

CHAPTER 6

CONFIRMATORY STUDY

6.1 Overview

This research has successfully incorporated Kansei Engineering (K.E.) methodology in the measurement and engineering of emotion and association of design elements in Website UID. As a result from the Exploratory Study, described in detail in Chapter 5, this research has proposed a design guideline for website that embeds target emotion, named Kansei Web Design Guideline©. The guideline provides design requirements to the development of website according to the concept of emotion that is targeted to capture visitor's attention at first sight.

In this chapter, the research strives for validation of the proposed guideline. The stages of this Confirmatory Study involve development of prototypes according to the guideline and testing the success of the prototypes in eliciting the targeted emotion, by performing Emotion Measurement and analysing the structure of emotion that formed by the evaluation result of the prototypes. The chapter concludes with the justification of the successful use of the guideline to embed target emotion in the prototypes.

6.2 The Validation Method

This research performed Confirmatory Study to validate the proposed guideline presented in Chapter 5. In order to test the implementation of guideline, the research must develop several prototypes according to the guideline, perform Emotion Measurement using the prototypes as specimens, and analyse the structure of

emotion that formed from subject's emotional responses towards the specimen. Comparison of the structure of emotion can be done with the use of Principal Component Analysis (PCA) to the averaged data produced by the same group of subjects in both Exploratory Study and Confirmatory Study. To ensure the reliability of the comparative analysis to both datasets, this research introduces Guideline Validation Method. The method is shown in Figure 6.1.

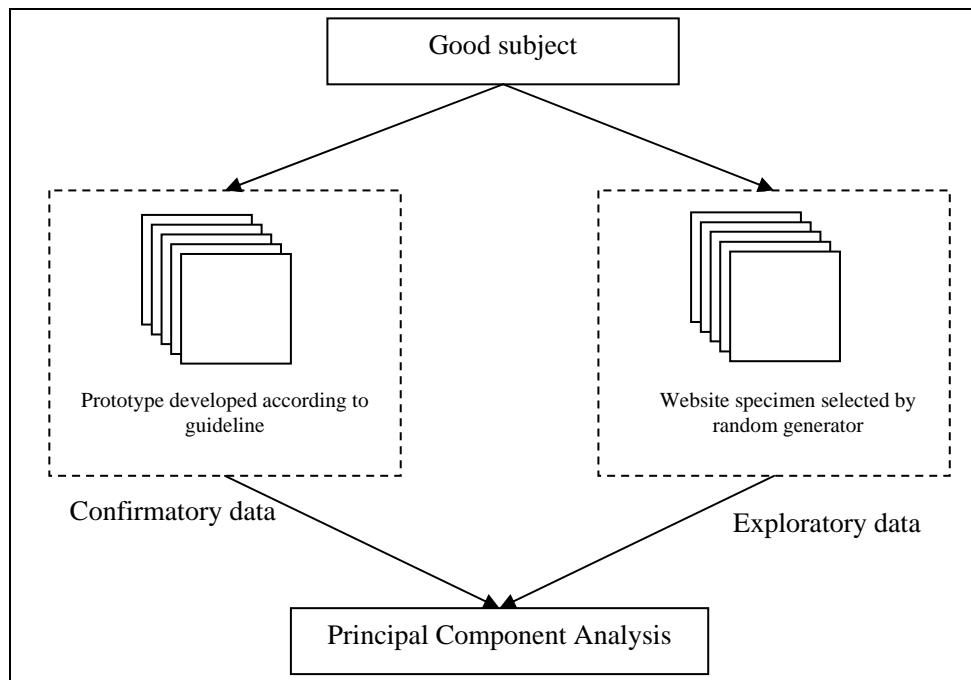


Figure 6.1: The Guideline Validation Method.

The method involves the identification of good subjects to be used as data source in the validation procedure. Two datasets produced before and after the guideline implementation by the identified good subjects are to be analysed by PCA. PCA will be used to justify all the instruments used in Confirmatory Study, compare the structure of emotion between the two datasets, and confirm the validity of the proposed guideline. In confirming the guideline, the structure of emotion for both datasets should be noticeably separated, showing an improve structure of emotion in the newly developed prototype.

In this research, the Kansei Web Design Guideline © is proven as valid when there is evidence of improvement in structure of emotion. The following sub-sections describe all the components from the Kansei Validation Method.

6.3 The Confirmatory Dataset

Confirmatory dataset is the dataset obtain from Confirmatory Study, which was performed to obtain evaluation result of subject's emotional responses towards the newly developed prototypes. A similar exercise of Emotion Measurement conducted during Exploratory Study was performed using 5 specimens, 5 emotion and 15 participants selected from 15 good subjects. Good subject refers to subject who is capable to perform consistent emotion measurement, and provide good structure of emotion ratings. Description on the selection of good subject and its number is provided in Chapter 4. Figure 6.2 shows the confirmatory method performed in this chapter.

