

Kansei Approach in Development of Application Interface Design Based on User's Emotional Feeling

Ana Hadiana, Budi Permana, and Djajasukma Tjahjadi

Abstract—The emotional feeling of User plays major role in developing a web based application software especially when designing its interface, because it is one of important part of software that has position between system and user. The better interface the better impression to attract user to use it longer. This research applied Kansei Engineering to translate what user's emotional feeling into application interface design component in order to show what user wants about interface. Kansei words related with user emotions are used to investigate user emotions when looking at appearance of interface of software. Data questionnaires are collected and processed using multivariate analysis, and then translated into detail interface design elements. This research found that four users' emotional feeling related to helpdesk application, and the biggest impact of emotion in designing its interface is "Harmony".

Index Terms—Kansei Engineering, User Interface, Emotion, Multivariate, Helpdesk.

I. INTRODUCTION

The impact of information technology's application in the world of business has been accepted as one of critical point to win the high business competency. Computer application such as helpdesk application basically is important to endorse business activities. Communication with customer is important and must be more effective and efficacy by using web based helpdesk application over internet, so it is possible to be accessed directly using gadget such as smartphone or tab [1].

Many open source helpdesk applications are available in the internet, however most of their appearance of user interface lack the consideration of psychological aspect based on user's perspective, in case of helpdesk the user is customer. Therefore, it is important to pay attention to observe the interface of helpdesk application in detail by considering user's emotional perspective to build the most suitable design of it, since it is a particular part of application which directly connects to user and it also can give great impact to user's impression about application [2]. It is critical consideration to think of user interface's design components such as layout, background color, font color, font size, font type etc. which will give influences to user's impression towards helpdesk application. The more suitable user interface's appearance, the more pleasure user can

enjoy the application, the longer time the application can be used.

In the field of Human and Computer Interaction, focusing on how influence of interaction between human and computer application through its interface is critical point and it needs to be explored in detail [3,4]. Therefore, when developing an application, it is important to look at not only its functional aspect but also at its aesthetic point of view. So the appearance of user interface's application plays the same important role with application's technical functions.

Kansei Engineering has been established as a specific method to analyze the implicit psychological needs of user using statistic calculations in various field including design of user interface of application [5]. Kansei Engineering is used to grab the information about application from user such as human sense from five sensory organs as an input and use filters such as culture, emotion, gender, sense, etc. to create the final output. In Kansei Engineering, Kansei Words are used to show human sense. Adjectives or phrases are usually used as parameters of user feelings towards the appearance of user interface of application, combined with semantic differential analysis to measure the sensibility [6].

Kansei Engineering has been used to evaluate many kinds of application such as e-learning, e-commerce, ERP etc to identify design concept and its characteristics that appeals to users 'emotion [7],[8],[9].

This paper focuses on investigation of helpdesk application in order to provide developer to design the suitable interface for users by applying Kansei Engineering to analyze what user implicitly desires about helpdesk interface, so user can enjoy exploring the content of helpdesk in the best environment.

II. KANSEI PROCEDURE

Kansei assessment which is adopted in this research (as shown in Fig. 1) basically based on Kansei Engineering Type I [10],[11],[12]. It is capable of relating emotional appeal in their form of Kansei Words to physical design characteristics using item/category classification, and it is described in detail as follows.

- 1) Specimen Collections; some samples of related open source web based helpdesk application are explored and collected from internet, then based on some criteria some samples will be selected as specimens.
- 2) Kansei Words Collections; this research collected forty-eight adjectives as alternative Kansei Words related to helpdesk application. Finally, some adjectives are selected according to strength of relationship with helpdesk application.
- 3) Data Questionnaire; Once the Kansei Words collection

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is constructed, then the next step is to design bipolar adjective scales such as modern-classic, simple-complex etc. After selecting the most frequently used adjectives, five points semantic differential (SD) scale were defined. Each specimen had to be tested with five point SD scales. The participant is therefore forced to provide his own rating on a ‘one to five’ scale by only knowing the description of these two contradictory words.

- 4) **Multivariate Analysis;** Once the SD data are gathered, it is analyzed statistically using various statistical models in order to identify Kansei Words which represent the feelings in respect to particular specimen. After gathering the questionnaires and analyzing the data, some Kansei Words are selected. Coeffisien Correlation Analysis and Factor Analysis were used to understand Kansei Words relationship and the strength of Kansei Words.
- 5) **Design Recommendation;** Partial Least Square is used to explore design elements based on selected Kansei Words, and to generate general specification of design elements for designing a new interface.

