Enriching the Comfortability Emotion on Website Interface Design Using Kansei Engineering Approach

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Abstract. Today, website has become an important virtual identity to everyone including corporate companies or organizations and is used for many purposes such as electronic commerce and business marketing. The entire website has to be competetive to retain their users and to meet their objective as well as website survival. Stemming from Nielsen research, a website must be a usable website to capture the user's attention. For this reason, many researchers have been working on exploring the meaning of web usability as well as enhance website capability. However, the web usability findings were more on website efficiency which focuses more on functionality and cannot measure user satisfaction. A good website should provide not only useful functions, but also support comfortable interaction between user and website. This new paradigm was defined as web comfortability. This research explored the new paradigm by evaluating the top eight Malaysian websites using Kansei engineering as proven successful product development methodology. As a result, this research will provide design guidelines for any web designer to design any website that can evoke user's comfortability emotion expectations.

Keywords: Web Comfortability, Kansei, Website Interface design.

1 Introduction

Today's website users are greedy in making choices and the market is becoming increasingly complex, as people's need for emotional satisfaction is growing and being acknowledged by producers nowadays [1]. Unfortunately, when designing a product, designers tend to follow their intuition of what the product should be. Consequently, users are dissatisfied since it somehow does not meet their expectations even though the products are functionally reliable and meets a certain standard [2]. According to [3], user`s emotions had been influenced many products to be successful in the market. As a matter of fact, if a product such as a website cannot attract visitors at first sight, it will go out of business even if it's highly helpful and convenient to use [4]. Therefore, all websites need to embed their website's interface design with user`s emotion to influence user's decision making, perception, attention, performance, and cognition [5]. The aspect of emotion in web design and the focus on website functionality and usability can be a major aspect to capture user attention [4] [6]. This study mainly aims towards creating an evaluation of website design from a perspective of online user comfortability by using Kansei Engineering approach. The

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research objectives are (i) to prove that Web Comfortability can be determined by investigate the Web Comfortability evaluation using Kansei Engineering and (ii) to identify relationships between Comfortability value and website design elements through empirical studies. In relation to that, this study was done comprehensively due to the lack of researches on emotional evaluation on websites in terms of Web Comfortability perspective. Additionally, a guide to design such website is lacking and does not help much to captures visitor's comfortability at first sight [2] even though there are massive discussions addressing the emotional aspect of web design [4]. Therefore in this research, the increase in number of researches in the literature for future researcher's reference so that users will feel more comfortable when first surfing the website and will motivate them to stay longer on the website thus leading them to proceed to the next process of actions is set as the benchmark of this Web Comfortability study.

2 Web Comfortability and Kansei Engineering

Websites should capture more on user feeling intention besides usability. The comfortability in physical sites in the real world is important to capture customer attention to the get their service or product. Therefore they believe that applying the same feeling in virtual Web sites will be a key factor to become winner in the battle of Websites to retain users. Therefore, a new paradigm which goes beyond the concept of website usability was defined as Web Comfortability. This concept were highlight on this research as the means to provide not only useful functions, but also the feeling of Comfort in the virtual cyberspace that aims to satisfy the user by providing a less stressed use of a Website [6]. When user feels comfortable, they will retain at the website for longer duration and maybe revisit it in the future. This research was performed by adopting Kansei Engineering in its research methodology as its proven success of the implementation of the developed guideline in designing several prototypes. Kansei Engineering is designed to capture these subjective user insights, synthesize them with the actual product design element, that is to map what Kansei is associated to which element, so that the new product design embeds the user insights [7]. Even though, there are many other engineering methods that developed to meet user requirement and attract them from other products such as Quality Function deployment (QFD), Conjoint Analysis, and Voice of Customer. Therefore, this study chose to use Kansei Engineering than other methods because Kansei Engineering specializes on determining user's implicit desire and combine it with any product or service design characteristic while others only explicit the user's emotion [8].

