ORIGINAL ARTICLES
SPECIAL ISSUE

CHANGE IN USERS' ATTITUDE BY GIVING THE UNKNOWN INFORMATION

– FOCUSING ON TRAIN ROUTE FINDER WEB SITE FOR MOBILE PHONE –

Kei MASAKI*, Ryuhei OTSUKA*, Hideki FUJIKURA* and Hisao SHIIZUKA**

* *Informatics, Kogakuin University Graduate School, Nishishinjuku 1-24-2, Shinjuku-ku Tokyo, Japan*

** *Faculty of Informatics, Kogakuin University, Nishishinjuku 1-24-2, Shinjuku-ku Tokyo, Japan*

Abstract: People are making a good use of all the every-day functions of televisions, computers, or cell phones. However, they hardly can get the best of them, that is to say to use all the functions of these devices, which yet are inseparable from people's life. This is especially true concerning the web sites for mobile phone (WEST): there is a huge amount of information per WEST, with an everyday increasing quantity of web pages, contents and functions. In this study, focusing on WEST which is difficult to differentiate, we verify that information presentation influences the user, and show the availability of information presentation for other WEST differentiation. We measure the user's psychology change by causing the user's value creation, and it is become clear the subjects passed the 3 classes decision making process from the results.

Keywords: *Buying behavior, Value Creation, Decision Making Process, Text mining*

1. INTRODUCTION

In recent years, IT technology has been developed extremely quickly, with outputs improving our life, such as web browsers or emotion search systems.

Also, as homepages can be easily made by anybody using popular homepage building software, the free sites and the functionalized sites are numerous. And users cannot get easily what they want.

Moreover, with the rapid informatization, we receive a huge amount of information in various situations, the user needs to figure out what is relevant information, which might be difficult as a decision-making process. Therefore WEST already advanced the commoditization.

At the same time, "we now have the 24hour, 3cm away interactive media [1]" – i.e. the mobile phone. Nowadays, it has replaced PCs and has become the main way to connect with the Internet [1]. Mobile marketing is now becoming a new market. Therefore, in order to develop the market, many sites for mobile phone have been built and yet the same issues occur: the users can't get the useful things within the vast field of information.

To solve the problem, many sites are providing a paid section to serve people who need specific and useful information. However, if the site cannot show users the value of their pay, then users may have no will to subscribe to the service. Consequently, after a great increasing registration period, it has recently slowed down, and even stopped. This is caused by the fact that paid sites cannot show users the charming and the value which would attracts the users to pay.

This paper is focusing on the Train Route Finder Site (TRFS). We have conducted an experiment based on Kosaka's Consumers' Motive Action to test the hypothesis: The free site users may change their mind after they have been shown the benefit of using a paid site. As a purpose of this experiment, we extract the factors related to what the site can do to help user to change their mind, and to get what makes them change their minds.

Moreover, we present in this paper a user test. We have surveyed how users change their mind by putting themselves in a situation in which they are in a trouble, and after explaining them what the site can do, have made them using the site to find a solution.

2. INFORMATION TRANSMISSION METHOD

2.1 Train Route Finder Site

TRFS is a "System service that offers the optimal path between the place of start and the destination by using the public transportation facilities such as railways, air routes, sea routes, highway buses, or shuttle buses" [4]. On TRFS's site, 6.49 million users were logged on in 2006 [5], and it is used in various situations. The paper is focused on 4 sites which have been ranked by TRFS Share Ranking among Top5.

2.2 Information Transmission Method : User Test

2.2.1 Possibility of Value Creation by User Test

In this paper, the user test was executed as a technique for chasing the value of TRFS. The reason for choosing this technique is that it has been considered as the best way to use *Kansei* Information to influence the subject

and to create *Kansei* value. The *Kansei* Information here means the information and the stimulation that influence the subject. The *Kansei* value means the psychology changes caused by *Kansei* information.

In the experiment, tasks are set referring to students' daily life. This is to create the opportunity for them to have potentially a wish to subscribe to TRFS by matching their experience value and tasks.

2.2.2 The details of the experimental environment

The experiment has been done during five days from March 20th, 2008 to March 24th, 2008. Subjects were 43 university students of Kogakuin University (31 men and 12 females), among which 5 persons registered to the service, and the other 38 persons tried several times (during travel, job hunting, and so on).