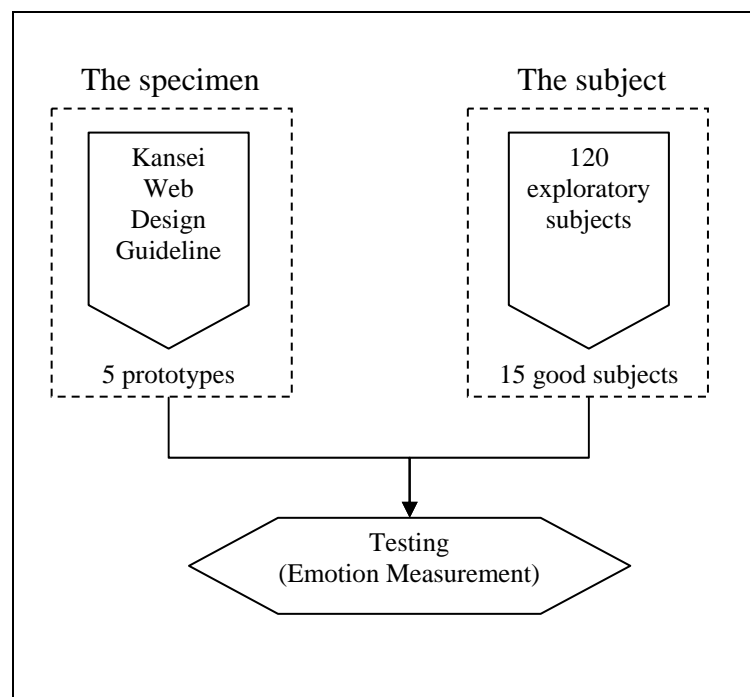


Figure 6.2: The Confirmatory Method.

6.3.1 Prototype Development

Ideally, to develop a successful product that elicits target emotion, designer needs to combine two or more elements of emotion selected from different concepts of emotion. However, in this research, for confirmatory purposes, prototypes were developed according to individually selected elements of emotion. This was partially due to the large amount of design elements, and it is almost impossible to combine concepts of emotion. The five elements of emotion were selected from the first, second, and third concept from the proposed guideline presented in Chapter 5. Table 6.1 shows sample of the selected elements of emotion and the design elements.

Table 6.1: Sample of the Selected Emotion from the Guideline.

Design Element	Emotion				
	Cute	Feminine	Luxury	Masculine	Simple
Body Bg Colour	Light Blue	Light Blue	Black	Black	Dark Brown
Body Bg Style	Texture	Texture	Colour Tone	Colour Tone	Picture
Page Shape	Sharp	Sharp	Sharp	N/S	Sharp
Page Menu Shape	Mix	Mix	Sharp	Sharp	Sharp
Page Style	None	None	None	None	None
Page Orientation	Footer	Footer	Vertical Split	Header	Content
Dominant Item	Picture	Picture	Picture	Picture	N/S
Page Colour	Grey	Pink	Black	Blue	Brown
Page Size	Small	Small	Small	Medium	Medium
Other Images?	Animal	Animal	Animal	Animal	Kids
Product Display Style	Filmstrip	Filmstrip	Filmstrip	Filmstrip	Catalogue
Product Try On	Yes	Yes	Yes	Yes	Yes
Product view angle	Rear	Rear	Mix	Side	None
Artistic Menu?	Yes	Yes	Yes	Yes	No
Empty Space?	Less	Less	Less	Less	More
Discount Ad. Existence	No	No	No	Yes	Yes

The guideline was carefully followed to in the development of the five prototypes to be used as specimens in the Confirmatory Study. Figure 6.3 shows an example of the developed ‘Cute’ website, to give an illustration of how the guideline is used in the development of the prototype. Table 6.2 shows snapshot of the developed five prototypes. It should be noted that, in ideal case, the guideline is to be used in combination to designer’s creativity to achieve optimum result.

