

## CHAPTER

## 4

### RESEARCH METHODOLOGY

#### 4.1 Overview

This chapter provides detail to the research methodology employed in the research. Following the discussion of issues in emotional aspect in website design and the need to engineer emotion in previous chapters, this chapter describes how to enable the engineering of emotion in website design. The developed research framework includes phases involving the adoption of Kansei Engineering (K.E.) methodology presented by this research in Chapter 3. The engineering of emotion in Website UID encompasses the conceptualisation of emotional responses in Website UID, analysis of design requirement to develop website that embeds target emotions, development of prototypes and testing to justify the validity of the association of design requirement to emotion. The success of the implementation of this research method will provide evidence that K.E. can be used to engineer emotion in website design. In this research, the conceptualisation of emotional responses and requirement analysis are performed in the Exploratory Study phase, which will be described in detail in Chapter 5. The development and testing phases are performed in the Confirmatory Study phase, which will be described in Chapter 6.

#### 4.2 The Research Method

After outlining the theoretical background to the research in earlier chapters, this chapter presents the research method to enable the engineering of user's emotional responses and design elements in Website UID. The outcome will be used

to formulate design guideline for the development of website that embeds target emotion, in the effort to capture visitor's attention. Figure 4.1 shows the research method.

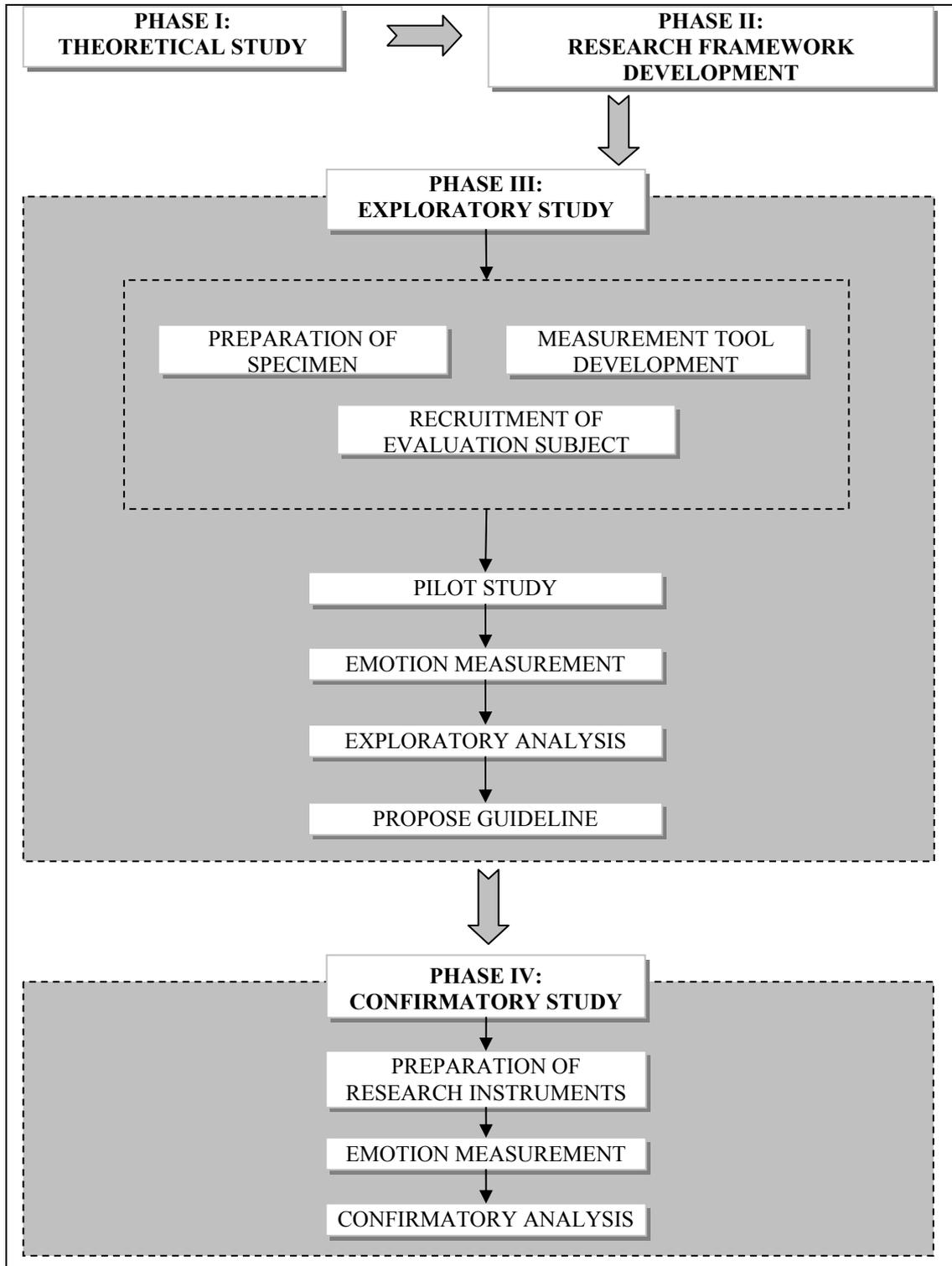


Figure 4.1: The Research Method.

This method is developed to enable the measurement of user's emotional responses to Website UID, identification of the design elements from user's view point, investigation of the underlying relationship between the emotional responses and design elements, and development and validation of guideline to the design of Kansei Website.

The activities in this method are grouped into four phases, i.e. 'Phase I: Theoretical Study', 'Phase II: Research Framework Development', 'Phase III: Exploratory Study' and 'Phase IV: Confirmatory Study'. The method was developed to conform to the research scope and the availability and accessibility of research instruments. Further descriptions of all activities are described accordingly throughout this chapter.

### **4.3 Phase I: Theoretical Study**

The phase begins with review of previous literatures on general concepts and issues regarding user experience, web design, e-Commerce website evaluations and emotional aspect of web design. This phase enables the identification of potential research issues which require further investigations. The details of this phase were described in Chapter 2.