3 Methodology

Generally Kansei Engineering measurement systems consist of three phases [3] which are (i) Synthesize Specimen, (ii) Synthesize Kansei Words Subject Identification and (iii) Subject Identification. This phase of study has enabled the research to conclude all design elements in a website that is transparent to the user's eye. The first step is to synthesize a process with the purpose to identify the details of design elements in all

websites in the context of what the user's see in the interface or the features of a website. The process will be based on their visible differences in design elements. The design elements of the selected website addressed in this research covers the context of content and layout, which cover design elements such as location, link colour, font colour, navigation pattern and layout pattern. To ensure consistency of the specimens' screenshots and reliability of the selection, the specimens must be defined from a reliability source. Specimen in this study refers to websites selected from Malaysian website ranking which had been browsed by 150,000 Malaysians among 17 million Internet users in of Malaysia from November 2010 until January 2011[9]. These websites were chosen according to its listing over the Malaysian Digital Association report. Malaysian Digital Association (MDA) is a representative body comprising of online reliability publishers, advertising agencies, creative agencies and digital service providers. MDA was formed in 2009 to unify and act as the watchdog for the digital advertising and marketing industry in Malaysia. The lists are;

i. Mudah.my-An e-commerce directory website
ii. Thestar.com.my- The online newspaper website for The Star (English)
iii. Malaysiakini.com- The Malaysiakini News portal
iv. Hmetro.com.my- The online newspaper website for Harian Metro (Malay)
v. Lowyat.net- An Online Forum about computer and technology
vi. Utusan.com.my- The online newspaper website for Utusan Malaysia
vii. Mylaunchpad.com.my- A community for Maxis broadband Subscribers
viii. Kosmo.com.my- The online newspaper website for Kosmo

Next process is synthesizing the Kansei Words. The measurement of visitor's Kansei in Malaysian top eight websites is a psychological measurement which deals with human emotional state. Thus, the most suitable measurement method is by self-reporting system. This is done by using words that describe the emotional expression associated to the website. In Kansei Engineering, this expression is called Kansei Word [3]. After creating the concepts, they would then be presented to the users and rated with the same Kansei words gathered previously to determine if the product has matched the Kansei words. Kansei words are used to represent emotional responses and were synthesized based on brainstorming sessions, web design guidebook, experts, and pertinent literatures about comfortability in websites, with words expressing sensibility and emotions. For this study, the Kansei words were adopted based on [6] research since they are the founders of Web Comfortability concept. This Kansei words were used to develop a checklist that rates websites, and is organized in a 5-point Semantic Differential (SD) scale form. On this Study, the nine Kansei words are Comfortable, Calm, Simple, Beautiful, Easy to understand, Uniform, Interesting, Trustable, and Safe which then were gathered in a measurement checklist. The checklist is developed to be used as an emotion measurement tool. The checklist comprises of emotional keywords that are identified according to the steps described in the following subsections. The emotional keywords are used as the measure of strength of the emotional responses that the subjects feel when looking at the website. The order of the keywords in the checklist is changed 5 times to eliminate bias in the emotion measurement procedure. The last step is subject identification. This study has selected respondents ranging from the age of 20 to 25 years old as they are the second

most common online services user group [10] and meets the suggested subject number in K.E. methodology which is around 30 ~ 50 subjects [3]. Thus, 40 respondents were gathered from Early Child Education Diploma students from College of Early Years Development (CEYD), Damansara Perdana, Petaling Jaya, Selangor, Malaysia. The eight website specimens were shown one by one in a projector layout in a systematic and controlled manner. Participants were asked to rate their feelings using the checklist according to the given scale within two minutes.

4 Result and Discussion

The evaluation analysis of this study were using multivariate analysis to find empirical evidence of the concept of Kansei in website interface design and relations of design characteristic to the Web Comfortability responses. The research calculated the average evaluation value obtained from all subjects from the Kansei Evaluation procedure. The average data was used in the calculation of the multivariate analysis. In analyzing the data, this research performed the analysis according to the flow as described in Table 1. Most of the statistical methods presented in the table are widely used in K.E. studies. The subsequent sections describes in detail the results of each of the types of analysis performed accordingly.

Table 1. Instance of the Average Data.