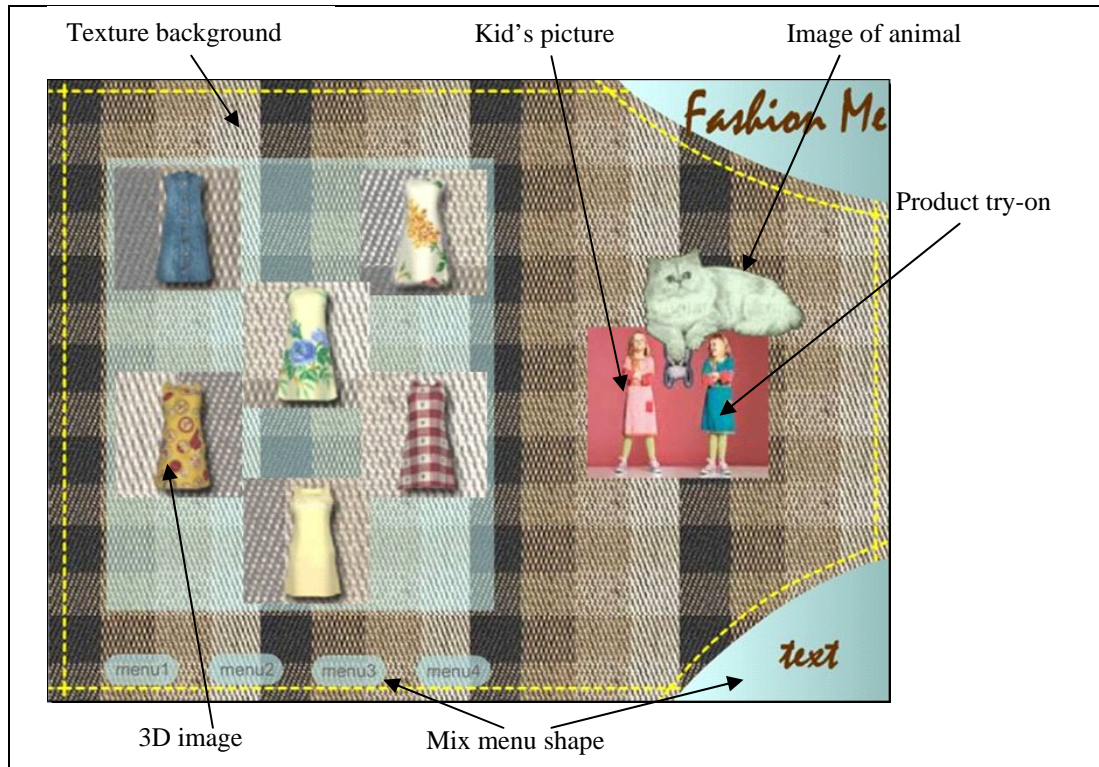


Figure 6.3: Example of Design Requirement for 'Cute' Website.

Table 6.2: Confirmatory Website Specimen.

ID	Emotion	Specimen	ID	Emotion	Specimen
1	Cute		4	Masculine	
2	Feminine		5	Luxury	
3	Simple				

6.3.2 The Testing (Emotion Measurement)

A checklist comprising of the five selected elements of emotion, arranged in 5-point SD scale, were developed to be used as measurement tools in Emotion Measurement procedure. With the use of the checklist, fifteen good subjects and the five developed prototype, Emotion Measurement was performed to obtain confirmatory datasets. Figure 6.4 illustrates the Emotion Measurement procedure.