From this phase of study, the research has identified that there has been great transition in the design paradigm of website. From the heavy concentration to functionality and usability (Backlund 2001; Garret, 2003; Ivory & Hearst, 2001; Krug, 2000; Lederer et al., 1998; Lam, 2001; Lee et al., 2003; Marcus & Gould, 2001; Nielsen, 2000; Powell, 2002; van Welie et al., 1999; Zhang et al., 1999; Veen, 2001), research have paid increasing interest in the aspect of emotional user experience towards Website UID (Kim et al., 2003; Lee et al., 2001; Li & Zhang, 2005; Okada & Tejima, 2003; Siu & Ho, 2005). The gap in terms of emotional design requirement for the production of website that embeds target emotion is evident.

Hence, this research is performed to pursue a method to engineer user's emotion in Website UID. This research has reviewed several potential methods that enable the evaluation of emotion. Among the presented methods that have been used to evaluate user experience, this research pays interest to K.E. methodology since it enables the quantification of emotion, and associate the emotion with design specifications. As a result, a new product that incorporates the emotional user experience can be designed. Thus, in this research K.E. methodology is adopted to enable the engineering of emotion to Website UID.

#### **4.3.1 Structuring K.E. Method into Kansei Design Model**

From the review of K.E. literature, this research has identified a gap in terms of description of steps to be performed in implementing the method. There were many types of techniques in different kind of implementation, but the description of the methodology is largely narrative. To fill in this gap, based on previous literatures involving the adoption of K.E., setting the foundation to the basic principles of K.E., this research models the K.E. methodology into Kansei Design Model. In structuring the model, careful attention was given to the capacity and availability of infrastructure, facility and cost. The structured model employs self-reporting system in the measurement of Kansei, allowing K.E. implementation in a basic environment setting where no special equipments and skills are required. With this model, as shown in Figure 4.3, audience are offered a structured guide to the implementation of K.E.

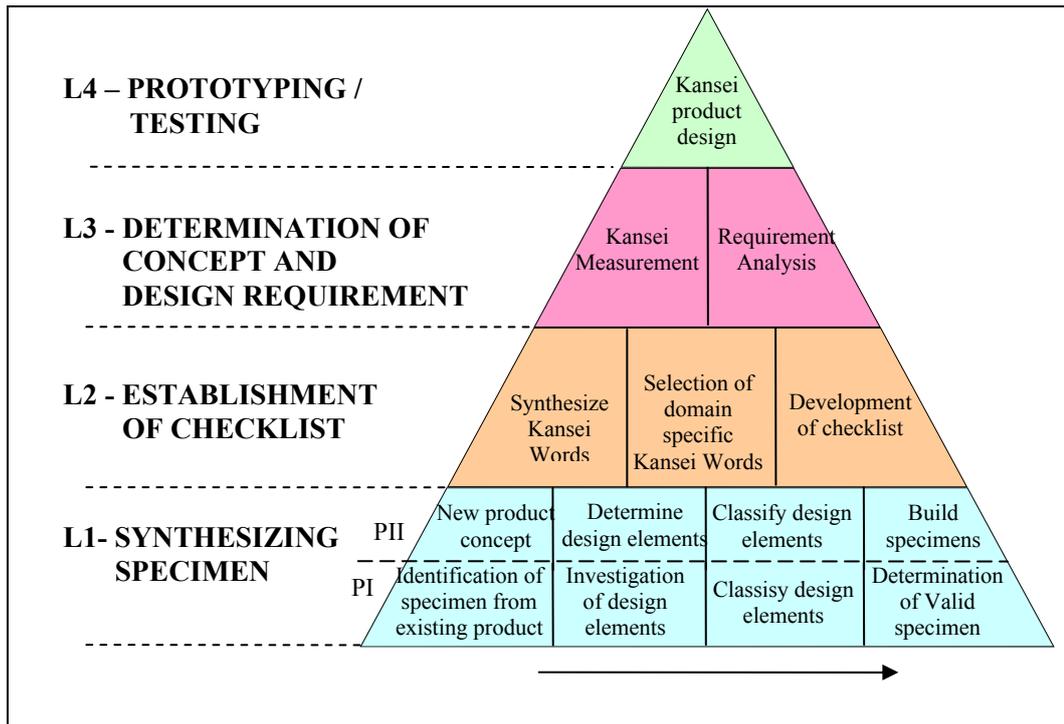


Figure 4.2: Kansei Design Model.

The model is developed to provide a systematic approach to the implementation of K.E in designing Kansei product. The presented model is a useful mechanism for industries, designers, academic researchers and other stakeholder in discovering the concept of emotion and design requirements for the development of product that embeds target emotion in its design.

The model is divided into four levels, L1, L2, L3 and L4. The followings describe details of each level:

### 1. L1 – SYNTHESIZING SPECIMEN

L1 is the level of synthesizing specimen. The level is sub-divided into two different procedures, PI and PII. These procedures are different in terms of the process in synthesizing specimen. There are four steps in both PI and PII, which are essential in determining valid specimen. The procedure can be decided according to one's objective.

**PI** is applicable to products that already exist in the market, and maker needs to improvise the design. The procedure begins with collection of specimens with visible differences from existing product in the market within a specific domain. K.E. emphasizes on controlling the domain, as consumer's response is unique with different domain (Ishihara, 2005), and the resulting structure of emotion will be different. Previous K.E. studies have suggested different techniques in determining specimens from using actual product or by the picture of the product. The choice of specimen depends on its suitability to the experimental design.

Then, the following procedure is the investigation of design elements in all specimens. Determination of the number of design elements depend on the level of detail that need to be included in one study. Controlling the number of elements enables more objective measurement. On the other hand, including all identifiable elements from the consumer's point of view could result a more accurate measurement. The latter is believed to offer higher accuracy of the resulting design requirements, as consumers are assessing a product as a whole. The more the detail of design elements are identified the higher the possibility to match the consumer's emotional responses. This research suggests that, to efficiently match consumer's emotion and design elements that influence the emotion, one should not control the number of design elements.

