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Evaluating users' emotions for Kansei-based Malaysia higher learning institution website using Kansei checklist

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Article Info

ABSTRACT

Emotions play a crucial role in human-computer interaction. Emotion research in the field of human-computer interaction has only started recently and continuously evolving through the investigation and understanding of emotional effects. Thus, it forms an intelligent interaction between human and computer by responding effectively to the humans' feelings. Emotional design generates remarkable user experiences for websites as the emotional experiences create an intense impression on our long-term memory. Recent scientific findings recommend emotional elements to be considered in designing websites as emotions influences one's perception, conception and decision-making throughout the interaction with a website. A poorly designed user interface leads to bad user interaction while rising the users' arousal and a displeasing user experience with a website elicits dissatisfaction emotion where consecutively results in avoidance and prevents revisit to the website. This proves the importance of emotional engagement in a website design. This research evaluated users' emotions toward a Malaysian higher learning institution website which was designed in accordance with the standard Kansei-based web design guideline. The result justified the standard Kansei-based web design guideline for website of higher learning institutions in Malaysia.

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1.   INTRODUCTION

Designing user interfaces has become particularly significant in web design as many works are done through internet. Emotions plays a crucial role in influencing users' perception of a product, persuading the users in decision-making process and establishing sincere relationship with the particular product [1, 2]. Employing users' emotional requirements in web design are of high importance as emotions play a vital role in influencing users' experience which in turn controls the users to choose which website to explore. Websites that evokes positive emotions in users trigger pleasant user experience which leads the users to have continuous visit to that particular website [3, 4]. Emotional design performs better than functional design [5] as it satisfies users' emotional needs [5-10]. Seeing the importance of emotional design, web developers trying their utmost to design websites that arouse positive emotions in users in order to generate exceptional pleasant user experience [11]. One of the challenge in designing emotional based websites is to

understand the users' emotional needs and how to relate such requirements with the website design features [12].

Kansei engineering (KE) is known to be a successful user-oriented technology which has the capability to investigate the users' emotional requirements and specifies the connection between the emotions and design features of a product. It has been widely used to develop Kansei-based products [13] that captivates and satisfies users as emotional products influence product evaluation, purchase decision, and product experience of users significantly [14]. Due to an ability of improving users' emotional experience along with the successful potential in making the link between users' needs and design elements, KE has been a well-known industrial design technique in a wide range of field. Thus, study [1] strived to employ KE technology into web design of higher learning institutions in Malaysia in order to propose a standard Kansei-based web design that can satisfy the users' emotions in order to invoke emotional user interaction.

This research tries to validate the employment of KE concept onto higher learning institutions website by designing a prototype based on the standard Kansei-based web design guideline for Malaysian higher learning institutions which was identified by the study [1]. Users' emotions towards the Kansei-based prototype was evaluated with Kansei checklist in order to prove whether the Kansei-based prototype elicits positive emotions in users.

2.   RESEARCH METHOD

A standard Kansei-based web design guideline for Malaysian higher learning institutions was identified in [1]. The standard Kansei-based web design guideline was employed to design a website of a higher learning institution in Malaysia as a prototype. Universiti Malaysia Sabah (UMS) website was taken as a case study and the website were adapted with the consideration of the findings from [1]. This research employed emotional concept onto the current UMS. The designed UMS website with the employment of emotional aspect as in [1] is demonstrated in link: https://punithathiru92.wixsite.com/mysite. The designed Kansei-based website (https://punithathiru92.wixsite.com/mysite) was tested to validate the employment of KE concept onto higher learning institution websites which in turn to justify whether the identified standard Kansei-based web design guideline in [1] can be used in design practices. Users' impressions towards the Kansei-based UMS website (https://punithathiru92.wixsite.com/mysite) was evaluated through this research in order to determine the emotions the Kansei-based UMS website elicits in users. The developed Kansei-based prototype (https://punithathiru92.wixsite.com/mysite) was evaluated through an online survey with the involvement of Kansei checklist.

2.1. Online survey design

To measure the users' Kansei towards the Kansei-based UMS website, an online survey was designed in two sections; Section A: Demographic and Section B: Emotion Evaluation with Kansei Checklist. Section A was designed to obtain demographic information of the respondents, whereas Section B was developed for the purpose of acquiring the users' impressions toward the adapted Kansei-based UMS website corresponding with the Kansei words in the Kansei checklist. The link of the adapted UMS website was included in the online survey for the respondents to explore the websites for a few minutes before they start answering the online survey. Kansei checklist was established with Kansei words. Kansei words are specific words that illustrate emotional responses and are used by users to convey their feelings. This research adopted 16 Kansei words related with higher learning institution website interface from previous literature of [16]. The adopted Kansei words are shown in Table 1.