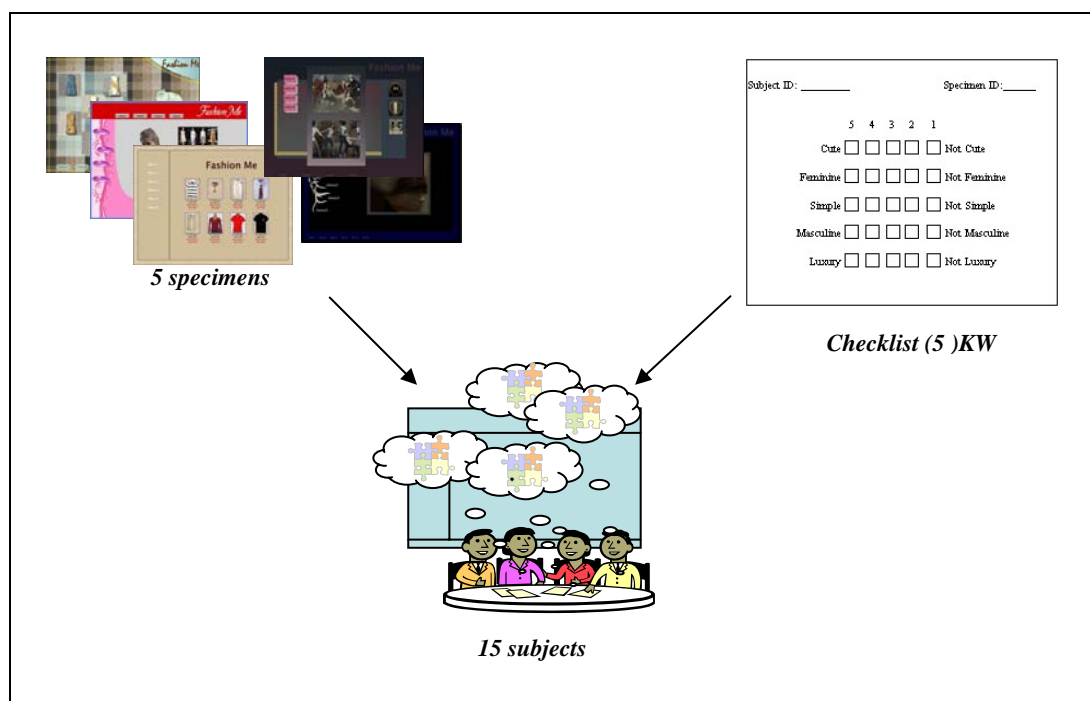


Figure 6.4: The Emotion Measurement Procedure.

One session was held to assess emotional responses from all subjects. During the session a briefing was given before the participants began their evaluation exercise. The five website specimens were shown one by one in a large white screen to all participants in a systematic and controlled manner, and subjects were asked to rate their feelings into the checklist according to the given scale. The subjects were given three minutes to rate their feelings towards each specimen, and the session took approximately fifteen minutes to complete.

6.3.3 The Data Audit

As described in the earlier section, subjects were required to rate their emotional responses into a paper checklist. Limitations of this instrument in the experimental procedure required all data to be entered manually into computer upon completion of the experiment. The whole data population amounts to 375 data. Due to the relatively small amount of data, the research performed 100% data audit in order to validate the data.

From the audit it can be observed that no error found during the data entry. Hence, the research concludes to accept the entire group of data recorded by the data entry, and proceeds with the intended data analysis.

6.4 The Exploratory Dataset

Exploratory dataset is the data extracted from the Exploratory Study results. In the process of identifying which data to extract, the research performed the following procedure:

- i. Data coding to segregate all data from the selected 15 good subjects.
- ii. Performed random generator to select 5 specimens.
- iii. Calculate averaged evaluation value from the data.

This research performed Microsoft Excel random generator to randomly select five specimens from the Exploratory Study. The selected specimens were specimen with ID no. 4, 6, 9, 14, and 24. The research finalized the exploratory dataset by filtering all the data using the generated specimen ID number.

6.5 Comparative Analysis of the Exploratory and Confirmatory Datasets (Confirmatory Analysis)

To validate the implementation of the proposed guideline, the research performed PCA to both exploratory and confirmatory datasets. Comparison of the structure of emotion formed by the two datasets was used to confirm the validity of the guideline. The validity of the proposed Kansei Web Design Guideline© is justified when improvement in the structure of emotion is evident.

6.5.1 The Exploratory PCA

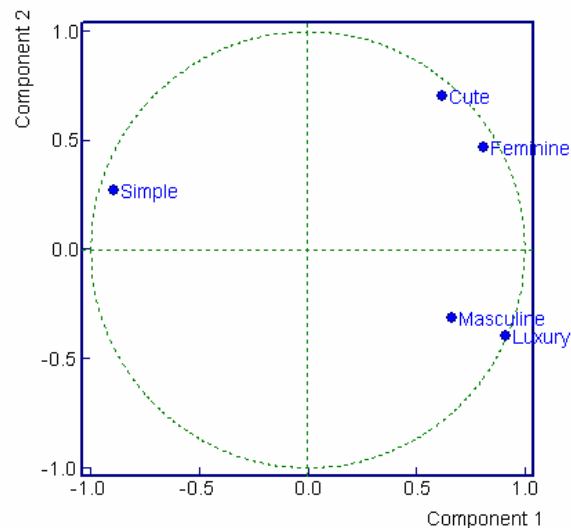


Figure 6.5: PC Loadings for Exploratory Dataset.

Shown in Figure 6.5 is the result of PCA performed to the exploratory dataset. It is evident from the result of the PC Loading shows that all emotions were well distributed to both axes. It is evident from the plot that the randomly selected specimens have elicited good structure of emotion, and thus they were good specimen to be used for comparison purposes. The distinction of emotion also provided evidence that the selected 15 subjects have given a good structure of responses, and thus justified their selection as good subjects.

Figure 6.6 shows vector result of the exploratory dataset. It is evident from the PC Vector analysis that all specimens are mostly distributed along the emotion axes. Thus, it is confirmed that the randomly selected specimen were good specimen and reasonably implied the selected emotion.