The next procedure is the classification of design elements. The identified design elements need to be analysed to investigate all possible value that could be assigned to the kind of product. The design elements are the common characteristic of all specimens such as background colour, body shape and text alignment. The value is the specific attribute to a particular design element, such as red as a background colour to specimen A, and blue as a background colour to specimen B. The process is crucial since the findings will be the essence in the success of Requirement Analysis stage.

Finally, based on a set of rules, valid specimen for Kansei Measurement can be synthesized from all the initial specimens.

**P11**, on the contrary, is designed for application when a company or designer plans to design a new concept of product based on their objectives. This is applicable to the development of product that has yet existed in the market. In this case, designers and experts have to determine product specification based on their inspiration in relation to the target concept. For instance, to design an 'elegant' mobile phone, the process begins with synthesizing words related to the concept of elegant within the domain. Then, designers or experts have to determine design elements that have connection with 'elegant' feeling, classify the design elements and build a number of prototypes based on their technical specification. This prototype will then be used as specimen at the following level of the model, to confirm their design with consumers.

## 2. **L2 – ESTABLISHMENT OF KANSEI CHECKLIST**

L2 describes the preparation and establishment of a checklist. The level is divided into 3 steps, which are; i) Synthesizing Kansei Words (KW), ii) Selection of domain specific KW, and iii) Development of checklist. The level synthesizes KW, from larger number of possible KW to focused KW which highly related to the product domain. KW can be adjective or noun such as 'calm', 'sophisticated' and 'natural'. These KW can be synthesized from pertinent literatures, technical magazines, or even consulting experts. Finally, utilizing the KW, L2 produces a checklist in the form of Semantic Differential scale, as a measurement tool for Kansei Measurement in the next level.

## 3. **L3 – DETERMINATION OF CONCEPT AND DESIGN REQUIREMENT**

L3 describes determination of the concept of Kansei and design requirement. This level is divided into 2 steps ; i) Kansei Measurement, ii) Requirement Analysis. In the first step Kansei Measurement is performed using expert or ordinary consumers as test subjects. The subjects are required to rate their impressions towards product specimen into the checklist. Results from the evaluation will be analysed to investigate relations between subject's Kansei and design elements identified in L1. The outcome can be used to determine design requirement for the development of Kansei product.

#### **4. L4 – PROTOTYPING / TESTING**

L4 describes prototyping / testing. In this final level, the results from L3 will be used as foundation to build prototype of Kansei product. The process will involve the employment of the concept of Kansei and design requirements identified in L3. To develop a successful Kansei product, expert's creativity should be included in the design process. Testing must be performed to validate the design requirements.

### **4.4 Phase II: Research Framework Development**

The second phase is the Research Framework Development stage. Here, the research incorporates the use of K.E. methodology that builds up the foundation to the research framework. The research has reviewed previous literatures involving the adoption of K.E. in the industry as well as in the academia. In Chapter 3, the definition of Kansei, the detail methodology, the usefulness, success stories and possible implementation in Website UID are discussed.

Earlier in this chapter, this research structured the K.E. methodology into Kansei Design Model to streamline the method which was largely narrative. The core phases involving the procedure of engineering emotion in the developed research framework are derived based on this model. This section describes the framework.

## 4.5 Phase III: Exploratory Study

The exploratory study involves all the essential stages in the adoption of K.E. in the research. This phase is founded to the Kansei Design Model introduced by the research earlier in this chapter. The exploratory study begins with preparation of instruments, i.e. the specimen, evaluation subject and measurement tool. Table 4.1 summarizes the instruments used in this phase.

**Table 4.1: Exploratory Research Instrument.**

Instrument	Quantity	Source
Specimen	35	Existing online clothing websites
Evaluation subject	120	Students from the researcher's university
Measurement tool	40	Emotional keywords from literature

In conformance to the rules specified in K.E., developing the right instruments is crucial to ensure the success of engineering emotion in website design. Failing which will lead to an invalid result. This section describes the process that involve in the derivation of each instruments.

### 4.5.1 Preparation of Specimen

Specimen identification phase involves four stages. They are:

- i. Identification of Initial Specimens.
- ii. Investigation of Design Elements.
- iii. Classification of Design Elements.
- iv. Finalizing Valid Specimen.

This phase of study has enabled the research to conclude all design elements in a website that are transparent to the user's eye. These elements work as a guide to this research to classify all design elements and its values in each specimen. The

elements are carefully investigated and analysed to identify valid specimen. These elements will be used during the investigation of relations between emotion and design element, towards the formulation of design requirements for website that embeds emotion.

#### **4.5.1.1 Identification of Initial Specimen**

Specimen in this research refers to websites selected from existing online clothing websites. Online clothing is selected as the focused domain due to its mounting interest among clothing consumers (Johnson et al., 2003; Rodriguez, 2004; Sullivan, 2007; Smith, 2006), and the visual design of online clothing is assumed to be diversified. Previous literature have classified the context of web design into content, layout, technology, delivery, and objective (Garrett, 2003; Powell, 2002; Veen, 2001). The design elements addressed in this research covers the context of content and layout, which cover design elements such as product presentation style, placement of buttons, tabs, images, and the visual design such as background, colour, and typography.

The specimen identification process begins with selection of initial website from the existing online clothing websites. 163 websites were selected as initial specimen based on their visible design differences in both content and layout context, i.e. colour, typography, layout and etc. These websites were chosen according to its listing over the Apparel Search website (<http://www.apparelsearch.com>). Apparel Search is the leading online clothing directory and the categorization structure of the kinds helped the research to select websites specimen within its scope.