As showed in Fig.1, the test has been performed with a HD video camera placed in the subject's back, and a voice recorder. To ensure that the video camera can take the scene properly, the subject has been asked not to move as much as possible, and the pose has been fixed for the two hands. The cellular phone was hold by the hand and was placed at a distance of 30 cm to the subject's face, for the whole 6 tasks as illustrated by Fig.2.

2.2.3 Making of scenarios and tasks

Before the tasks have been set, we decided which function will use for the experiment. Currently, TRFS are providing a lot of functions to the users, such as the optimal route search by railway or car. For this experiment, 13 functions of the railway route search, often used by the subjects, were selected.

In order to minimize the difficulty as much as possible, the tasks are based on the students' college life. Each function is chosen to fit a scenario [7]. Fig.2 shows one of the tasks. Task levels have been set as low, medium, high for the TRFS (Tab.1). Subjects are asked to start from a low level task.

2.2.4 Questionnaire Survey

The recorded sound and the video cannot show the

Figure 1: Situation of usability test.

subject's evaluation regarding the TRFS. Therefore, we also made a questionnaire after each of the tasks and at the end of the experiment in order to obtain subjects' opinion about the usability of the TRFS and of its function, and to chase the subject's changes of psychology.

2-a: Can this function be easily used?

2-b: Satisfaction percentage of the function.

2-c: Have you heard about this function before?

2-d: Have you heard about this site before?

2-e: Would you pay for the site?

Evaluation is based on a 5-grade scale (-2, -1, 0, 1, 2) for 2-a and 2-b. For other items, the subjects were required to choose a unique answer and to write their own feelings concerning each of the tasks.

3. ANALYSIS METHOD AND RESULTS

We analyzed the result of the questionnaire, the voice data and the animation data introduced in Chapter 2. First of all, in case of 2-a and 2-b, we standardized the average for a five stage evaluation. Moreover, the animation data

It is Sunday, April 20th today.
You spend a day in Tokyo Disneyland and come back to home from Maihama to Akihabara.
Because of the short money, you need to get the cheapest route starting at 21 and passing by the Tokyo Station.
*******search*******
You get the information that because of an unexpected situation, the railway from Tokyo has been stopped. You must use the function to search another way. When you get a new route, this test is over.

Figure 2: Example of task.

Table 1: Difficulty level of each TRFS's functions.

Task	Functions	Difficulty
Task 1	General Search	Low
	Round Trip Search	
Task 2	Anteroposterior Search	Mideum
	Sending Mail	
Task 3	Adjust a Transfer Time	High
	Map Displayed	
Task 4	Route Information	Mideum
	Exit Information	
Task 5	Time schedule	Mideum
	Focused Arrivals	
	Another Search	
Task 6	Total Navigation	High
	Detour function	

I think Detour function is useful when an injury accident happens. This makes our search in constant availability use more comfortable. Also, when I want to search an optimum route involving a blocked commuter pass, its availability is helpful. The better position of Detour button is set up, and it is suitable position for me. When I search the detour, the Detour function helps me.

Figure 3-(A) : A part of comment of subject A.

I frequently use TRFS, especially when going to parttime job. I have to get on time to the part-time job place, and it is very far from my house. So sending mail service which is written about delay train is very useful, and I want to register to this site. When I arrive at the station, I have to research the optimum route if the train delaying. If I could know about the delay before leaving, I would leave home early. And the mail service [one the phone] is more available to check details than the PC one.

Figure 3-(B) : A part of comment of subject B.

Figure 4: The 3 classes of decision-making processes.

was analyzed: Fig.7 to Fig.10 shows the average of clicks and the average of screen transitions for each subject. Also, the other questionnaire items are shown as percentage in Table 2.

In addition, questionnaire items 2-c and 2-d are indicating the acknowledgement of subjects concerning TRFS's function and TRFS itself. Each of them is defined respectively as "the percentage of knowing functions" and as "the percentage of knowing TRFS". Finally, 2-e shows the percentage of the will to register to TRFS, and is called "the percentage of registration".