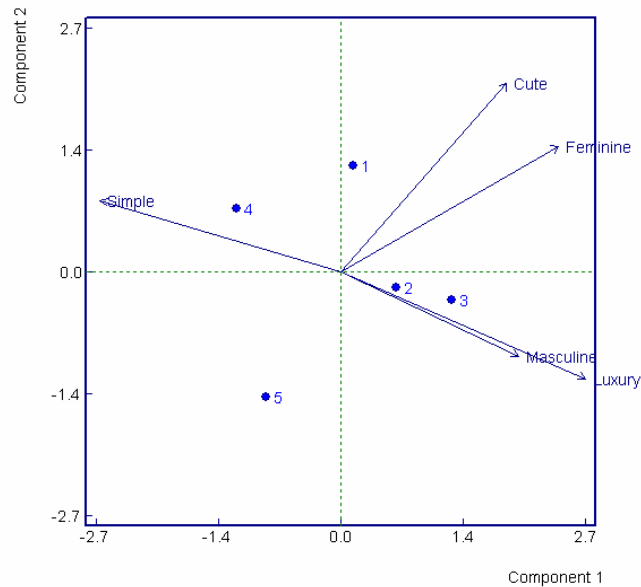


Figure 6.6: PC Vector for Exploratory Dataset.

6.5.2 The Confirmatory PCA

Shown in Figure 6.7 is the result of PCA performed to the confirmatory dataset. It is evident from the plot that all emotion were well distributed to both axes. Thus, it provides prove that the newly developed prototypes elicits the targeted emotion and they were good specimens to be used for comparison purposes.

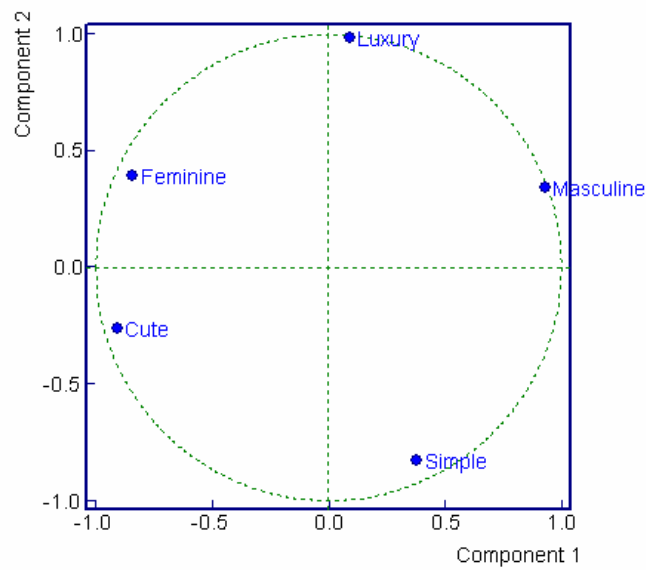


Figure 6.7: PC Loadings for Confirmatory Dataset.

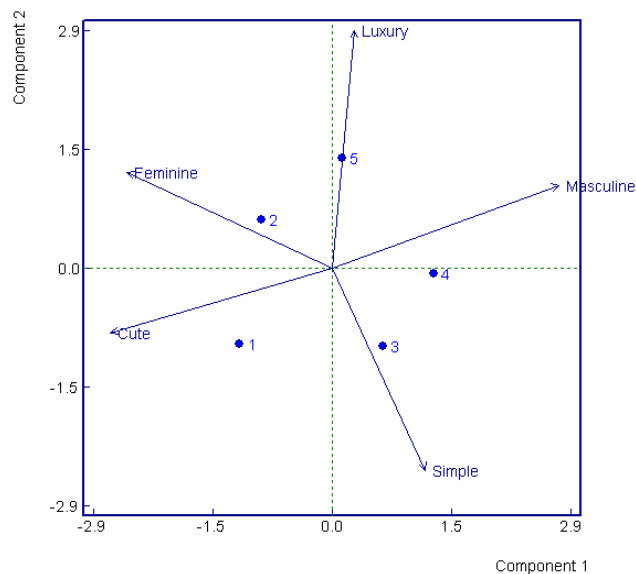


Figure 6.8: PC Vector for Confirmatory Dataset.

Figure 6.8 shows vector result for the confirmatory dataset. It is evident from the plot that all specimens were very well distributed along the emotion axes, and the distinction could clearly be observed. Thus, the result provides strong evidence that the developed prototypes were good Kansei Website design and accurately elicit the targeted emotion.

6.5.3 The Comparison PCA

The comparison dataset was a combination dataset from both exploratory and confirmatory dataset. PCA was then performed to investigate differences of the structure of emotion before and after the guideline implementation. Figure 6.9 illustrates the procedure.