In the process identifying initial specimen, a set of control condition was followed, and the condition is shown in Table 4.2. The controls were defined in order to ensure consistency of the specimens' screenshots and reliability of the selection. The complete listing of the selected initial website specimen can be found in Appendix 1.

**Table 4.2: Control Condition in Identification of Initial Specimen.**

No.	Item	Condition
1.	Website criterion	Visible differences in design
2.	Focus context	Design content and layout
3.	Screen resolution	1024 x 768 pixels
4.	Access / download date	1 – 30 June 2006
5.	Platform	Win32
6.	Operating System	Windows XP
7.	Colour quality	32 bit
8.	Browser	Opera 9.00
9.	Browser control	Encoding = Windows-1252 Default language = English, [en] Default Text size = Medium Colours = Windows 32 bit colour
10.	Encoding	Windows-1252
11.	Language	English
12.	Default text size	Medium (3 pt)

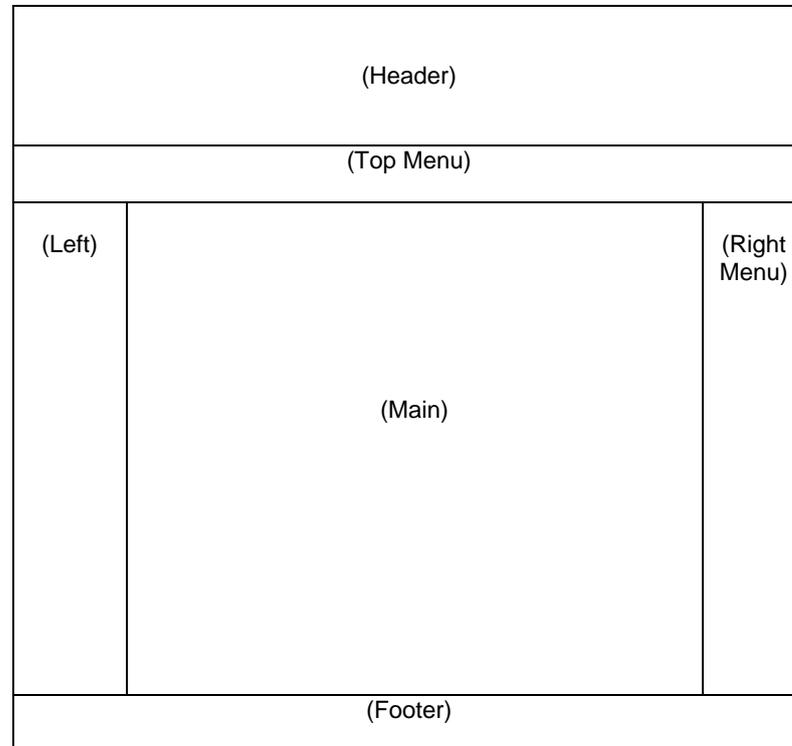
All websites were investigated in reference to some criterions within the structure of a website. The following subsections describe the criterions.

#### **A. Basic Webpage Layout**

The basic layout of a webpage (w3schools.com) referred to in the empirical procedure is as shown in the following Figure 4.3. Header refers to the head section of a web page.

In the layout, header section is located at the top of the page, top menu is the menu located right below the head section. Left section is located at the left pane, where if exist, left menu resides here. Right section refers to the right pane, where if exist, right menu resides here. Footer section is located at the bottom of the page, where if

exist, footer menu resides here. Main section refers to the main body of the webpage, where the main content of the website resides here. Webpage refers to the pane where all the above resides onto.



**Figure 4.3: Basic Webpage Layout.**

## **B. Generic Font Families**

In examining font face, observations were done based on typesets according to the generic font families, according to World Wide Web Consortium website (w3c.org) and Code Style website (codestyle.org). They described five typical font families used in website design, i.e. 'serif', 'sans-serif', 'cursive', 'fantasy' and 'monospace'. Table 4.3 presents classification of font families, description of each families and their examples.

**Table 4.3: Font Family Reference.**

<b>Family</b>	<b>Description</b>	<b>Example</b>
SERIF	Have finishing strokes and typically proportionately-spaced. They often display a greater variation between thick and thin strokes than fonts from the 'sans-serif' generic font family.	Book Antiqua Bookman Old Style Garamond <b>Georgia</b> Times New Roman
SANS-SERIF	Stroke endings are plain, typically proportionately-spaced. They often have little variation between thick and thin strokes, compared to fonts from the 'serif' family.	Arial Arial Black Arial Narrow Arial Unicode MS Century Gothic Lucida Sans Unicode Tahoma Trebuchet MS Verdana
CURSIVE	Have either joining strokes or other cursive characteristics beyond those of italic typefaces. The characters are partially or completely connected, and the result looks more like handwritten pen or brush writing.	Comic Sans MS <i>Lucida</i> <i>Handwriting</i>
FANTASY	Fonts are primarily decorative while still containing representations of characters.	<b>Haettenschweiler</b> <b>Impact</b>
MONOSPACE	All characters have the same fixed width. The effect is similar to a manual typewriter.	Courier New Lucida Console

### C. Font Size

HTML font size as described in the Web Standards from World Wide Web Consortium (W3C) (w3c.org) is used as reference in determining font sizes on all specimens. Table 4.4 illustrates the font sizes.

**Table 4.4: Font Size Reference.**

<b>Specimen</b>	<b>Size</b>	<b>Heading Level</b>	<b>Class</b>
text TEXT	1 (8 pt)	H6	Small
text TEXT	2 (10 pt)	H5	Small
text TEXT	3 (12 pt)	H4	Small
text TEXT	4 (14 pt)	H3	Medium
text TEXT	5 (18 pt)	H2	Medium
text TEXT	6 (24 pt)	H1	Medium
text TEXT	7 (36 pt)		Large

#### **D. Page Orientation**

Page orientation in this research refers to types of frame set in a web page (w3c.org). Frames are used to organize content from top to bottom and left to right. Page orientation referred to in this research can be seen in Table 4.5.

