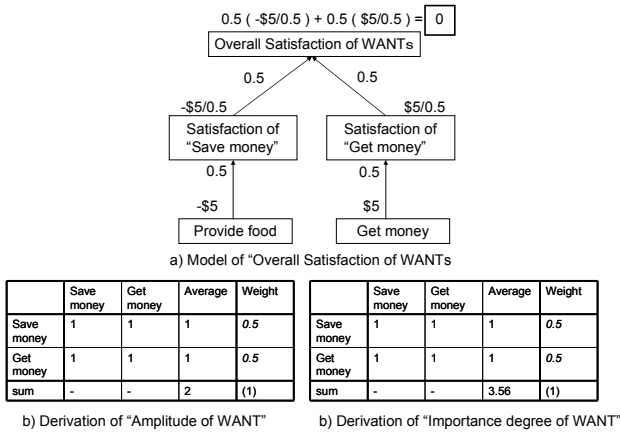b) Derivation of "Importance degree of WANT"

Fig .12 Calculation about Restaurant / Café of EM

D: Calculation of increment of "Overall Satisfaction of WANTs"

The increment of each "Overall Satisfaction of WANTs" is calculated as follows.

Customer: 0.64 – 0 = 0.64

Restaurant / Cafe: 1.07 – 0 = 1.07

E: Evaluation of the intended service

As shown the result of procedure D, All increments of "Overall Satisfaction of WANTs" are positive. Therefore, the effectiveness of the intended service was conducted.
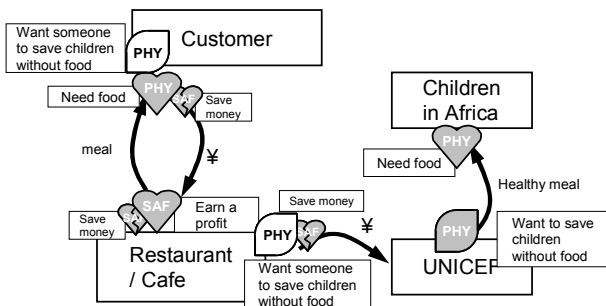
Fig.13 Result of WCA about Conventional Donation (CM)

A': Analysis of competitive service using WCA
The result of this procedure is shown in Fig. 13.

The result of this procedure, relationship of conventional donation program between stakeholders is almost same as TFT.

B': Check of a present service model

We eliminated the new part of competitive service from the competitive service, and derived the present service. The present service derived in this process is same as EM. The detail of the result is omitted in this paper because of the result is same as EM.

C': Calculation of "Overall Satisfaction of WANTs"

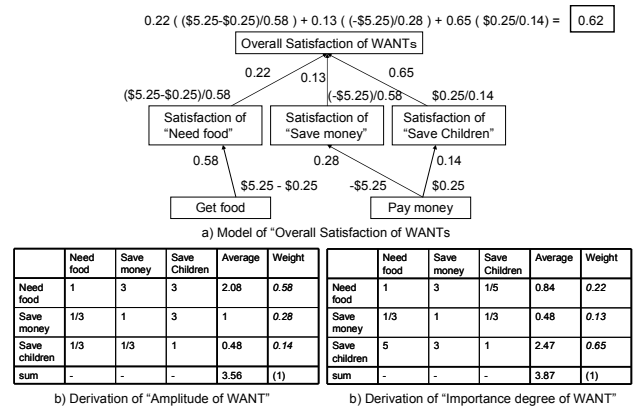The result of calculation about customer of CM is shown in Fig. 14.

$0.22 \, (\, (\$5.25-\$0.25)/0.58 \,) + 0.13 \, (\, (-\$5.25)/0.28 \,) + 0.65 \, (\, \$0.25/0.14 \,) = \boxed{0.62}$

Overall Satisfaction of WANTs
0.22   0.13   0.65

(\$5.25-\$0.25)/0.58   (-\$5.25)/0.58   \$0.25/0.14

Satisfaction of "Need food"   Satisfaction of "Save money"   Satisfaction of "Save Children"

0.58   0.28   0.14

\$5.25 - \$0.25   -\$5.25   \$0.25

Get food   Pay money

a) Model of "Overall Satisfaction of WANTs"

	Need food	Save money	Save Children	Average	Weight
Need food	1	3	3	2.08	*0.58*
Save money	1/3	1	3	1	*0.28*
Save children	1/3	1/3	1	0.48	*0.14*
sum	-	-	-	3.56	(1)

b) Derivation of "Amplitude of WANT"

	Need food	Save money	Save Children	Average	Weight
Need food	1	3	1/5	0.84	*0.22*
Save money	1/3	1	1/3	0.48	*0.13*
Save children	5	3	1	2.47	*0.65*
sum	-	-	-	3.87	(1)

b) Derivation of "Importance degree of WANT"

Fig. 14 Calculation about Customer of CM

The result of calculation about Restaurant / Café of CM is shown in Fig. 15.