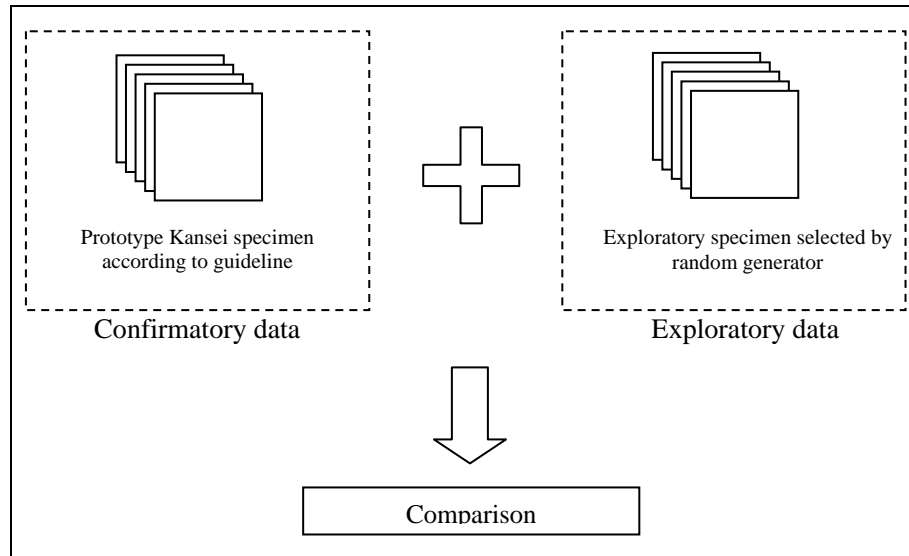


Figure 6.9: The Confirmatory Method.

The confirmatory dataset was appended to the end of the exploratory dataset to make clear the separation of specimens in the analysis procedure. In the combination, exploratory specimens were coded from 1 to 5, and confirmatory specimens were coded from 6 to 10. PCA was then performed to analyse the structure of emotion and relations between specimens and emotion. Figure 6.10 shows PCA result performed to the comparison data.

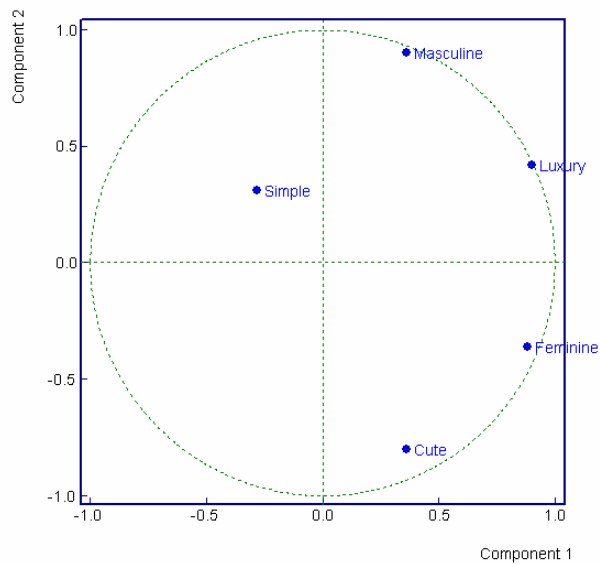


Figure 6.10: PC Loadings for Comparison Dataset.

The PC Loadings shows that all emotions were well distributed to both axes. This indicates that the dataset were good data and that all emotions were distinctive. Figure 6.11 shows PC Vector for the comparison dataset. The vector plot shows the structure of emotion and specimens in two dimensional spaces.

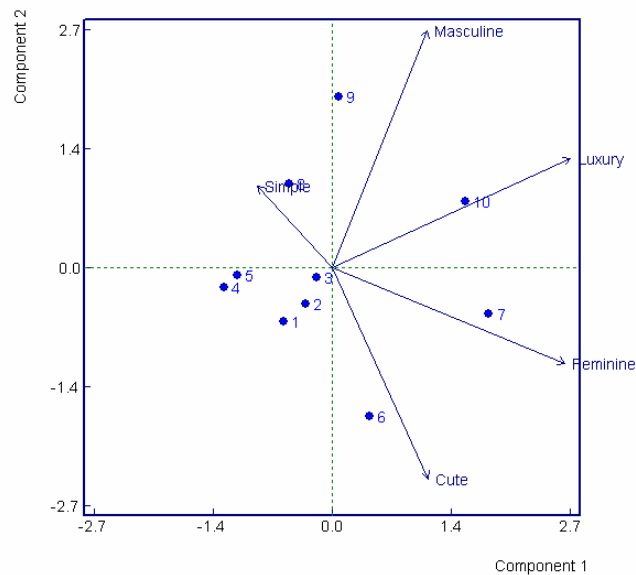


Figure 6.11: PC Vector for Comparison Dataset.