**Table 4.5: Page Orientation Reference.**

Page orientation					
Banner and Contents (B_C)		Footnotes (FN)		Header, Footnotes and Contents (H_F_C)	
Contents (C)		Horizontal Split (HS)		Vertical Split (VS)	
Footer (F)		Nested Hierarchy (NH)		None	
Header (H)		Top-down Hierarchy (TD-H)			

## E. Colour Basics

In examining colours on all specimens, a preliminary study was conducted to identify colours that are used in all the initially identified 163 websites. The colours were then grouped into a colour palette, and the grouping is shown in Table 4.6.

**Table 4.6: Colour Basics.**

PINK 255,192,203 FFC0CB	WHITE 255,255,255 FFFFFF	RED 255,0,0 FF0000	GREEN 0,128,0 008000
YELLOW 255,255,0 FFFF00	HOTPINK 255,105,180 FF69B4	PEACHPUFF 255,239,213 FFDAB9	BLUE 0,0,255 0000FF
CHOCOLATE 210,105,30 D2691E	GOLD 255,215,0 FFD700	FUCHSIA 255,0,255 FF00FF	GRAY 128,128,128 808080
BLACK 0,0,0 000000	BROWN 165,42,42 A52A2A	ORANGE 255,165,0 FFA500	PURPLE 128,0,128 800080

Described on the first row of each palette is the generic name of the colour. The second row is the RGB value in 8 bit format, and the third row is the hexadecimal code in accordance to web colour basics specified by W3C (w3c.org).

The description of colours is selected from web colour names from Robin's web colour palette (Robins, 2006). From the sixteen colours, web designers have options to modify the value or hue and saturation of the colour to create variations. For example designers might want to use the colour blue and change it from light blue to dark blue. It is also possible to modify the intensity which controls how bright or dull a particular colour appears. However, in this research, these two dimensions of colours are regarded as static. In this research context, every colour lighter than the specified colour in its dimension was considered as light colour, and everything darker than the specified colour in its dimension was considered dark colour.

#### **4.5.1.2 Investigation of Design Elements**

Each criterion over the basic webpage layout described in earlier sections were used as basis during the empirical investigation of all design elements composed in the build up of all the 163 specimens. The design elements were then analysed to investigate all possible elements that are transparent to visitor's eye. As a result from the empirical investigation, a total 77 design elements were identified. These 77 design elements are to be used as basis in investigating values that are assigned to each design elements on every specimen.

Table 4.7 summarizes all the identified design elements, classified to each section, in the 163 specimens that are transparent from the viewpoint of website visitors.

**Table 4.7: Design Elements in the Initial Specimens**

Section	Design elements
Body	Background Colour, Background Style
Page	Shape, Menu Shape, Style, Orientation, Colour, Size, Border Existence
Header	Existence, Background Colour, Background Picture Existence, Font Size, Menu Existence, Menu Link Style, Menu Background Colour, Menu Font Size, Menu Font Family, Menu Font Style
Main	Background Colour, Background Picture Existence, Shape, Adv. Existence, Text existence, Text Alignment, Font Colour, Font Size, Font Family, Font Style
Top Menu	Existence, Location, Link Style, Background Colour, Font Colour, Font Size, Font Family, Font Style
Right Menu	Existence, Style, Font Size
Left Menu	Existence, Link Style, Background Colour, Font Colour, Font Size, Font Family, Font Style
Footer	Existence, Menu Existence, Menu Link Style, Menu Background Colour, Menu Font Colour, Menu Font Size, Menu Font Family, Menu Font Style, Shape
Picture	Existence, Size, Dimension, Focus, Arrangement, Style, Image used?, No of People in 1 Picture, Body Representation Type, Face Expression, Face Facing?, Empty Space?, Other Images?, Product Display Style, Product Try On?, Product View Style
Others	Dominant Item, Artistic Menu used?, Discount Advertisement Existence, Logo Existence, Logo Location

#### 4.5.1.3 Classification of Design Elements

In the context of the basic layout of specimen, each specimen may comprise all or part of the design elements within each section. The specimens may also include pictures or other elements such as artistic menu and logo.

Based on the identified design elements from the previous procedure, this research investigated each value assigned to all the design elements over each specimen. The value is the characteristic that form the different appearance of website design. Table 4.8 shows example of design element and value that are being addressed.

**Table 4.8: Example of Design Elements and Values.**

Design element	Value
Page Background Colour	Blue
Left Menu Style	Button
Main Text Size	Medium

A sample of the result of the classification design elements and values that make up each of the initial 163 specimen can be found in Appendix 2. As a result from the investigation, the research has identified a total of 77 design elements and 249 values over all of the specimens. This is a large amount of data, and could complicate the next investigation process.

To simplify the organization of the huge amount of data, the research organized all the identified design elements and values into specimen by design elements matrix. The research carefully investigates each specimen to check the design elements and values that make up the appearance of each specimen. When a value of design element matched the investigated specimen, the matrix is checked. The process was repeated until the investigation of the design elements of all 163 specimens was completed. Although the construction of matrix does not substantially reduce the amount of work, which anyway impossible, it offers easy management of the knowledge by providing orderly data organization. The matrix data also alleviates the screening procedure, involving 249 values in 163 specimens, in order to identify valid specimen. A sample of the matrix is shown in Table 4.9, and more samples of result can be found in Appendix 3.