$0.20 \, (\, (\$5.25-\$0.25)/0.43 \,) + 0.20 \, (\, (-\$5.25)/0.43 \,) + 0.60 \, (\, \$0.25/0.14 \,) = \boxed{1.07}$

Overall Satisfaction of WANTs
0.20   0.20   0.60

(-(\$5.25-\$0.25)-\$0.25)/0.43   \$5.25/0.43   \$0.25/0.14

Satisfaction of "Save money"   Satisfaction of "Earn a profit"   Satisfaction of "Save Children"

0.43   0.43   0.14

- (\$5.25 - \$0.25)   \$5.25   -\$0.25   \$0.25

Get food   Get money   Pay money

a) Model of "Overall Satisfaction of WANTs"

	Save money	Earn a profit	Save Children	Average	Weight
Save money	1	1	3	1.44	*0.43*
Get money	1	1	3	1.44	*0.43*
Save children	1/3	1/3	1	0.48	*0.14*
sum	-	-	-	3.36	(1)

b) Derivation of "Amplitude of WANT"

	Save money	Earn a profit	Save Children	Average	Weight
Save money	1	1	1/3	0.69	*0.20*
Get money	1	1	1/3	0.69	*0.20*
Save children	3	3	1	2.08	*0.60*
sum	-	-	-	3.46	(1)

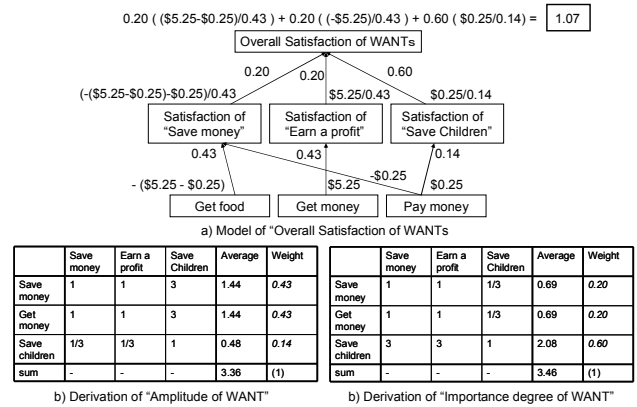b) Derivation of "Importance degree of WANT"

Fig. 15 Calculation about Restaurant / Café of CM

D': Calculation of increment of "Overall Satisfaction of WANTs"

The increment of each "Overall Satisfaction of WANTs" is calculated as follows.

Customer: 0.62 – 0 = 0.62

Restaurant / Cafe: 1.07 – 0 = 1.07

E': Evaluation of the competitive service

As shown the result of procedure D', All increments of "Overall Satisfaction of WANTs" are positive. Therefore, the effectiveness of the competitive service was conducted.

F: Comparison between intended service and competitive service

The increment of "Overall Satisfaction of WANTs" about the customer is shown in Table 3. As shown in Table 3, the increment of PM is larger than CM. Therefore, the

intended service is more effective than the competitive service.

Table 3 Comparison between PM and CM

Service	increment	Notes
Intended Service (PM)	0.64	Calculated in procedure D
Competitive Service (CM)	0.62	Calculated in procedure D'

4.3 Discussion

As performed through the section 4.2, quantitative analysis and evaluation of actual service are possible using the proposed method. When competitive service is assumed, the difference between intended service and competitive service was able to be quantified clearly.

The TFT, exampled service in this section steadily grow and became quite popular among restaurants users in Japan [9]. This remarkable growth of this service in itself proves validation of the model. In the result of evaluation by proposed method, the validity of TFT is shown in section 4.2. Therefore, the validity of proposed method was confirmed by validation through section 4.2.

4.4 Future Research

In this paper, the validation of proposed method is performed by only one application, demonstrated in section 4.2. Future research could futher validate the proposed method using more examples.

Ideally, the validity could be tested further through the design of actural service.

5 CONCLUSIONS

In this paper, we proposed a novel evaluation method of service based on quantification of WCA. The proposed method was validated by case study of application of the proposed method.

6 REFERENCE

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