It is evident from the vector plot that specimen 1, 2, 3, 4, 5 which were specimens from exploratory dataset, are concentrated towards the centre space. This indicates that the specimens have poor influence to emotion in comparison to the other dataset. Whereas, in specimen 6, 7, 8, 9, 10 which were the newly developed Kansei Website prototype based on the guideline, were very well spread all over the emotion vector. This result provides strong evidence that the newly developed prototypes successfully elicit the target emotion. Thus, it can be concluded that the structure of emotion in website design is improved by the used of the guideline, and this justifies the validity of the proposed Kansei Web Design Guideline©.

6.6 Finalizing the Kansei Web Design Guideline

The Confirmatory Study performed in this research has resulted clear structure of emotion in the newly developed website prototypes according to the proposed guideline. From the comparative analysis of the plot of PC Vector, it is evident that although structure of emotion is evident in the specimens from exploratory dataset, they were concentrated towards the centre space. This has indicated that the specimens have poor influence to emotion. On the other hand, the structure of emotion in the confirmatory specimens, the prototype websites developed based on the proposed guideline, were very well spread all over the targeted emotion vector. This result has provided strong evidence that the specimens elicit very good and distinctive emotion. Thus, the Confirmatory Study could be said to lend some hypothetical credence that by using the Kansei Web Design Guideline©, it is possible to develop website that embeds target emotion. Researchers, designers and user advocates could use the current form of the guideline as a basis to extend the effectiveness and reliability of the guideline. The finalized guideline table can be found in Appendix 10.

Nevertheless, the guideline was composed by large amount of information and this may cause trouble for the audience to access and interpret the underlying knowledge. Consequently, such method that could exemplify the information into an easy,

effective and well-organized access needs to be pursued. The following section describes a recommended solution to this issue.

6.6.1 The Periodic Table of Kansei Web Design Elements©

As can be seen from Appendix 10, the guideline holds a huge volume of information and one has to perform troublesome search and interpret the knowledge for it to be used. The intended audience, especially web designers, may find it difficult to use in its current form. As a recommended solution, this research formulated a periodic table to organize the knowledge offering easy, effective and well-organized access in facilitating the design process. The following characteristics of the guideline have made it possible to be composed into the form of periodic table:

- i. The resulting huge amount of information in the guideline requires easy, effective and well-organized data access, storage and visualization, for it to be usable.
- ii. The guideline consists of repetition of value for design elements in Website UID. Repetition of value means that the data is exchanging within the same elements, and thus the display of exchanging elements can be simplified. The formulation of periodic table could be useful for the research to deliver the interchange of value over one display.

Thus, the finalized guideline is arranged in the form of a periodic table, named the Periodic Table of Kansei Web Design Elements©, to provide easy, effective and well-organized access to the huge amount of information at one view. However, by its current form, the periodic table is not yet a standard, but suggested to be used as a bench mark to extend its effectiveness and reliability in facilitating the design process of Kansei Website. The periodic table could be enhanced with extension of work in the domain of website design, such as further study addressing enculturation and universal concept of emotion.

The periodic table is colour-coded to represent section grouping, i.e., Body, Page, Header, Main, Top Menu, Left Menu, Right Menu, Footer, Picture, Logo and Other design elements. Description of the sections can be referred to in Chapter 4. Sections are arranged from top to bottom and left to right, according to web page structure, beginning with overall body and page, followed by header section to footer. Finally, other elements and logo which may also be included on a web page is placed. Picture elements are placed in lower table where by itself it exhibits substantial impact to the whole impression of the web page.

Short form is introduced to represent design elements, and the actual design elements' name is included in smaller font size for better understanding. The purpose of this recommendation is to offer designers with easy, effective and well-organized access to guideline, and not to overload them with lengthy details in the search of the design elements. This periodic table offers a rule of thumb of Kansei Website design elements and its value. A snapshot of the periodic table can be found in Figure 6.12.