ID	Comfortable	Calm	Beautiful	Easy to Understand	Uniform	Interesting	Trustable	Safe	Simple
1	3.35	3.05	3.4	3.58	3.08	3.45	3.48	3.6	3.43
2	3.33	3.13	2.98	3.4	3.05	3.3	3.58	3.6	3.1
3	3.5	3.28	3.3	3.7	3.63	3.65	3.7	3.6	3.48
4	4.4	4.08	4.3	4.78	4.2	4.43	3.98	4	4.15
5	3.05	2.83	2.93	3	3.2	3.18	3.03	3.2	3.23
6	3.95	3.83	3.83	4.25	3.9	4.15	4.03	4.1	4
7	3.5	3.3	3.75	3.48	3.38	3.68	3.43	3.6	3.68
8	4.5	4.4	4.33	4.85	4.4	4.65	4.35	4.4	4.43

Principal Component Analysis (PCA), were used to first determine the structure of Kansei which enables the researcher to identify relationships between comfortability value and website design elements. The research performed PC Analysis (PCA) using JUSE-StatWorks/V3.0 to reduce 9 axes of Kansei to smaller number of axes, i.e. two axes. This is to enable the researcher to understand the structure of Kansei easily and the description of subject's response is much constructive. PCA is also used to help identify space in overlapping positive values in each component, which can be used to strategize new target concept of website interface design from the perspective of Web Comfortability. Figure 1 shows a plot of the eigenvalues obtained. As can be seen from the plot, the values of first, second, and subsequent eigenvectors are found from left to right along the horizontal axis of the graph. This helps to determine how many eigenvectors are important for understanding the structure of the data. In this research's case, as can be seen from the plot, the slope becomes quite smooth after the second eigenvector. This means that the first two eigenvectors are sufficient to

characterize all the information. In other words, the plot shows that the overall structure of Kansei could be represented by the first two variables. The remaining variables account for a very small proportion of the variability. This means that they have very less influence to the structure of Kansei and can be ignored. The decisive number was used to calculate PCA to further analyse the structure of Kansei. Two or three types of PCA were calculated as follows, (i) PC Loading and (ii) PC Score. PC Loading was calculated to identify strength and influence of components to the structure of Kansei, determining the relationship between Kansei and specimen, and direction of strategy for future concept of website interface design from the perspective of Web Comfortability using Kansei Engineering. Figure 2 shows result of PC Loading.