Besides, all subject's voice data are written down. Unclear recorded sentences are supplemented with the animation data and with the interview after the task, and are corrected with clearly described Japanese words [7]. Data are analyzed by TMS (Text Mining Studio) [8],

Table 2: The percentage of knowing functions
The will of subscribers to TRFS.

Functions	The percentage of knowing the Function	The percentage of subscribers to TRFS
General Search	100.0%	0.0%
Round Trip Search	30.0%	10.0%
Anteroposterior Search	32.5%	22.5%
Sending Mail	35.0%	20.0%
Adjust Transfer Time	12.5%	25.0%
Map Display	15.0%	22.5%
Route Information	38.7%	16.1%
Exit Information	20.0%	32.5%
Time Schedule	80.6%	16.1%
Focused Arrivals	18.2%	36.4%
Another Search	15.0%	30.0%
Total Navigation	44.4%	33.3%
Detour	9.1%	63.6%

subjects' thinking of the whole task is cleared. We extracted the operational problem from the animation data of each subject. The subjects' motion was transcript. In this paper, the user test was executed as a technique for chasing the value of TRFS. The reason to choose this technique is that it has been thought as the best way to use *Kansei* Information to influence the subject, and then to create a *Kansei* value. The *Kansei* Information here means the information and stimulation that influences the subject.

From the above-mentioned three analysis outputs, we extracted some operational problems and psychology changes while using TRFS by causing subject's decision-making process with presentation value.

4. ANALYSIS RESULT

4.1 The percentage of function acknowledgement and the percentage of TRFS subscribing.

From Table 2, the percentage of function acknowledgement, the general search function, and the time schedule search seems to be well known, more than other functions. The subjects are TRFS experienced students. They usually use the route search when they are travelling or in an urgent situation. Yet, in daily life, they are not frequently using this function. Based on this observation, in case we consider about the difference with the percentage related to knowing the function, it causes about Information presentation method and how to use it.

At first, concerning the TRFS's usage, the TRFS was introduced to the subject, but only the optimal route search function was considered in their daily life. Therefore, this can be difficult not to make subjects concentrate on TRFS. In fact, the subjects who did the TRFS1 user test know

Figure 5: Comparison of 3 classes of Decision-making processes.

Figure 6: The percentage people desiring to subscribe to TRFS for each task.

little about TRFS1's function. Although they know the function to change time schedule, the TRFS1 user test mentioned this function as the least known one (lowest percentage).

4.1.1 Information presentation method and 3 classes of decision-making processes

The main purpose of each company is to make users registering for paid services thanks to highly recognized TRFS's functions and chasing value. In conventional value creation, it is used to provide great functions and to wait for the user, yet it is hard to evocate people to register and to pay for the associated service. A reason is required for subjects to choose it. Therefore, an information presentation method is needed to elicit the motivation to register.

This paper uses story telling technique as an information presentation method to inform the subject about the task. After the subjects had been informed (e.g. in Table 2), they showed more will to register to the site and to pay for it. The influence of decision-making processes is based on the text extracted from subject's interview data and from TRFS's usability score.

Fig.3 (A) shows the subject's comments during the test (For instance: "when I met the accident and I must change for other train, this may be very helpful"). Based on these experiences, users recognized that this service may make their daily life easier. Therefore, when they know that the usability and the accessibility of the TRFS will not trouble them, they show a tendency to register for the pay service. Fig.7-10 shows the satisfaction and the usability of the TRFS. Their relationship is obvious and that can be seen as a reason inciting users to register.

Fig.4 shows a subject goes through the 3 classes of decision-making processes to register paid service in an unconsciousness situation. this has a great influence on the subject's registration behavior for paid service. This

also happened for other subjects. The following three conditions were pointed out in the subjects' comments:

- ① This may be helpful in my life.
- ② It is easily to use.
- ③ It has the (desired) function.

Fig.5 shows that 51% of the comments fit with the 3 classes decision-making processes and also that 93% of the subjects shown a tendency for it. Moreover, we determine that 70% of the comments fit the 3 conditions listed above. This means that the subjects who show the will to register the pay service are influenced by the 3 classes decisionmaking processes. Thus, the 3 classes decision-making processes, driving unconsciousness buying behavior, can explain why subjects register for the pay service in the experiment.