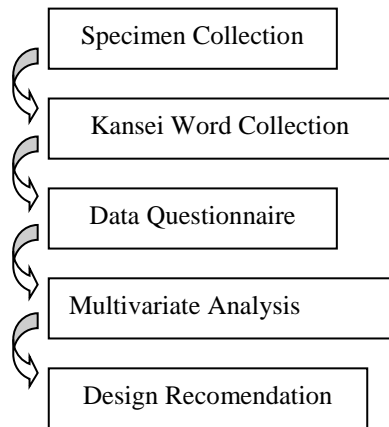


Fig. 1. Kansei Assessment.

III. RESULT AND DISCUSSION

This research prepared specimens consisting of web based open source helpdesk applications, and also Kansei Words related to users’ emotional feeling regarding the appearance of application. 30 persons who are familiar with web application participated in collecting data of what they feel after looking at each specimen one by one using semantic differential scale.

A. Specimens Collection

All helpdesk applications basically have the similar function to improve customer service. First of all, we collected most popular open source helpdesk application, then we selected five applications (in Table I) as specimens according to the following criterias:

- Specifically, and directly related to helpdesk and included as open source application.
- Each specimen clearly has different appearance of its interface.
- Globally used as popular helpdesk application in supporting business.

Specimen	Description	Characteristics
Zendesk	www.zendesk.com	Simple, natural,
Spiceworks	www.spiceworks.com	Colorful, harmony, formal
NgDesk	www.ngdesk.com	Impressive, sample, futuristic
Freshdesk	www.freshdesk.com	Modern, elegant, formal
C-Desk	www.cdesk.in	Natural, artistic, colorful, modern

Due to our study on helpdesk’s visual emotional appeal, our item/category classification is limited the physical trait that can be view in our specimen images. Fig. 2 shows the partial list of 16 items/categories classification that we used.

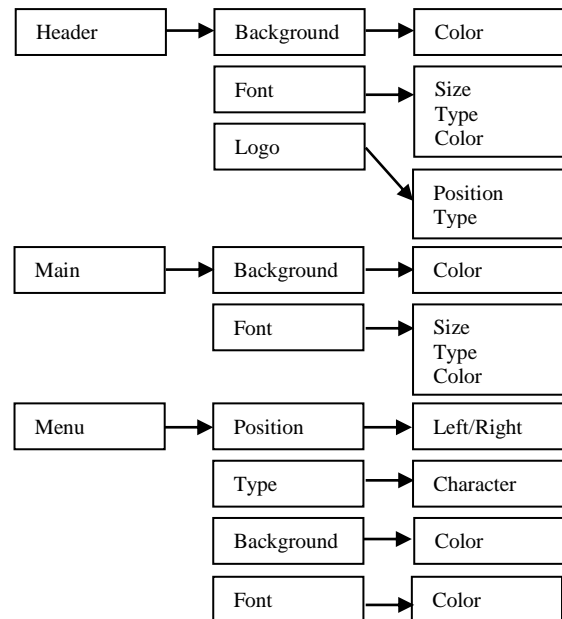


Fig. 2. Design Elements Category.

B. Kansei Words Collection

All selected Kansei Words are shown in Fig. 3. First of all, fifteen anjectives are collected as Kansei Words from related articles, and have emotional relationship with helpdesk application. All Kansei Words must be clear, unique and have no contradictive meaning with each other [13],[14],[15]. In addition to that, we also verified the suitability of Kansei Words with specimens by consulting with web designer expert before conducting the evaluation experiment.

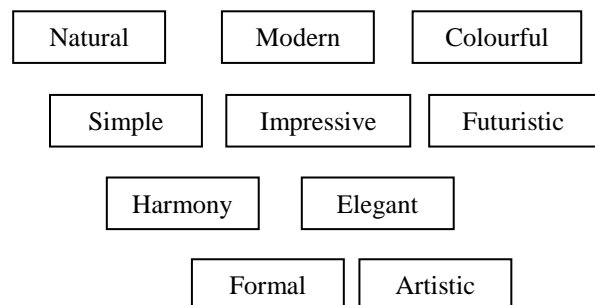


Fig.3.Kansei Words.