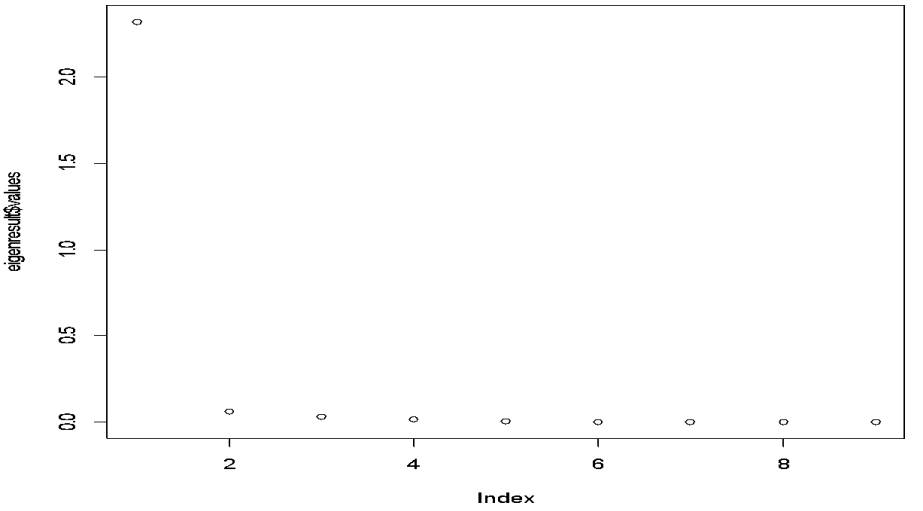

Fig.1. Screeplot of Eigenvalues

For figure 1, it shows a good distribution of variables corresponding to the concept of comfortability can be observed, which proves that the evaluation was successful. It is evident from the plot that all the Kansei words have produced large positive first PC Loadings (x-axis). The area of the right hand side of the chart is corresponding to such Kansei. In other words, all subjects have responded well to comfortability concept. While Figure 3 shows result of PC Score, which made possible the visualization of specimen, which holds strong Kansei. Those located at the edge of the corresponding space of Kansei, have strong meanings. From the figure it could be concluded that specimen D, F, and H highly correspond to comfortability values. In analyzing which design characteristics or design elements influence Kansei responses, Partial Least Square (PLS) analysis was performed. The analysis results enable the design guide to develop a website design that embeds a targeted Web Comfortability concept. The PLS analysis was performed using SAS JMP version 9 and used to discover relationships between Kansei and website design. It is also used to discover influence of design elements in each Kansei, the best and worst value for each design elements, and the kind of Kansei elicited by each specimen. In the research, three sets of data were used for this analysis, and they were; (i) The dependent (objective)

variables, y, i.e. the 9 sets of Kansei responses by 40 subjects, (ii) The specimen, s, i.e. 8 websites and (iii) The independent (explanatory) variables, x, and the design characteristic.

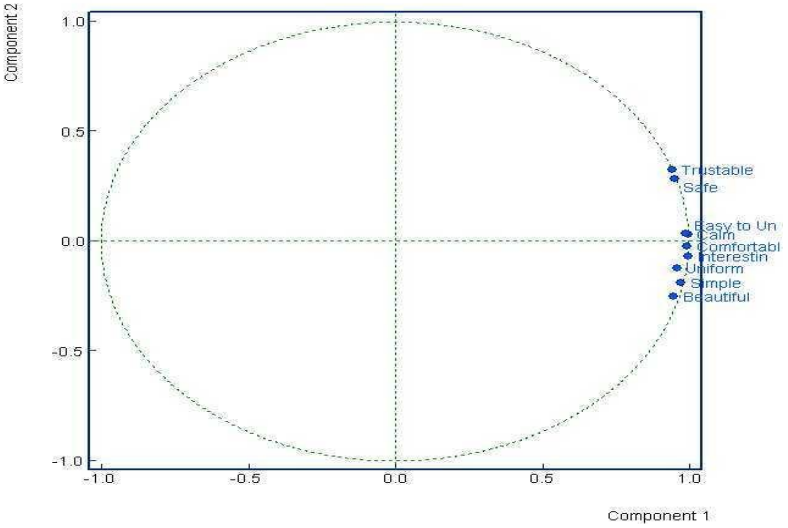

Fig. 2. PC Loading for component 1 and 2.

Fig.3. PC Score for component 1 and 2

Table 2. PLS result.

