A STANDARD KANSEI-BASED WEB DESIGN FOR MALAYSIAN HIGHER LEARNING INSTITUTIONS

PUNITHA A/P TURUMUGON

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FACULTY OF COMPUTING AND INFORMATICS
UNIVERSITI MALAYSIA SABAH
2018

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UMS
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THESIS SUBMITTED IN FULFILLMENT FOR THE DEGREE OF MASTER OF SCIENCE

FACULTY OF COMPUTING AND INFORMATICS
UNIVERSITI MALAYSIA SABAH
2018

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DECLARATION

I hereby declare that the material in this thesis is my own work except for certain quotations, equations, summaries, definitions, and references, which have been duly acknowledged.

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ACKNOWLEDGEMENT

Accomplishment of my master thesis would not have been possible without the support and assistance from several individuals. I would like to take this opportunity to express my appreciation to all those who gave me the possibility to complete this report. First and foremost, I would like to thank God for his blessings who gave me the strength to undertake this research and finish it successfully.

I would like to express by deepest thanks to my supervisor, Dr. Aslina Baharum, who has been serving as a lecturer in Faculty of Computing and Informatics, Universiti Malaysia Sabah (UMS). As a supervisor since my Bachelor degree, she had been greatly assisting me in research in spite of being extraordinarily busy with her duties. Thank you for the untiring support and endless encouragement throughout the entire journey.

I would like to acknowledge the Ministry of Higher Education Malaysia for funding my research through Fundamental Research Grant Scheme (FRG0436-ICT-1/2016). In addition, I am very grateful to the Postgraduate Center of Universiti Malaysia Sabah for their generosity in funding the Postgraduate Assistance Scheme. Thank you for offering me the educational aid. By offering me the financial aid they have diminished my financial burden which allowed me to concentrate more on my research.

I would also like to convey my gratitude to all the participants who involved in the survey of this research project. The research could not have been successfully conducted without their intense participation and cooperation. I would also like to thank my dearest friends Tan Choon Beng, Emilia Rosa Jimson and Aaron Frederick Bulagang for being attentive and giving me advice. Thank you for the support through the entire process of writing the thesis.

Finally, I would like to express my profound appreciation to my beloved family who were always there for me by providing emotional and financial support as well as for the continuous encouragement throughout the master research. Sincerely, I devote a thousand thanks to my caring family.

Thank you for all your support!

Punitha A/P Turumugon
07 April 2018

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ABSTRACT

Emotions evidently play an important role in the entire human accomplishments as emotions aid in decision making, including Human-Computer Interaction (HCI). Emotion research in the field of HCI 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 identified a standard Kansei-based web design guideline for Malaysian higher learning institutions using Kansei engineering method. 12 different design higher learning institution websites with 16 Kansei words were used to evaluate users' feelings towards the selected websites and were analyzed to identify a standard Kansei-based web design guideline. Current Universiti Malaysia Sabah website was adapted based on the identified standard web design guideline and was evaluated with Geneva Emotion Wheel and Kansei Checklist. A total of 143 participants involved in the evaluation of users' emotional experience towards the Kansei-based Universiti Malaysia Sabah website. The users' emotional experience evaluation has proved that the adapted website does cultivate positive emotional engagement between users with the identification of users' emotion model. The identified guideline with details design elements was successfully justified and can be used in design practices of Malaysian higher learning institutions' website.