C. Data Collections

We constructed the five points SD Scale with ten Kansei Words. In briefing each Kansei Word are described to all

participants before starting the experiment. The data recapitulation is shown in Fig. 4. It shows that the average value of each Kansei Words are between 2 and 5, and because of the cronbach alpha's value is 0.75, so it means that the collected data from questionnaire are valid and can be used for next analysis such as coefficient correlation analysis, factor analysis, and pearl least square. The result in Fig. 4 shows that most of value more than the average value 2.5.

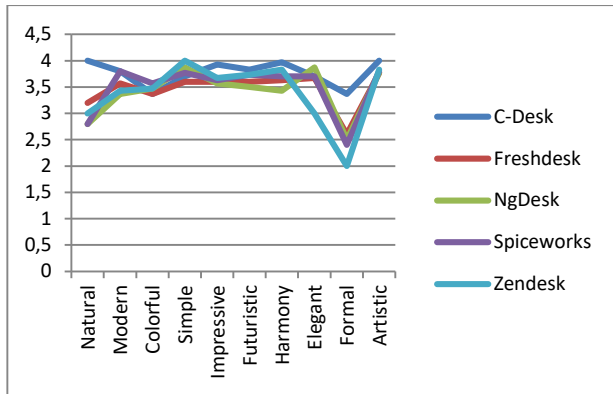


Fig. 4. Data Questionnaires.

D. Kansei Words Relationship

Coefficient Correlation Analysis is used to find out the strength of relationship between Kansei Words [16]. We found the Kansei Words' relationship as shown in the following Table II. For example, Kansei Word "Natural" has very strong relationship with Kansei Word "Artistic", strong relationship with Kansei Word "Elegant", and weak relationship with Kansei Word "colorful". This relationship is important to find alternative emotion in developing a concept design for user interface.

TABLE II: KANSEI WORDS RELATIONSHIP

	Natural	Modern	Colorful	Simple	Impressive	Futuristic	Harmony	Elegant	Formal	Artistic
Natural	3									3
Modern		3								1
Colorful			3	1						
Simple				3						
Impressive					3	2	3		2	3
Futuristic						3	3			2
Harmony							3			2
Elegant								3	1	
Formal									3	2
Artistic										3

3:Very Strong, 2:Strong, 1:Weak

E. Factor Analysis

Factor Analysis plays important role to find a small number for factors that will contribute significantly more weight. These factors show student's emotional feeling represented by Kansei Words. The calculation using XLStat software, we found the biggest four factors contribution as shown in Table III.

TABLE III: FACTOR CONTRIBUTION

	Factor1	Factor2	Factor3	Factor4
Eigenvalue	5.6927	2.2705	1.1635	0.3999
Variability (%)	56.9269	22.7050	11.6345	3.9988
Cumulative (%)	56.9269	79.6319	91.2664	95.2653

There are four factors in Table III. The two factors have a cumulative contribution of 79.63%. Factor 1 has a contribution of 56.9%, factor 2 has a contribution of 22.7%, and the cumulative value is 79.6%. It means that, the rest of the factors such as factor 3 and factor 4 are significantly smaller. Therefore, it is enough confidently to focus on factor 1 and factor 2 in constructing the design concept based on ten Kansei Words.

TABLE IV: FACTOR ANALYSIS RESULT

Kansei Words	Factor1	Factor2
Natural	0,7959	0,5301
Modern	0,5931	0,4189
Colorful	-0,3028	-0,5351
Simple	-0,0656	-0,7811
Impressive	0,9256	0,2953
Futuristic	0,9531	-0,1146
Hamony	0,9868	-0,0983
Elegant	-0,3406	0,8145
Formal	0,4990	0,8532
Artistic	0,9073	0,2680

Table IV lists ten Kansei Words with its weight based on factor 1 and factor 2. Table IV shows that in Factor 1 there are four factors that have big impact. We can see that Kansei Words associated with factor 1 such as "impressive", "futuristic", "harmony", and "artistic" have big impact because they have value more than 0.9, so this group of Kansei Words can be analyzed more detail. As matter of fact, Kansei Word "harmony" in factor 1 shows the biggest value of 0.9868. This is the biggest priority design concept for helpdesk application

So it can be assumed that the users' emotional feeling of "harmony" gives the greatest impact in design concept of helpdesk application. It means that what users desire about the appearance of helpdesk application is that the user interface must make users have a feeling of "harmony". Other Kansei Words can be used as alternative design concept.