The 16 adopted Kansei words as shown in Table 1 were used to construct a Kansei checklist in the form of five point Likert's scale. The Likert's scale with five point scale indicates "strong agreement" for the score of five and "poor agreement" for the score of one. The designed Kansei checklist is demonstrated in the link (https://goo.gl/forms/BWYSUHSQuQ58gFxE3).

Table 1. Adopted Kansei words

Kansei Word	Kansei Word
Convenient	Creative
Simple	Messy
Professional	Waste of time
Unique	Confusion
Beautiful	Lovely
Efficient	Modern
Appealing	Disappointment
Perfect	Up-to-date

2.2. Participants and procedure

As for the recruitment of participants as subjects, this research targeted the users of higher learning institution websites in Malaysia following the rule defined in KE by KE practitioners, which is to approach particular target users of the product [9]. Thus, this study focused on the user who uses websites of higher learning institutions in Malaysia. The online survey was distributed through social media and email as well as face to face session was conducted at UMS. The participants were instructed to explore the Kansie-based UMS website by clicking the link attached and were asked to rate their impressions towards the website on the Kansei checklist of five point scale. They were required to rate for all the Kansei words by giving a score from the range of five to one, where five indicates the strong agreement whereas the one refers the poor agreement. A total of 53 participants answered the online survey which was conducted for three months. The finding of the users' impressions towards the Kansei-based UMS website are discussed in details in the following section.

3.   RESULTS AND ANALYSIS

The survey gathered the data of users' emotions towards the Kansei-based UMS website in accordance with the Kansei checklist. The participants were requested to take a look at the Kansei-based website by clicking the link provided and then were asked to describe their feelings on the adapted website by giving a score to the 16 adopted Kansei words in the Kansei checklist. The participants' feelings towards the adapted website are presented in the Figure 1. The data were analyzed with descriptive statistics by finding the mean as average for each Kansei words. The Figure 1 reports the responses of the participants' impressions towards the Kansei-based UMS website in relation with the Kansei words. The data from the Figure 1 are illustrated in the Figure 2.

Kansei Words	Strong Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Disagree 1	Mean
Convenient	20	21	8	3	1	4.06
Simple	16	23	11	2	1	3.96
Professional	22	17	9	4	1	4.04
Unique	18	19	8	5	3	3.83
Beautiful	16	18	13	3	3	3.77
Efficient	19	20	12	1	1	4.04
Appealing	16	16	18	11	1	3.83
Perfect	16	14	19	3	1	3.77
Creative	16	22	9	6	0	3.91
Messy	4	11	12	13	13	2.62
Waste of time	1	7	12	14	19	2.19
Confusion	3	8	19	9	14	2.57
Lovely	12	20	12	7	2	3.62
Modern	14	19	14	4	2	3.74
Disappointment	3	7	12	11	20	2.28
Up-to-date	16	18	11	5	3	3.74

Figure 1. Participants' impression towards Kansei-based UMS website

The participants' response in accordance with the Kansei words towards the Kansei-based UMS website are presented in Figure 2. The size of the range for each level scores was identified with the formulae $((n-1)/n)$, in order to form the range for the five point levels. Since, the five point scale is used to gather participants' impression, the size of the range for each level is calculated with $((5-1)/5)$ which will result in 0.8. The range was identified by adding the range size to the each level of the score from five to one. The range for each intensity level is shown in Table 2.
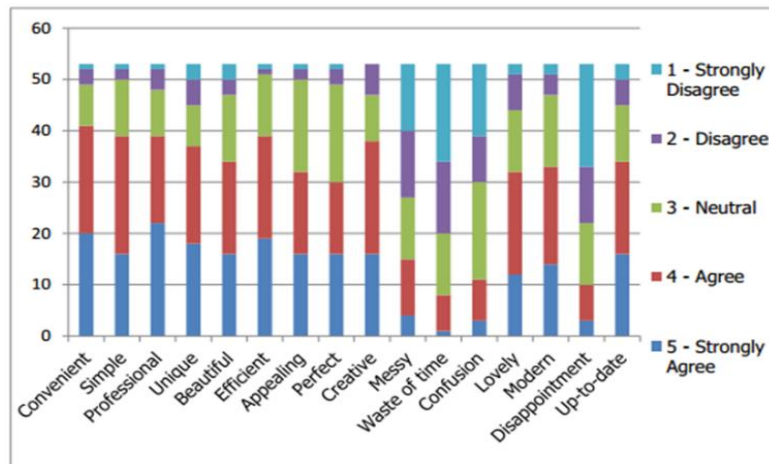
Figure 2. Participants' response in relation with Kansei words

Table 2. Range of each score level

Score	Range of Intensity
5	4.21–5.00
4	3.41–4.20
3	2.61–3.40
2	1.81–2.60
1	1.00–1.80

The data (refer Figure 2) were analyzed in accordance with the mean and the range of each score level (Table 2) in order to find the feelings evoked from the adapted website. The feelings the users experienced in accordance with the Kansei words while using the website were analyzed and are discussed with the information in Figure 3.