**Table 4.9: Sample of the Matrix of Specimen vs. Design Element.**

Specimen No.	Page Bg Colour						TopMenuLocation			FontSize			PictureSize			...
	None	Green	Blue	Grey	Brown	Mx	Left	Right	Centre	S	M	L	S	M	L	
1	✓							✓		✓			✓			
2		✓							✓			✓				✓
3					✓				✓	✓			✓			
4				✓			✓				✓		✓			
...																
163				✓			✓				✓		✓			

To contribute an idea of comm on practice in web de sign, the d ata were then statistically analysed acco rding to each central tendency. Elem ents are considered dominant whenever it is higher than the central tenden cy, in this case, the m ean. Pareto Chart were plotted for each design elements of websites, and sample of Pareto result can be found in Appendix 4. From the analysis, it can be observed that m ost online clothing websites did not em ploy visual technologies extensively. The results lead to the assumption that although employment of sophisticated visual technologies can enormously enhance the context of visual appeal in web design, when it come to user’s concern, performance of the webs ite may overrule (Patel, 2004; Rodriguez, 2004). This invokes the issue of balanc ing factors of website appeal and performance.

The result have strengthen the research attempts, which targ et to offer website tha t capture vis itors’ atten tion at first sight by offering em otional engagem ent to the website. As suggested in previous literature, consumers make decision based on their feelings or emotion (Bhattacherjee, 2001; Constantinides, 2004; Griffith, 2002, Ki m et al., 2003; Li et al., 2001; Norm an, 2002; Russell 2003; Tractinsky 2004). Therefore, designing website that e mbeds target em otion can be seen to offe r emotional engagement, and thus influence consumers’ decision.

#### 4.5.1.4 Finalizing Valid Specimen

Results from the matrix of specimen and design elements need to be examined according to a set of rule as described in Figure 4.4, in conformance to K.E. methodology. The rule must be carefully followed so that the intended statistical calculation can be done properly at later stage.

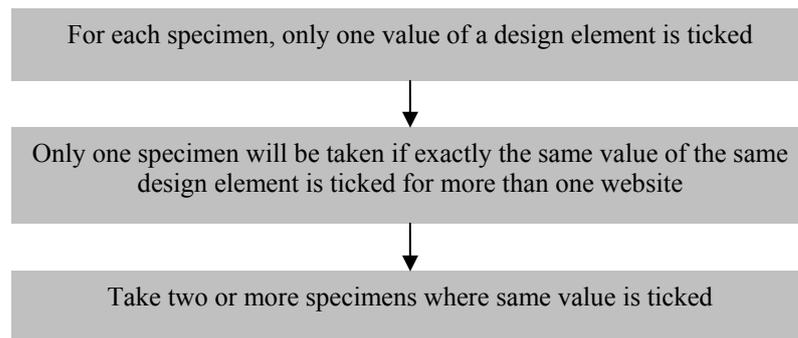


Figure 4.4: Rules to Identify Valid Specimen.

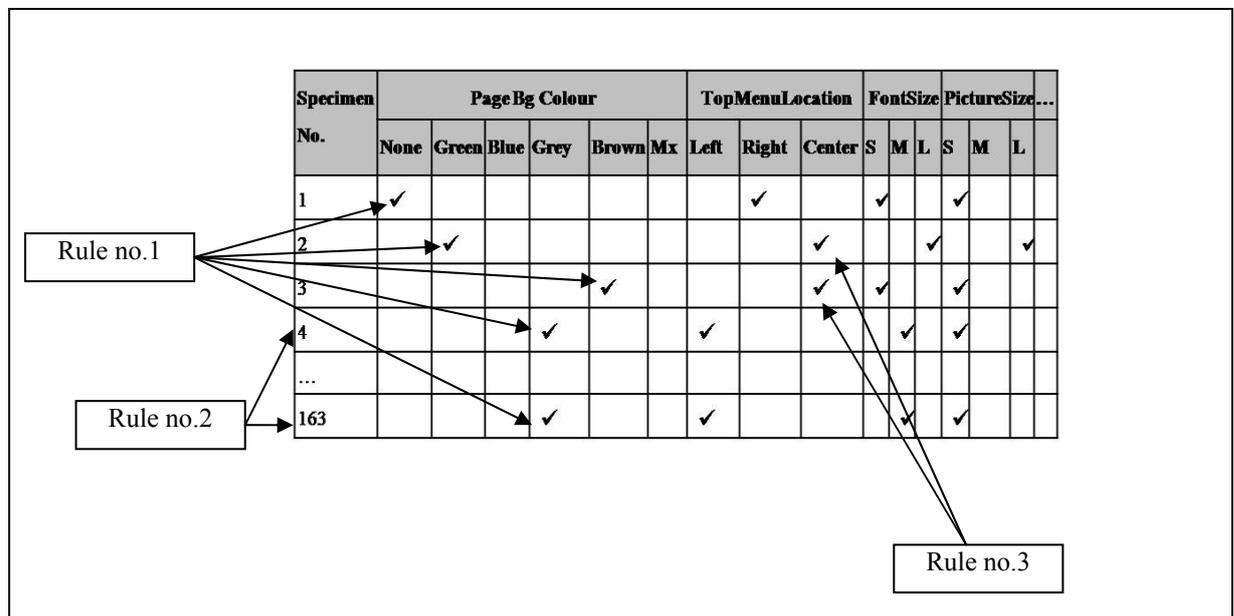


Figure 4.5: Rules in Screening Specimens.

Figure 4.5 illustrates how the rules are executed in screening the valid specimens. For example, conforming the first rule, for element of ‘Page Bg Colour’ every specimen must only have one value checked. Secondly, specimen no. 4 and 163 are having exactly the same result of design element and value, so only one can be included as valid specimen. Finally, two or more specimens having same design element’s value, e.g. specimen no 2 and 3 that have element of ‘Top Menu Location’ as ‘Centre’ in both specimen, must be included. This simple set of rules enabled this research to narrow down the number of specimen into smaller number, to be used as valid specimens in the Emotion Measurement procedure. Although the rules are simple, but the work of screening of 249 values over 163 specimens was enormously demanding. With careful treatment, 35 website specimens were finally determined. These specimens were then coded numerically from one to thirty-five, and snapshot of the specimens are shown in Table 4.10. Samples of better picture of specimens to be used in the empirical studies can be found in Appendix 5.