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ABSTRAK

STANDARD REKA BENTUK WEB BERASASKAN KANSEI BAGI INSTITUSI PENGAJIAN TINGGI MALAYSIA

Emosi memainkan peranan penting pada keseluruhan pencapaian manusia sebagai bantuan emosi dalam membuat sesuatu keputusan termasuk Interaksi Manusia-Komputer. Kajian emosi dalam penyelidikan interaksi manusia-komputer baharu bermula dan terus berkembang melalui penyiasatan dan pemahaman kesan emosi. Maka, membentuk interaksi pintar antara manusia dan komputer dengan memberi respon secara efektif kepada perasaan manusia. Reka bentuk emosi menjana pengalaman pengguna yang luar biasa bagi laman web sebagai pengalaman emosi yang dapat mencipta kesan yang kuat pada memori jangka panjang. Penemuan saintifik terkini mencadangkan unsur emosi untuk dipertimbangkan dalam mereka bentuk laman web kerana emosi mempengaruhi persepsi, dan konsep individu serta dalam pembuatan keputusan sepanjang interaksi dengan laman web. Antara muka pengguna yang telah direka dengan kurang baik akan menyebabkan interaksi pengguna yang tidak menyenangkan dan akan menimbulkan perasaan tidak puas hati, justeru mengelak dan menghalang pengguna untuk kembali ke laman web tersebut. Ini membuktikan kepentingan penglibatan emosi dalam reka bentuk laman web. Kajian ini telah mengenal pasti satu garis panduan reka bentuk web yang standard untuk institusi pengajian tinggi Malaysia dengan menggunakan kaedah kejuruteraan Kansei. 12 laman web institusi pengajian tinggi reka bentuk yang berbeza dengan 16 perkataan Kansei telah digunakan untuk menilai perasaan pengguna terhadap laman web terpilih dan telah dianalisis untuk mengenal pasti satu garis panduan reka bentuk web yang standard berdasarkan Kansei. Laman web asal Universiti Malaysia Sabah telah diadaptasi berdasarkan garis panduan reka bentuk standard yang dikenal pasti dan telah dinilai dengan Geneva Emotion Wheel dan Kansei Checklist. Sejumlah 143 peserta terlibat dalam penilaian pengalaman emosi pengguna terhadap laman web Universiti Malaysia Sabah yang telah diadaptasi berdasarkan Kansei.. Penilaian pengalaman emosi pengguna telah membuktikan bahawa laman web yang telah diadaptasi ini menanamkan penglibatan emosi positif antara pengguna dengan mengenalpasti model emosi pengguna. Garis panduan yang telah dikenalpasti dengan elemen reka bentuk yang terperinci telah berjaya disahkan dan boleh digunapakai dalam amalan mereka bentuk laman web institusi pengajian tinggi Malaysia.

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LIST OF ABBREVIATIONS

GEW	-	Geneva Emotion Wheel
GUI	-	Graphical User Interface
HLI	-	Higher Learning Institution
HCI	-	Human-Computer Interaction
KE	-	Kansei Engineering
UI	-	User Interface
UID	-	User Interface Design
UM	-	Universiti Malaya
USM	-	Universiti Sains Malaysia
UPM	-	Universiti Putra Malaysia
UiTM	-	Universiti Teknologi Mara
UUM	-	Universiti Utara Malaysia
UTHM	-	Universiti Tun Hussien Onn Malaysia
UMS	-	Universiti Malaysia Sabah
MEDIU	-	Al-Madinah International University

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Designing a good website (Garett *et al.,* 2016) has become noticeably significant as countless tasks are being done over the Internet nowadays. The user interface (UI) of websites is the only bridge that connects a user to the particular computer applications or the web environments and therefore, it is an interaction platform for users and machines (Noori *et al.,* 2015). A good design can optimize website success through the improvement of several consumer dimensions, including information gathering, intention to return to the website, trust, and performance improvement (Lindgaard *et al.,* 2011). Whereas, a poorly designed website may frustrates the users (Aslina *et al.,* 2017) which in turn leads the users to leave from a homepage of the website without visiting the internal pages (Garett *et al.,* 2016). The traditional design of the website UI was designer orientated where only designers' thought and viewpoints were considered in designing websites. But, researchers have proved that users' opinions and viewpoints are remarkably important in designing websites as it have direct impacts on user satisfaction and experience (Noori *et al.,* 2015; Garett *et al.,* 2016). The UI has a vital role in satisfying users and establishing enhanced human-computer interaction (HCI). A success of a website depends highly on user satisfaction and the possibility of meeting users' needs in the best and efficient way where in turn depends on the nature of communication between the user and the interface (Flavian *et al.,* 2009). Therefore, a good web design is particularly important in the development of websites.

Emotion is a psychological approach that needs to be considered in website design in order to provide the user with emotional appeal, a sense of aesthetic, or a positive impression on the website (Cyr *et al.,* 2009). Emotional appeals are contributed to the users through the visual design of a website where it can be delivered through images or colors (Cyr *et al.,* 2009; Lindgaard *et al.,* 2011). Emotional responses are triggered by an ability to engage the user in an online environment which is aesthetically pleasing and emotions are elicited through visual design and interaction design. Previous researchers (Cyr *et al.,* 2009; Zhang, 2013) have argued that a website should be able to encourage emotional engagement and elicit positive impression as it results in higher user satisfaction. Poor interface design results in bad user interaction and experience which lead to high arousal and continuous anxiety of the users (Wang *et al.,* 2001). This results in user dissatisfaction emotion and leads to avoidance to a poorly designed website (Gao, 2013). A website that provides a good impression produces pleasant emotion, whereas, bad impression produces unpleasant emotion (Dahal, 2011).