Kansei Words	Mean	Range	Score	Score State
Convenient	4.06	3.41 - 4.20	4	Agree
Simple	3.96	3.41 - 4.20	4	Agree
Professional	4.04	3.41 - 4.20	4	Agree
Unique	3.83	3.41 - 4.20	4	Agree
Beautiful	3.77	3.41 - 4.20	4	Agree
Efficient	4.04	3.41 - 4.20	4	Agree
Appealing	3.83	3.41 - 4.20	4	Agree
Perfect	3.77	3.41 - 4.20	4	Agree
Creative	3.91	3.41 - 4.20	4	Agree
Messy	2.62	2.61 – 3.40	3	Neutral
Waste of time	2.19	1.81 – 2.60	2	Disagree
Confusion	2.57	1.81 – 2.60	2	Disagree
Lovely	3.62	3.41 - 4.20	4	Agree
Modern	3.74	3.41 - 4.20	4	Agree
Disappointment	2.28	1.81 – 2.60	2	Disagree
Up-to-date	3.74	3.41 - 4.20	4	Agree

Figure 3. Participants' impression evaluation in relation with Kansei words

From the Figure 3, we can infer that the Kansei-based UMS website elicited positive feelings in participants since all positive Kansei words were acknowledged with the score four indicating the term agree. The responses with high mean that fell in the range of 3.41–4.20 for the score 4, shows that the participants felt positive impressions towards the Kansei-based UMS website which was designed based on the standard

web design guideline from study [1]. Seeing the low mean for the negative Kansei words (waste of time, confusion and disappointment), we can infer that most of the participants did not feel the negative feelings towards the Kansei-based UMS website. The Kansei word messy with the mean 2.62 which fell into the score 3, specifies that the most of the participants were neutral to the feeling. The data presented in the Figure 3 proves that the Kansei-based UMS website aroused strong positive Kansei in users.

The data gathered on the users' Kansei towards the Kansei-based UMS website (refer Figure 1) were compared and analyzed with the data gathered from the participants in study [1] towards the current UMS website. Study [1] collected users' impressions towards 12 selected higher learning institution websites in Malaysia, including current UMS website. The data gathered on participants Kansei towards the current UMS website along with the mean are presented in the Figure 4.

Kansei Words	Strong Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Disagree 1	Mean
Convenient	3	15	30	5	0	3.30
Simple	8	18	20	9	0	3.40
Professional	4	17	23	7	2	3.26
Unique	3	8	27	10	5	2.89
Beautiful	2	14	26	10	1	3.11
Efficient	3	13	30	7	1	3.23
Appealing	3	12	26	11	1	3.09
Perfect	3	8	27	13	2	2.94
Creative	1	12	25	13	2	2.94
Messy	1	4	16	25	7	2.38
Waste of time	1	7	12	14	19	2.28
Confusion	1	5	20	22	5	2.53
Lovely	1	15	24	11	2	3.04
Modern	1	12	34	6	0	3.15
Disappointment	1	8	15	20	9	2.47
Up-to-date	2	18	28	5	0	3.32

Figure 4. Participants' impressions towards current UMS website

A comparative analysis was done in order to validate the employment of the Kansei concept into the higher learning institution website design. The mean of the each Kansei word in relation with the current and Kansei-based UMS website were compared in order to check for the improvement on the participants' Kansei responses after employment of KE concept to the web design. The mean of the Kansei words of both website designs are shown in Figure 5 and are illustrated in Figure 6.