**Table 4.10: The 35 Valid Specimen.**

ID	Specimen								
1		8		15		22		29	
2		9		16		23		30	
3		10		17		24		31	
4		11		18		25		32	
5		12		19		26		33	
6		13		20		27		34	
7		14		21		28		35	

#### 4.5.2 Recruitment of Evaluation Subject

Evaluation subjects for the empirical study were employed with equal distribution of fifteen male and female participants of thirty people in four groups. A total of 120 undergraduate students from the Faculty of:

- Information Technology and Quantitative Science Faculty (IT)
- Architecture, Building, Planning and Survey Faculty (AD)
- Business and Management Faculty (BM)
- Engineering Faculty(ER)

from the researchers' university were recruited for the Emotion Measurement procedure. All of them are in their 20s, experienced Internet users and familiar with online shopping. The suitability of the employment of young students as subjects in this research is supported by the literature in Information System studies that suggest students and youngsters as representing the majority of e-Commerce consumers (Liu et al., 2005; Lu & Lin, 2002; Shang et al., 2005 as in Saarenpää & Tiainen (2005)). Therefore, they are the best demographic group to be studied on. On the other hand, the population of subjects in this research is decided based on the suggested number in K.E. methodology. Although the population of test subjects varies from minimal number such as five to over a thousand in different K.E. implementation depending on objectives and measurement tools used, the suggested number for this kind of consumer research is around 30 ~ 50 subjects (Nagamachi, 2003). In this research, in the effort to explore differences of the structure of emotion by educational background, and to ensure reliability of the results, a total of 120 students from four different academic backgrounds were employed. Additionally, to inculcate sense of balance in the resulting structure by gender population, equal distribution of subject number, fifteen females and fifteen males, is employed in each group.

### **4.5.3 The Measurement Tool**

A checklist is developed to be used as emotion measurement tool. The checklist comprises of emotional keywords that are identified according to the steps described in the following sub-sections. The emotional keywords are used as the measure of strength of the emotional responses the subjects feel when looking at the website.

#### **4.5.3.1 Synthesize Emotional Keywords**

Initially, a set of emotional keywords were identified in reference to pertinent literature in K.E. and language experts. The words were then cross-checked with dictionaries for synonyms and antonyms. Subsequently, the words were validated by four English Language experts, which finally concluded a total of 757 emotional keywords that can be used in the measurement of emotion.

#### **4.5.3.2 Selection of Domain Specific Emotional Keywords**

Although it is tempting to study correlations of all set of 757 words, and investigate the full range of domain specific keywords in web design, the amount of work involved will be huge and expensive, and is beyond the scope of this research. Therefore the research scoped down the selection of words based on its frequency of appearance in web design guidebooks, websites, research papers and journals. Additionally, general words were also added according to its relevance in describing website. From the selection process, this research have selected a total of 40 emotional keywords to be used in the experimental procedure.

Table 4.11 lists the full set of emotional keywords employed in this research in alphabetical order.

**Table 4.11: The Emotional Keywords.**

No.	Keyword	No.	Keyword
1	Adorable	21	Interesting
2	Appealing	22	Light
3	Beautiful	23	Lively
4	Boring	24	Lovely
5	Calm	25	Luxury
6	Charming	26	Masculine
7	Chic	27	Mystic
8	Childish	28	Natural
9	Classic	29	Neat
10	Comfortable	30	Old-fashioned
11	Cool	31	Plain
12	Creative	32	Pretty
13	Crowded	33	Professional
14	Cute	34	Refreshing
15	Elegant	35	Relaxing
16	Feminine	36	Sexy
17	Fun	37	Simple
18	Futuristic	38	Sophisticated
19	Gorgeous	39	Stylish
20	Impressive	40	Surreal

### 4.5.3.3 Development of Checklist

The 40 set of emotional keywords selected from the earlier section were then organized into 5-point Semantic Differential (SD) scale to form a checklist. This checklist will be used as a measurement tool in investigating user's emotional responses in Website UID. A sample of the developed checklist can be found in Figure 4.6. The order of the keywords in the checklist is changed 5 times to eliminate bias in the Emotion Measurement procedures.

Subject ID: _____						Specimen ID: _____					
	5	4	3	2	1		5	4	3	2	1
Adorable	<input type="checkbox"/>	Not Adorable									
Appealing	<input type="checkbox"/>	Not Appealing									
Beautiful	<input type="checkbox"/>	Not Beautiful									
Boring	<input type="checkbox"/>	Not Boring									
Calm	<input type="checkbox"/>	Not Calm									
Charming	<input type="checkbox"/>	Not Charming									
Chic	<input type="checkbox"/>	Not Chic									
Childish	<input type="checkbox"/>	Not Childish									
Classic	<input type="checkbox"/>	Not Classic									
Comfortable	<input type="checkbox"/>	Not Comfortable									
Cool	<input type="checkbox"/>	Not Cool									
Creative	<input type="checkbox"/>	Not Creative									
Crowded	<input type="checkbox"/>	Not Crowded									
Cute	<input type="checkbox"/>	Not Cute									
Elegant	<input type="checkbox"/>	Not Elegant									
Feminine	<input type="checkbox"/>	Not Feminine									
Fun	<input type="checkbox"/>	Not Fun									
Futuristic	<input type="checkbox"/>	Not Futuristic									
Gorgeous	<input type="checkbox"/>	Not Gorgeous									
Impressive	<input type="checkbox"/>	Not Impressive									
						Interesting	<input type="checkbox"/>				
						Not Interesting					
						Light	<input type="checkbox"/>				
						Not Light					
						Lively	<input type="checkbox"/>				
						Not Lively					
						Lovely	<input type="checkbox"/>				
						Not Lovely					
						Luxury	<input type="checkbox"/>				
						Not Luxury					
						Masculine	<input type="checkbox"/>				
						Not Masculine					
						Mystic	<input type="checkbox"/>				
						Not Mystic					
						Natural	<input type="checkbox"/>				
						Not Natural					
						Neat	<input type="checkbox"/>				
						Not Neat					
						Plain	<input type="checkbox"/>				
						Not Plain					
						Old-fashioned	<input type="checkbox"/>				
						Not Old-fashioned					
						Pretty	<input type="checkbox"/>				
						Not Pretty					
						Professional	<input type="checkbox"/>				
						Not Professional					
						Refreshing	<input type="checkbox"/>				
						Not Refreshing					
						Relaxing	<input type="checkbox"/>				
						Not Relaxing					
						Sexy	<input type="checkbox"/>				
						Not Sexy					
						Simple	<input type="checkbox"/>				
						Not Simple					
						Sophisticated	<input type="checkbox"/>				
						Not Sophisticated					
						Stylish	<input type="checkbox"/>				
						Not Stylish					
						Surreal	<input type="checkbox"/>				
						Not Surreal					