An emotional based website entices the users to experience enjoyment, involvement, trust, or satisfaction besides being useful and user friendly as emotions are essential to the interpretation of experience (Cyr *et al.,* 2009). Hence, website designers are trying their maximum in designing website that satisfies the users' emotional needs by enhancing the quality of user experience. In order to develop a website that cultivates emotional engagement as well as elicits positive user experience, this study aims to investigate the knowledge of how UI design elements influences emotion and could engineer the emotion into a website design.

Higher learning institutions (HLIs) in Malaysia uses their own website as a platform to provide information for prospective students, current students, faculty and alumni (Mentes & Turan, 2012). However, it is a great challenge to present information on a HLI website in a way that can be easily explored by the users. Websites of HLIs in Malaysia failed to meet high quality standards and researchers indicated the needs for the guideline for HLIs websites (Dominic & Jati 2010).

Therefore, research on the webpage design of HLI websites, exceptionally the appearance of the webpage is essential due to the limited studies done on HLI websites considering the emotional needs of the users (Howard *et al.,* Noori *et al.,* 2015). The primary intention of this research is to explore the needs and emotion of users while using a HLI website.

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 (Lokman *et al.,* 2012) that captivates and satisfies users as emotional products influence product evaluation, purchase decision, and product experience of users significantly (Moktad *et al.,* 2017). 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, this study strives to employ KE technology into web design of HLIs in Malaysia in order to propose a standard Kansei-based web design that can satisfy the users' emotions by invoking emotional involvement. The proposed standard Kansei-based web design justified with a self-report emotional assessment tool, Geneva Emotion Wheel (GEW) and Kansei checklist. GEW allows users to report the emotions they felt towards a product with different intensity levels (Scherer, 2015). Whereas, Kansei checklist includes Kansei words which can used by users to convey their feelings (Lokman *et al.,* 2012). The justified Kansei-based web design can be helpful for designers to design website for Malaysian HLIs that can respond to the emotional needs of users' appropriately.

1.2 Research Background

Emotional design attempts to produce products with emotional appeal that attracts users with positive experience (Carvalho & Oliveira, 2017). Emotional design performs better than functional design (Howard *et al.,* 2014) as it satisfies users'

emotional needs (Desmet & Hekkert, 2007; Ishihara *et al.,* 2011; Lee *et al.,* 2000; Nagamachi & Lokman, 2011; Norman, 2004; Howard *et al.,* 2014). Previous research have proved that emotions influences one's perception and decision making (Han *et al.,* 2007; Lerner *et al.,* 2015; Loewenstein & Lerner, 2003; Lokman & Nagamachi, 2009; Howard *et al.,* 2014). This has inspired proponents (Chuan *et al.,* 2013; Hadiana & Lokman, 2016; Ramachandiran & Jomhari, 2013) to embed emotional aspect in web design as emotion based web design entices users to visit the website with the involvement of positive engagement. Emotional web design has the potential to facilitate the user to have a longer lasting visit to a website which in turn positively affects user loyalty (Cyr *et al.,* 2009; Lokman & Nagamachi, 2009).

It is salient to design a UI of a website that stimulate positive emotional experience in users as the UI is the medium that connects the user with a website (Kim *et al.,* 2003; Li & Zhang, 2005). Affective UI attaches a user with a website emotionally and provokes emotional user experience and satisfies users with their emotional needs. Poorly designed website with the lack of emotional approach arouses negative emotions such as anxious, confusion, and frustration in users. The negative emotions were evoked when the users were having difficulties in recognizing the task and finding the necessary information from poorly designed interface (Ward, 2002) which in turn reduces the possibility of retention to the website. Therefore, it is important to design emotional UI that provokes positive emotions in users such as joy, pleasure and interest.

In order to elicit emotional response from website visitors through emotional design, web designers needs to understand and meet users' affective requirements. Several studies reported that the emotion of users can be linked and converted to design elements of a product to ensure the users experience emotional engagement (Achiche & Ahmed, 2008, 2009, 2011; Howard *et al.,* 2014; Noori *et al.,* 2015). However, the major challenge in emotional design research is understanding users' affective needs and transforming the emotional needs into

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design features that can help to create emotional connection between the users and the product (Lim & Zakaria, 2015). According to Guo *et al.,* (2016) web interface designers are having difficulties in enhancing standard of the web UI that arouse emotional effect on users' experience. Considering the influential of emotional aspect in web design, this study employs KE technique on user interface design (UID) for HLI website in Malaysia. Inspired by previous research on KE technique on web design for e-learning (Hadiana & Lokman, 2016), e-commerce (Hussin & Lokman, 2011; Lokman & Nagamachi, 2009; Lokman *et al.,* 2009), job hunting (Guo *et al.,* 2016), student blogs (Ramachandhiran & Jomhari, 2013), department of university (Howard *et al.,* 2014) and as well as for university websites (Noori *et al.,* 2015), this study tries to transforms users emotions to design elements for UID of HLI website in order to improve the users' emotional experience. A standard Kansei-based web design guideline for Malaysian HLIs is proposed based on the extracted design elements.