Kansei Words	Mean (Without KE Concept)	Mean (With KE Concept)
Convenient	3.30	4.06
Simple	3.40	3.96
Professional	3.26	4.04
Unique	2.89	3.83
Beautiful	3.11	3.77
Efficient	3.23	4.04
Appealing	3.09	3.83
Perfect	2.94	3.77
Creative	2.94	3.91
Messy	2.38	2.62
Waste of time	2.28	2.19
Confusion	2.53	2.57
Lovely	3.04	3.62
Modern	3.15	3.74
Disappointment	2.47	2.28
Up-to-date	3.32	3.74

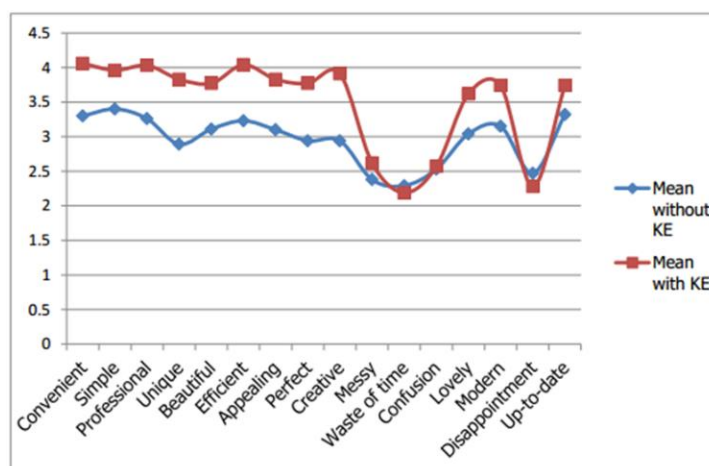Figure 5. Mean of Kansei words in accordance with the websites

Figure 6. Comparative analysis of the mean

The particular higher learning institution websites were compared based on the determined mean of each Kansei (refer Figure 5 and Figure 6 for details) the users' experienced with the website before the application of Kansei concept and after the implementation of Kansei concept into the web design. Seeing the higher mean for the twelve positive Kansei words and lower mean for the two out of four negative Kansei (waste of time and disappointment) towards the web design with the employment of Kansei concept, we can infer that the website with the employment of the KE has induced strong positive Kansei in users and improved the current website. Even though the mean was higher for the two negative Kansei words (messy and confusion) for the Kansei-based website, the mean of the negative Kansei messy fell into the range (2.61–3.40) neutral indicating the participants were neutral and the mean of the negative Kansei confusion fell into the range (1.81–2.60) of score two which is disagree indicating majority of the participants were disagree to the word confusion. The line plot (see Figure 6) shows that the website with the application of the KE concept is one top of the website without KE which is the current website, which signifies that the prototype with KE concept has enhanced the current website significantly by eliciting positive Kansei in users.

Furthermore, the independent t-test was conducted to test the validity of the averages. The test is generally performed to determine whether there is a statistically significant difference between the means in the two unrelated groups [15]. In this research, it compares the means for each Kansei the participants experienced towards the current UMS website and adapted UMS website with the employment of KE concept.

Based on result obtained, there was significant difference between the current UMS website and adapted UMS website with the embedment of the KE concept for all the positive Kansei words. The results indicated that participants were more convenient with the adapted Kansei-based website (M=4.06, SD=0.97) in comparison with the current website (M=3.30, SD=0.72, t (104)=4.54, p (two-tailed) < 0.05, Cohen's D=0.88). As for the Kansei simple, the participants agreed the Kansei-based UMS website is simpler (M=3.96, SD=0.92) than the current website (M=3.39, SD=0.91, t (104)=3.19, p (two-tailed) < 0.05, Cohen's D=0.62). The results also show that there was significant difference for the Kansei professional. The adapted website (M=4.04, SD=1.04) is more professional than the current website without the employment of KE concept (M=3.26, SD=0.92, t (104)=4.06, p (two-tailed) < 0.05, Cohen's D=0.79).

There was significant difference for the Kansei unique with the result showing participants impression to the Kansei unique towards the adapted website (M=3.83, SD=1.17) was higher that current website (M=2.89, SD=0.97, t (104)=4.51, p (two-tailed) < 0.05, Cohen's D=0.88). The independent two-tailed test for the Kansei beautiful shows that there was significant different for the mean of beautiful for adapted website (M=3.77, SD=1.12) and current website (M=3.11, SD=0.82) conditions; t (104)=3.46, p (two-tailed) < 0.05, Cohen's D=0.67. This result indicates that the adapted Kansei-based website is more beautiful that current website. The result of the Kansei word efficient for the adapted website (M=4.04, SD=0.92) and current website (M=3.23, SD=0.75) showing the significant difference for the Kansei efficient (t (104)=4.98, p (two-tailed) < 0.05, Cohen's D=0.97) signifies that the adapted website designed based on the emotional concept is more efficient than the current website with the lack of emotional element.