From the beforehand mentioned matter, we suggest that the appropriate method to create value comes from the provided *Kansei* information in order to drive the user with some sympathy. Although, we can stimulate user to bring the experience back to create the wealth. However it is better to use these functions to make the user acting to make their life better. This paper is based on the students' daily life. Considering *Kansei* information, subjects figured out that, after having used one of the functions, they could easily get what they want. Therefore, a comparison between the "updated self" and the "current self" occurred: the demerit of the past becomes the current motive to register for the service. To conclude, this shows that the demerit is present as long as the user does not register for the service, and that the user can make his life better, i.e. he/she can creates *Kansei* Value.

4.1.2 Impulsiveness decision-making process

Finally, the Fig.4 shows another method of buying behavior. The main purpose of this paper is to clear the 3 class decision-making processes and another one: the impulsiveness decision-making process. Fig.3 (B) shows

Figure 7: Usability and Satisfaction (TRFS1).

Figure 9: Usability and Satisfaction (TRFS3).

Figure 8: Usability and Satisfaction (TRFS2).

Figure 10: Usability and Satisfaction (TRFS4).

■ Click-through count
■ Usability
■ Satisfaction

■ Usability
✕ Number of screen transitions

the subject with impulsiveness decision-making process. This decision-making process is not based on the function, being able to be used easily, but on the comparison of updated self and current self after using the function. Moreover, considering that life will be better after experiencing and using the service, a simple comparison may convince the user to register to the service.

Therefore, Shiizuka [9], considering human *Kansei* value creation through system methodologically, explains the concept of sympathetic vibration. In his case, a degree of emotion and sympathetic vibration is defined by the distance between the producer (device) and the user. When this distance is minimum, this degree is maximum.

In this paper, this has been replaced with the degree of self-desire, and the story with difference between updated self and current self (the demerit is if the user does not register).

The subject judges that whether the function rapidly improves their standard of living or not. As a result, the difference between updated self and current self becomes maximum, and a degree of desire becomes maximum too.

Therefore, the subject shows will of buying behavior regardless of the interlayer.

In this paper, the buying behavior is called as “impulsiveness”, and its process is shown in the Fig.4.

4.2 The log ratings of other TRFS services

In Fig.6, TRFS2 has a 81.8% (high) percentage of registration. The result comes from the company's advertisement and the way it delivers the information. In order to promote the advantage of the search function, the company creates various scenario in ads and shows user what this function can do. It shows the user what would be the benefit of getting it. Other sites also have the same function, but promote it by a weaker advertisement: they do not emphasize their own main function. Therefore, the TRFS2 emphasizes the advantage of their own product to attract the users who need it. When a user has built an experience, and has a strong relationship with the function, the site benefits from it, and the user obtains and keeps an image of it. When the user compares the function with other sites, he will choose what is in his mind at first

and then will image what can be the benefit from it. Therefore, in this case, the high percentage of register is understandable.

Also, there is an experience concerning a subject who has done job hunting (when I heard: “if you’re in job hunting you should use the TRFS2, I chosen the TRFS2”). AISAS theory inferred that buying behavior can be proofed by students with similar experiences. AISAS theory is about an assumption of user behavior in marketing. The assumption is that the user’s buying is always connected with keywords such as Attention, Interest, Search, Action, and Share [10]. It means that concerning job hunting students, no matter the number of visited sites for search route, they always have a definite image of TRFS2. Therefore, they show their interests in it, after trying and being satisfied. Then, they may share information concerning TRFS2 with people running for job. Finally, the buying behavior may take place. It means the user unconsciously advertise for unintentional advertisement of TRFS2 between students. Comparatively with common advertisements, the latest cannot create a relationship between the user and the merchandise. In this case, a person who is given the value has already created the relationship with the friends or the family. Based on this, the view point of being given the value, experience heard from friends or families, is more believable than advertisements. Therefore, TRFS2 could attract users better, for the benefit of the site.

5. CONCLUSION

To persuade the user to pay for the service, there are 2 important conditions:

- (1) Satisfying the 3 classes of decision-making processes;
- (2) Fitting information presentation method with subjects’ experience.