**Figure 4.6: Sample of Checklist for the Exploratory Study.**

A pilot study will be performed to verify reliability of the research instruments, determine validity of research framework and test the subject recruitment strategy. After they are confirmed by the pilot study, the intended full-scale controlled experiment will be performed to explore user's emotional responses that formed when visiting a website. Description on the results obtained in Phase III is provided in Chapter 5. The concept of Website Emotion and design requirements for the development of website that embeds target emotion are to be determined in this phase. This phase is targeted to conclude with the proposal of guideline to the design of Kansei Website.

#### **4.6 Phase IV: Confirmatory Study**

In order to validate the proposed guidelines from Phase III, a confirmatory study will be performed. It involves the development of several prototypes in reference to the

proposed guideline based on five selected concept of Website Emotion. The instruments to be used in this phase are summarized in table 4.12. Description on the results obtained in this phase is provided in Chapter 6.

**Table 4.12: Confirmatory Research Instruments.**

Dataset	Instrument	Quantity	Source
Exploratory	Specimen	5	5 specimen from Exploratory Study selected by random generator
	Evaluation subject	15	Identified good subjects from the exploratory study
	Measurement tool	5	5 selected element of emotion from the proposed guideline
Confirmatory	Specimen	5	New prototype developed according to the design guideline
	Evaluation subject	15	Identified good subjects from the exploratory study
	Measurement tool	5	5 selected element of emotion from the proposed guideline

#### 4.6.1 Preparation of Research Instrument

This phase of the research requires preparation of research instruments that includes the development of prototypes to be used as specimen, the selection of evaluation subject and development of emotion measurement tool. The following sub-section describes the instrument preparations.

##### 4.6.1.1 The Prototype (Specimen)

The purpose of this study is to validate the proposed guideline, and thus specimen in this phase will be prepared according to the guideline. Five elements of emotion will be selected, and five prototypes will be developed according to the design requirements specified in the guideline for the selected element of emotion.

#### **4.6.1.2 The Evaluation Subject (Good Subject)**

The evaluation subject for the Confirmatory Study will be selected among good subject from the Exploratory Study. Good subject refers to subject who is capable to perform consistent emotion measurement, and provide good structure of emotion ratings. This proves that they are sensitive to emotion and responsive to the stimuli. Employment of good subject is important in order to ensure consistency of data in both exploratory and confirmatory datasets.

The research will select fifteen good subjects from participants of the Exploratory Study to be employed in the Emotion Measurement procedure in Confirmatory Study phase. The number of subject is sufficient in relevance to user testing studies (Faulkner, 2005; Gilbert; Landeman & Perfetti, 2001; Nielsen, 2000; Williams & Seals, 2007) and confirmatory purposes. Additionally, although it does not affect the resulted structure of emotion, the research will attempt to get well distributed number of subjects from all backgrounds, in order to reduce biasness that may shape.

#### **4.6.1.3 The Measurement Tool**

The five selected elements of emotion will be used in the emotion measurement tool. The emotional keywords will be organized in 5-point SD scale to assess emotional responses to the five developed prototypes, and produce a confirmatory dataset. The checklist to be used in the assessment is as shown in Figure 4.7.

						SubjectID: _____
<b><u>SAMPLE 1</u></b>						
	5	4	3	2	1	
Cute	<input type="checkbox"/>	Not Cute				
Feminine	<input type="checkbox"/>	Not Feminine				
Simple	<input type="checkbox"/>	Not Simple				
Masculine	<input type="checkbox"/>	Not Masculine				
Luxury	<input type="checkbox"/>	Not Luxury				
<b><u>SAMPLE 2</u></b>						
	5	4	3	2	1	
Cute	<input type="checkbox"/>	Not Cute				
Feminine	<input type="checkbox"/>	Not Feminine				
Simple	<input type="checkbox"/>	Not Simple				
Masculine	<input type="checkbox"/>	Not Masculine				
Luxury	<input type="checkbox"/>	Not Luxury				

**Figure 4.7: Sample of Checklist for the Confirmatory Study.**

Another dataset, the exploratory dataset, is to be filtered from Exploratory Study based on the fifteen good subjects and their emotional measurement towards five specimens that will be selected by random generator. This phase of the research is performed to confirm the validity of the proposed guideline. A comparison of the structure of emotion that results from both confirmatory and exploratory dataset will be analysed to enable the research to conclude the validity of the guideline and thus justify the success of the research in engineering emotion in Website UID. The validation and justification will enable the research to finalize guideline to the design of website that embeds emotion, establish taxonomy to the design of Kansei Website and generate method to engineer emotion in website design.

## **4.7 Summary**

The chapter has described the framework constructed to enable the engineering of emotion in Website UID. It highlighted the four phases of the research methodology, positioning the implementation of K.E. in the study. The core activities in engineering emotion in Website UID are incorporated within the exploratory and confirmatory study phases. Exploratory study is performed to investigate emotional responses to Website UID, and its association to website design elements. The result of exploratory study will be provided in Chapter 5. The success of the implementation of K.E. in Website UID is to be justified by a confirmatory study, which its results will be presented in Chapter 6.