Moreover, the Kansei-based UMS website (M=3.83, SD=0.98) was proven more appealing than the current website (M=2.94, SD=0.89) from the result pointing the significant difference for the Kansei

appealing (t (104)=4.49, p (two-tailed) < 0.05, Cohen's D=0.80). The mean for the Kansei word perfect towards the Kansei-based website (M=3.77, SD=1.01) claimed to be significantly different in comparison with the current website (M=3.83, SD=0.98) was proven with the t-test result t (104)=3.46, p (two-tailed) < 0.05, Cohen's D=0.87 which showing that the participants agreed the adapted website is perfect than the current website. There was a significant difference between the Kansei-based website (M=3.91, SD=0.97) and current website (M=2.94, SD=0.84) for the mean of the Kansei creative t (104)=5.47, p (two-tailed) < 0.05, Cohen's D=1.06 claiming that the Kansei-based UMS website elicits the feeling creative more than the current website. The adapted website with KE concept (M=3.62, SD=1.10) proved to more lovely than the current website (M=3.04, SD=0.85) with the result obtained from the independent t-test (t (104)=3.06, p (two-tailed) < 0.05, Cohen's D=0.60) stating the presence of the significant difference for the mean of Kansei word lovely.

The participants reported that the Kansei-based UMS website (M=3.74, SD=1.06) more modern that the current website (M=3.15, SD=0.63) was proven with the result shown from the t-test confirming the existence of the significant difference for the mean of the Kansei modern (t (104)=3.45, p (two-tailed) < 0.05, Cohen's D=0.67). There was a significant difference between the adapted website (M=3.74, SD=1.16) and current website (M=3.32, SD=0.70) for the mean of Kansei up-to-date which was confirmed with the result t (104)=2.23, p (two-tailed) < 0.05, Cohen's D=0.43 showing the participants responses who agreed the Kansei-based website up-to-date compared to the current website. As for the negative Kansei messy, the results revealed that there was no significant difference in the mean for the adapted website (M=2.62, SD=1.27) and current website (M=2.38, SD=1.88, t (104)=1.15, p (two-tailed) > 0.05, Cohen's D=0.22) even though the mean of Kansei messy was higher for the adapted website.

There was also no significant difference in the mean of negative Kansei confusion towards the Kansei-based website and (M=2.57, SD=1.20) current website (M=2.53, SD=0.89, t (104)=0.19, p (two-tailed) > 0.05, Cohen's D=0.04) despite the higher mean for the adapted website (Table 4.12). For the Kansei waste-of-time, the result pointed out no significant difference in the mean for the adapted website (M=2.19, SD=1.13) and current website (M=2.28, SD=0.93, t (104)=-0.47, p (two-tailed) > 0.05, Cohen's D=0.09) indicating the difference is by chance and not significant even when the mean of the Kansei waste-of-time towards the adapted website was lower (Figure 9). The independent t-test result signified that there was no significant difference in the mean of Kansei disappointment for the adapted website (M=2.28, SD=1.26) and current website (M=2.47, SD=1.01, t (104)=-0.85, p (two-tailed) > 0.05, Cohen's D=0.17) although the mean was less for the Kansei disappointment the participants felt towards the Kansei-based adapted UMS website.

The results for the negative Kansei words indicating no significant difference between the Kansei-based UMS website and current UMS website showing there is not enough evidence to claim that the Kansei-based website elicits less or more negative emotions compared to the current website. But, the results for the positive Kansei words revealed that there were significant difference between the current website and the adapted website which was designed with the application of KE concept and there is enough evidence to claim the fact that the Kansei-based UMS website elicits positive feelings in users. These results validates the standard Kansei-based web design guideline and declares that the prototype with KE concept has improved the current UMS website significantly by eliciting positive Kansei in users.

Seeing the result that proved the successful improvement on the current UMS website, we can infer that the KE has a capability to assist web designers to recognize the users' emotional needs and transform it into design details as a guideline in order to design a website that satisfies the users emotionally through positive emotional engagement. Therefore, the KE concept can be applied on website design practices. The research findings has proven that the standard Kansei-based web design guideline identified in [1] can be successfully used to design a Malaysian higher learning institution website that emotionally satisfies the users as positive emotions that elicits from a website leads to exceptional user emotional experience which create intense impression on users' long term memory.

4.   CONCLUSION

This research validated the employment of KE onto higher learning institution website by testing the developed Kansei-based prototype in accordance with the identified standard Kansei-based web design guideline in [1]. Users' response towards the Kansei-based UMS website were evaluated with 16 Kansei words. The results have proved that the identified guideline can be used in design practices and validated the application of the KE concept onto higher learning institution website. This research proved that the application of KE concept significantly improved the current UMS website by invoking positive emotion in users and by pleasing the users emotionally. Therefore, the identified standard Kansei-based guideline can be used to design an emotional higher learning institution websites in Malaysia.

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