In the user’s test, according to the story told by the experimenter, the subject decides what to do base on experience instead of what the subject have heard. In spite of the lack of usability or accessibility, the subject can decide clearly what action to be taken. Consequently, when information is provided, life quality improvement is possible. The subject compares unconsciously updated self and current self, the difference showing the demerit that being unregistered is harder than paying for it. Then it means behavior of “impulsiveness” make subjects pass through the middle-layer in 3 classes of decision-making processes.

Furthermore, in order to influence the user, the advertisement plays also an important role. The user test can point out that the more the user encounter an advertisement the more he/she is familiar with it. When the user is

used to it, the benefit fades out. The result proves AISAS theory: it can be considered that the information based on this theory can convince the user to register for pay service.

6. FURTHER CONSIDERATIONS

Based on the results of this paper, we can verify the availability of users’ decision making process for other situations. After expanding this process, it will be possible to explain the human psychology related to the fact of getting tired of it. At last, we can valid assessment techniques to advance a conceptual formulation of it.

In this paper, the subject was student. He has a few chance to use TRFS, therefore we considered that he could not see advantage for registering for TRFS. Next time, we intend to conduct a user test to workers as subjects. Workers could have many changes to use TRFS frequency. Therefore, it is considered that they could see many advantages to registering for TRFS. Consequently, more reality-based results could be expected.

REFERENCES

1. Naoto Onzo, Naohiko Oikawa, Akihisa Hujita: Mobile Marketing, Nikkei Publishing Inc. (2008)
2. NTT Docomo Report, Marketing Research of “i mode”: Monthly information fee of “iMenu” have grew about 200 billion yen a year., 30th, 11, 2006.
3. Yuji Kosaka, Hisao Shiizuka; Mechanism for making creation value by *Kansei*, Journal of Japan Society of *Kansei Engineering* Vol.9 No.9, ppE21-1 (2007)
4. Train Route Finder Site, Ekitan Inc.
<http://ekitan.com/info/help/norikae.html>
5. Nielsen//NetRatings, Travel-Related Trend Survey for Internet Use in July, Ohmsha, Tokyo, 2006
6. Satoru Kubota: Account of readability and image quality by Color JCD for mobile phone, Technology research report for Institute of Electronics, Information and Communication Engineers Vol.102 No.304 (EID2002 30-36), pp21-24 (2002.09.18)
7. Tetsuya Tarumoto: Usability engineering, Ohmsha, 2005
8. Mathematical system Inc., Text Mining Studio,
<http://www.msi.co.jp/tmstudio/aboutTextMining.html>
9. Hisao Shiizuka: *Kansei* Value Creation in *Kansei Engineering*, Journal of Japan Society of *Kansei Engineering* Vol.7 No.3 March 2008, pp430-434
10. IT Pro Keyword, about AISAS, accessed date : October 2008,
<http://itpro.nikkeibp.co.jp/article/Keyword/20080409/298462/>

Kei MASAKI

Kei Masaki is a graduate student of Informatics, Kogakuin University. His research areas are *KANSEI* Engineering and *Kansei* Marketing.

Hideki FUJIKURA

Hideki Fujikura is a graduate student of Informatics, Kogakuin University. His research areas are artificial emotion for software and machine learning.

Ryuhei OTSUKA

Ryuhei Otsuka is a graduate student of Informatics, Kogakuin University. His research areas are web intelligence and *KANSEI* Engineering.

Hisao SHIIZUKA

Hisao Shiizuka is a Professor of *Kansei* Engineering, Information Design and Soft Computing at Faculty of Informatics, Kogakuin University since 2006, Tokyo Japan, after having contributed for 11 years as a Professor of Artificial Intelligence System, Linear System Theory and Electric Circuits, to the Department of Computer Science and Communication Engineering at Kogakuin University since 1995, Tokyo Japan. He is engaged in the circuit theory, the graph theory, the Petri net, and the application of the system simulation and the fuzzy theory and the researches on a soft computing and *Kansei* engineering, etc. Currently, his research interests are *Kansei* Engineering, Soft Computing, Information Design and Artificial Intelligence. He was a director of Japan Society for Fuzzy Theory in 1995-1997, and was a director of Japan Society of *Kansei* Engineering in 1999-2001. He was a Vice-President of Japan Society of *Kansei* Engineering in 1994-1997. He is now the President of Japan Society of *Kansei* Engineering.