PLS

Model Coefficients for Centered and Scaled Data

Coefficient	Comfortable	Calm	Beautiful	Easy to Understand	Uniform	Interesting	Trustable	Safe	Simple
Intercept	0	0	0	0	0	0	0	0	0
AL-Upper	0.2220521	0.2335284	0.1603558	0.2221584	0.2012596	0.2101175	0.2603216	0.2526755	0.1753706
AL-Bottom	0	0	0	0	0	0	0	0	0
AL-Distributed	0	0	0	0	0	0	0	0	0
AL-Side	0	0	0	0	0	0	0	0	0
AL-None	0	0	0	0	0	0	0	0	0
FC-Blue	0.0798192	0.0909851	0.0664895	0.0959657	0.0247649	0.0793531	0.17916	0.1704685	0.0523257
FC-Black	0	0	0	0	0	0	0	0	0
FC-White	-0.787184	-0.663304	-0.880474	-0.73005	-0.736128	-0.719576	-0.330269	-0.319058	-0.726685
FC-Red	-0.536178	-0.463662	-0.495908	-0.449829	-0.486372	-0.434982	-0.184196	-0.176711	-0.388542
FC-Others	-0.768928	-0.687644	-0.762267	-0.723042	-0.695646	-0.694575	-0.473316	-0.454422	-0.652967
LP-LeftRight	0.19709	0.1747469	0.2527174	0.1550362	0.1761563	0.1825421	0.0561391	0.0684189	0.1949719
LP-Panaorama	0	0	0	0	0	0	0	0	0
LP-Photo	-0.442322	-0.425612	-0.420965	-0.384277	-0.446005	-0.410769	-0.258051	-0.267829	-0.399382
LP-One Slop	0	0	0	0	0	0	0	0	0
LP-Simmetry	0	0	0	0	0	0	0	0	0
LP-Dispersion	0.1872988	0.1916016	0.128501	0.1750856	0.2061006	0.1743115	0.1542127	0.1523023	0.1561058
LP-Enclosed	0	0	0	0	0	0	0	0	0
LP-Satelite	0	0	0	0	0	0	0	0	0
LC-Blue	0	0	0	0	0	0	0	0	0
LC-Others	0	0	0	0	0	0	0	0	0
NT-Menu Type	0	0	0	0	0	0	0	0	0
NT-Search Box	-0.750941	-0.680643	-0.819668	-0.731505	-0.819319	-0.758753	-0.423526	-0.426095	-0.808752
NT-Image Type	0	0	0	0	0	0	0	0	0
LC-Dark	0	0	0	0	0	0	0	0	0
LC-Light	-0.19709	-0.174747	-0.252717	-0.155036	-0.176156	-0.182542	-0.056139	-0.068419	-0.194972
LC-MixDark&Light	0.19709	0.1747469	0.2527174	0.1550362	0.1761563	0.1825421	0.0561391	0.0684189	0.1949719
NL-Whole Screen	-0.123876	-0.157319	-0.163693	-0.108546	-0.206456	-0.179003	-0.11078	-0.140461	-0.231639
NL-Image Surrounded	0	0	0	0	0	0	0	0	0
NL-In Image	0	0	0	0	0	0	0	0	0
NL-Top & Left	0.1824652	0.224633	0.2144824	0.1776625	0.2301443	0.2390823	0.2368029	0.2615201	0.2749807
NL-Top	0	0	0	0	0	0	0	0	0
NL-Fixed	-0.079819	-0.090985	-0.06649	-0.095966	-0.024765	-0.079353	-0.17916	-0.170468	-0.052326

Note: AL: Ads Location, FC: Font Colour, LP: Layout Pattern, LC: Link Colour, NT: Navigation tool Type, LC: Layout Colour, NL: Navigation Location

Table 3. The Design Characteristic for the Selected Web Comfortability Concept

Comfortability Concept	Web Design element Characteristic
Comfortable	Ads Location – Upper Font Colour – Blue Layout Pattern – Left/ Right Layout Colour – Mix Dark & Bright Navigation Location – Top & Left
Calm	Ads Location-Upper Font Colour-Blue Layout Pattern-Dispersion Link Colour-Mix Dark & Light Navigation Location-to Top & Left
Beautiful	Ads Location-upper Font Colour-Blue Layout Pattern-Left/Right Layout Colour-Mix Dark & Light Navigation Location-Top & Left
Easy to understand	Ads Location-Upper Font Colour-Blue Layout Pattern-Dispersion Link Colour-Mix Dark & Light Navigation Location-to Top & Left
Uniform	Ads Location-Upper Font Colour-Blue Layout Pattern-Dispersion Link Colour-Mix Dark & Light Navigation Location-to Top & Left
Interesting	Ads Location-Upper Font Colour-Blue Layout Pattern-Left/Right Link Colour-Mix Dark & Light Navigation Location-to Top & Left
Trustable	Ads Location – Upper Font Colour-Blue Layout Pattern-Dispersion Link Colour-Mix Dark & Light Navigation Location-to Top & Left
Safe	Ads Location – Upper Font Colour-Blue Layout Pattern-Dispersion Link Colour-Mix Dark & Light Navigation Location-to Top & Left
Simple	Ads Location – Upper Font Colour-Blue Layout Pattern-Left/Right Link Colour-Mix Dark & Light Navigation Location-to Top & Left'.

5 Conclusion

This study has successfully achieved all its objectives. The design requirements for comfortability concept of website within the observed design elements in this research case can be concluded as; (i) Ads Location: Upper, (ii) Font Colour: Blue,(iii) Layout Pattern: Left/Right, (iv) Link Colour: Mix Dark & Light and (v) Navigation Location: Top & Left. Further research involves investigating the guidelines with the interest of cultural effect which is shaped by indigenous characteristics of the different cultural races and might be a useful contribution to the generalization of the Web Comfortability concepts [11].

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