1.3 Problem Statement

i. Poorly designed interface leads to bad user interaction and experience with the rise of users' arousal.

Aslina *et al.* (2017) have proved that the poor interfaces leads to bad user interaction that makes users feel inconvenient causing difficulties in finding tasks straightforward and they are uncertain for a much longer period about how to find the particular required information provoking confusion and their arousal remains high, where in turn having continuous anxiety.

ii. Displeasing user experiences with a websites elicits dissatisfaction emotion where consecutively results in avoidance and prevents revisit to the website.

Gao (2013) found that if a user experiences an unpleasant event or fails to achieve a goal, an outcome-desire conflict would occur which results in a particular emotion dissatisfaction which in turn stimulates the intention of avoidance.

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iii. Insufficient approaches to intensely understand users' emotional needs on the website design.

Rudnicka (2009) has demanded that more advanced measurement and statistical methods should be employed to help understand how exactly the emotional response towards website elements is conceived.

1.4 Research Questions

i. What are the users' emotional requirements on web design of HLIs' website in Malaysia?
ii. How to design website of HLIs that evokes emotional engagement?
iii. Does the adapted HLI website elicit positive emotions that lead to users' satisfaction?

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1.5 Research Objectives

i. To identify a standard Kansei-based web design for Malaysian HLIs using KE technology.
ii. To design a HLI website based on identified standard Kansei-based web design.
iii. To evaluate the users' emotion towards Kansei-based HLI website using GEW and Kansei checklist.

1.6 Research Scope

This research study aims to identify a Kansei-based web design for Malaysian HLI. In order to achieve this goal, this study has identified the research scope which are as stated below.

i. This research focus on the users of the Malaysian HLIs' website as subjects.
ii. This research focus on the web design of Malaysian HLI.
iii. Web design focus on the adaptation of Universiti Malaysia Sabah (UMS) website.

1.7 Organization of Report

Chapter 1 is the introduction of the research where the chapter will explain briefly about the introduction, research background, problem statement, research questions and research objectives of the research.

Chapter 2 comprises literature review of this research. Previous studies and findings related to this research are discussed in details in this chapter. The chapter briefly explains the definition of emotion by proponents. Arguments of researchers on emotions in web design and emotional design are explained in this chapter as well. Furthermore, literature on KE technology and Kansei related studies are included and discussed as KE technique is a unique approach that can be used to understand users' affective needs and transform the emotions with products design features in order to invoke emotional experience in users as well as to satisfy the users emotionally (Lokman *et al.,* 2012). A popular emotional evaluation tool, GEW was explored thoroughly and reviews of GEW by practitioners are discussed in the last part of this chapter.

Chapter 3 broadly describes the research methodologies, which comprises of three phases; each phase to accomplish each objectives of this research. Phase I was conducted to achieve the first objective, which is to identify a standard Kansei-based web UID for HLIs using KE technology. KE method was utilized in Phase I and a standard Kansei-based guideline were proposed. Phase II was implemented to fulfil the second objective, which is to design a HLI website based

on standard Kansei-based web design. UMS website was adapted based on the identified standard emotional web design in Phase I. Consequently, Phase III was executed to attain the last objective of this research, which is to evaluate users' emotions toward the adapted HLI website using GEW and Kansei checklist. In this phase, UMS website was evaluated for users' emotional experience using GEW and Kansei checklist. This phase justifies the standard Kansei-based web UI guideline that was identified in Phase I.

Chapter 4 reports the findings of each phases that were conducted in this research. Data collection and data analysis were carried out in Phase I to identify standard Kansei-based web UID for HLIs in Malaysia. In Phase II, UMS website was adapted according to the identified guideline in Phase II. Whereas, in Phase III, data collection and analysis was executed in order to evaluate users' emotional experience on adapted website. The findings of Phase I, II, and III are discussed in detail in this chapter.

Chapter 5 concludes this research with research summary along with the contributions and work that can be furthered as future work. Reference of the paper referred and the appendices are included as well as the last part.

1.8 Conclusion

Seeing the importance of emotional embedment in web design and the need for the standard web design guideline for HLIs in Malaysia, this research tries to employ KE method to identify a standard Kansei-based web design for Malaysian HLIs. The standard Kansei-based guideline will be validated to be used in design practices of websites for HLIs in Malaysia. This research tries to fulfill the research aim which is to study the users' emotions towards the HLIs in Malaysia through the three objectives which were derived from the research questions to solve the