F. Design Recommendation

Partial Least Square (PLS) analysis is used to identify the influential design element. PLS is conducted using the data from Kansei Words survey and the Item/Category Classification. Relationship between the four chosen Kansei Words and the design element describe in the item/category is obtained.

According to the result of factor analysis we can focus on designing user interface based on Kansei Word of "harmony". Range calculation used substitution between max value and min value of coefficient at every group of design elements, then also calculate the average of range. This is used to determine the priority of element design significant (S) or non-significant (NS). Significant means this element design is considered has great impact to concept design. "Harmony" based concept design generated seven element designs have great impact and eight element designs have low impact. This result depends on the

previous result of concept design generated by factor analysis. Different concept design can generate different priority of element designs.

TABLE V: PLS RESULT OF "HARMONY"

Variable	Coefficient	Range	Priority
HBgCW	0,1255	0,1969	S
HBgCB	-0,0714		
HFS10	0,0857	0,0960	NS
HFS12	-0,0103		
HFTAr	0,0857	0,1192	S
HFTTa	-0,0336		
HFCB	0,0714	0,0504	NS
HFCG	0,0210		
HLPLLeft	0,0336	0,0336	NS
HLPNo	0,0000		
HLSSsmall	0,0501	0,0729	NS
HLSMed	-0,0228		
HLTChar	0,0857	0,1269	S
HLTPic	-0,0412		
MBCW	0,0810	0,1667	S
MBCBW	-0,0714		
MFS10	-0,0857	0,1192	S
MFS12	0,0336		
MFTAr	0,0412	0,0824	NS
MFTTa	-0,0412		
MFCBlack	0,0714	0,1428	S
MFCBlue	-0,0714		
MMPLLeft	-0,0210	0,0419	NS
MMPTop	0,0210		
MMTChar	0,0857	0,0369	NS
MMTPic	0,0488		
MMBCO	0,1328	0,2042	S
MMBCDB	-0,0714		
MMFCW	0,0488	0,0976	NS
MMFCB	-0,0488		
Average of range		0,105838	

According to the result shown in Table V, we found that in the header we have to consider background color, font type, and logo type with high priority, in the main/body we have to consider background color, font size, and font color with high priority, and in menu we have to consider font color with high priority. Finally, using PLS we can generate the global specification for designing interface of helpdesk application based on emotion of "Harmony" as shown in Table VI.

We also generated another design concept based on "Futuristic" as alternative design as shown in Table VII, and the specification of element designs are shown in Table VIII.

TABLE VI: RECOMMENDATION OF ELEMENT DESIGN

	Background	Color	:White
Header	Font	Size	:10
		Type	:Arial
	Logo	Color	:Black
Position		: Left	
Size		:Small	
Main	Background	Type	:Character
		Color	:White
	Font	Size	:12
Menu	Position	Type	:Arial
		Color	:Black
	Type	:Left	
Background	:Character		
Font	:Orange		
	Color	:White	

TABLE VII: PLS RESULT OF "FUTURISTIC"

Variable	Coefficient	Range	Priority
HBgCW	0,0979	0,1722	S
HBgCB	-0,0743		
HFS10	0,0846	0,0986	S
HFS12	-0,0141		
HFTAr	0,0846	0,1139	S
HFTTa	-0,0293		
HFCB	0,0743	0,0621	NS
HFCG	0,0121		
HLPLeft	0,0293	0,0293	NS
HLPNo	0,0000		
HLSSsmall	0,0274	0,0309	NS
HLSMed	-0,0035		
HLTChar	0,0846	0,1353	S
HLTPic	-0,0507		
MBCW	0,0641	0,1384	S
MBCBW	-0,0743		
MFS10	-0,0846	0,1139	S
MFS12	0,0293		
MFTAr	0,0507	0,1015	S
MFTTa	-0,0507		
MFCBlack	0,0743	0,1485	S
MFCBlue	-0,0743		
MMPLLeft	-0,0121	0,0242	NS
MMPTop	0,0121		
MMTChar	0,0846	0,0682	NS
MMTPic	0,0164		
MMBCO	0,1078	0,1821	S
MMBCDB	-0,0743		
MMFCW	0,0164	0,0327	NS
MMFCB	-0,0164		
Average of range		0,0968	

We also can consider to combine two or more concept design to create a new design recommendation, for example according to result of coefficient correlation analysis in Table II the emotion of "Harmony" is clearly strong relationship with the emotion of "Impressive" and also according to Table IV "Impressive" is one of Kansei Word that has big impact to define user emotion feeling towards the appearance of helpdesk interface.

TABLE VIII: RECOMMENDATION OF ELEMENT DESIGN

	Background	Color	:White
Header	Font	Size	:10
		Type	:Arial
	Logo	Color	:Black
Position		: Left	
Size		:Small	
Main	Background	Type	:Character
		Color	:White
	Font	Size	:12
Menu	Position	Type	:Arial
		Color	:Black
	Type	:Left	
Background	:Character		
Font	:Orange		
	Color	:White	

TABLE IX: PLS RESULT OF “IMPRESSIVE”

Variable	Coefficient	Range	Priority
HBgCW	0,0979	0,2097	S
HBgCB	-0,0743		
HFS10	0,0846	0,0874	NS
HFS12	-0,0141		
HFTAr	0,0846	0,0908	NS
HFTTa	-0,0293		
HFCB	0,0743	0,0624	NS
HFCG	0,0121		
HLPLLeft	0,0293	0,0223	NS
HLPNo	0,0000		
HLSSmall	0,0274	0,1467	S
HLSTMed	-0,0035		
HLTChar	0,0846	0,1193	S
HLTPic	-0,0507		
MBCW	0,0641	0,1787	S
MBCBW	-0,0743		
MFS10	-0,0846	0,0908	NS
MFS12	0,0293		
MFTAr	0,0507	0,1018	NS
MFTTa	-0,0507		
MFCBlack	0,0743	0,1229	S
MFCBlue	-0,0743		
MMPLLeft	-0,0121	0,0018	NS
MMPTop	0,0121		
MMTChar	0,0846	0,0094	NS
MMTPic	0,0164		
MMBCO	0,1078	0,2268	S
MMBCDB	-0,0743		
MMFCW	0,0164	0,1556	S
MMFCB	-0,0164		
Average of range		0,1084	

The combination of two Kansei Words in Table V and Table IX generated different specification as shown in Table X. Finally, the highest coefficient value from each category of element design were selected and considered as recommendation design as shown in Table XI.

TABLE X: THE COMBINATION OF “IMPRESSIVE” AND “HARMONY”

Variable	Coefficient	Priority(I)	Priority(H)
HBgCW	0,1255	S	S
HFS10	0,0857	NS	NS
HFTAr	0,0857	NS	S
HFCB	0,0743	NS	NS
HLPLLeft	0,0336	NS	NS
HLSSmall	0,0501	S	NS
HLTChar	0,0857	S	S
MBCW	0,0810	S	S
MFS12	0,0336	NS	S
MFTAr	0,0507	NS	NS
MFCBlack	0,0743	S	S
MMPTop	0,0210	NS	NS
MMTChar	0,0857	NS	NS
MMBCO	0,1328	S	S
MMFCW	0,0488	S	NS

TABLE XI: RECOMMENDATION OF ELEMENT DESIGN BASED ON “IMPRESSIVE” AND “HARMONY”

Header	Background	Color	:White
		Size	:10
	Font	Type	:Arial
Main		Color	:Black
		Position	: Left
	Logo	Size	:Small
Menu		Type	:Character
	Background	Color	:White
	Font	Size	:12
	Type	:Arial	
	Color	:Black	
	Position	:Top	
	Type	:Character	
	Background		:Orange
	Font	Color	:White

IV. CONCLUSION

Kansei Engineering has been adopted in this research to analyze user’s emotional factors related to helpdesk application. In this research, emotional factors are shown by Kansei Words and translated into the design concept for user interface of helpdesk.

Using factor analysis and PLS to analyze each specimens of helpdesk, and to determine which emotional factor has the biggest impact towards helpdesk. According to the result of factor analysis users’ emotional factor that has the biggest impact on helpdesk is “Harmony”, then this research recommends design elements for prototype of helpdesk in order to enhance the appearance of helpdesk interface. There are three alternative emotional factors to be considered such as “Impressive”, “Artistic”, and “Futuristic”.

Further research is proposed to investigate users’ preferences based on wider population and different methods in order to get more specific interface design elements. It is also important to combine different two or more analysis method to improve the analysis of interface design elements based on users’ psychological preferences.

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