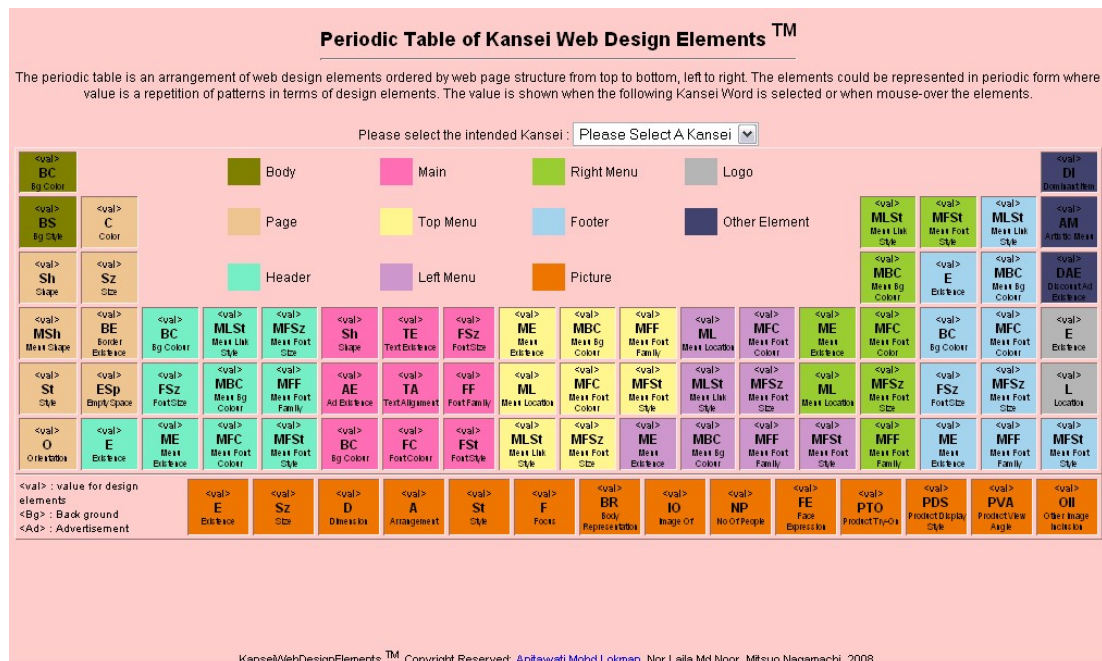


Figure 6.12: Snapshot of the Periodic Table.

6.7 Taxonomy Development

This research has identified all the significant factors to the design of Kansei Website by the use of Factor analysis. Additionally, the association of design elements, the combinations and its influence to emotion was discovered by the use of PLS analysis. Henceforth, with these results the classification of emotion could be determined. Utilizing the results, this research formulated taxonomy in the form of categorization of the concept of emotion and the contributing element of emotion to the website design elements. The taxonomy is formulated positioning its high factor and influence in emotion. This research named the taxonomy, the Kansei Website Taxonomy, and this taxonomy could be use as a reference to ensure the success of Kansei Website design. Due to the large volume of information, the taxonomy is divided into 2 levels. The first level of Kansei Website Taxonomy is shown in Table 6.3. Table 6.4 shows the second level taxonomy for the element of ‘Mystic’. More sample of the taxonomy can be found in Appendix 11.

Table 6.3: The Kansei Website Taxonomy – 1st level.

Concept of Emotion	Description	Element of emotion
EXCLUSIVENESS	The factors related to the concept that reflects exclusiveness	Mystic
		Futuristic
		Masculine
		Luxury
		Sophisticated
		Surreal
		Impressive
		Gorgeous
		Cool
GRACEFULNESS	The factors related to the concept that reflects gracefulness	Professional
		Feminine
		Chic
		Beautiful
		Cute
		Sexy
		Charming
		Adorable
EASINESS	The factors related to the concept that reflects easiness	Elegant
		Simple
LIGHTNESS	The factors related to the concept that reflects lightness	Plain
		Light
ORDERLINESS	The factors related to the concept that reflects orderliness	Neat
		Natural

Table 6.4: The Kansei Website Taxonomy - 2nd level (Mystic).

Element of Emotion	Description	Design Element	Attribute
Mystic	The criteria related to the concept that reflects the impression of mystic	Artistic Menu	Artistic
		Body Bg Colour	Black
		Picture Style	Artistic
		Header Bg Colour	Grey
		Body Representation	Mannequin
		Face Expression	Mix
		Main Bg Colour	Black
		Main Font Style	Italic
		Main Font Face	Cursive
		Footer Menu Font Colour	Grey
		Picture Arrangement	Centre
		Other Images	Animal
		Product view angle	Side
		No of people in picture	2 or more
		Left Menu Link Style	Picture
		Page Colour	Black
		Page Style	None
		Page Orientation	Plain
		Picture Focus	Full Body
		Top Menu Bg Colour	Black
		Top Menu Font Colour	White
		Picture Size	Large
		Footer Menu Bg Colour	Grey
		Main Font Colour	White
		Logo Location	Centre
		Header Menu Bg Colour	Grey
		Product Try On	Try On
		Header Font Size	Small
		Product Display Style	Filmstrip
		Image of?	Mix
Header Existence	Not Exist		
Header Bg Picture Existence	Not Exist		
Body Bg Style	Colour Tone		
Header Menu Link Style	Text		
Right Menu Font Size	Small		

6.8 Method Generation

The empirical studies performed in this research have served some hypothetical credence to justify the research approach and the Kansei Design Model, presented in

Chapter 4. Hence, it provides some hypothetical basis for this research to propose a novel Method to Engineer Kansei Website, as illustrated in Figure 6.13.

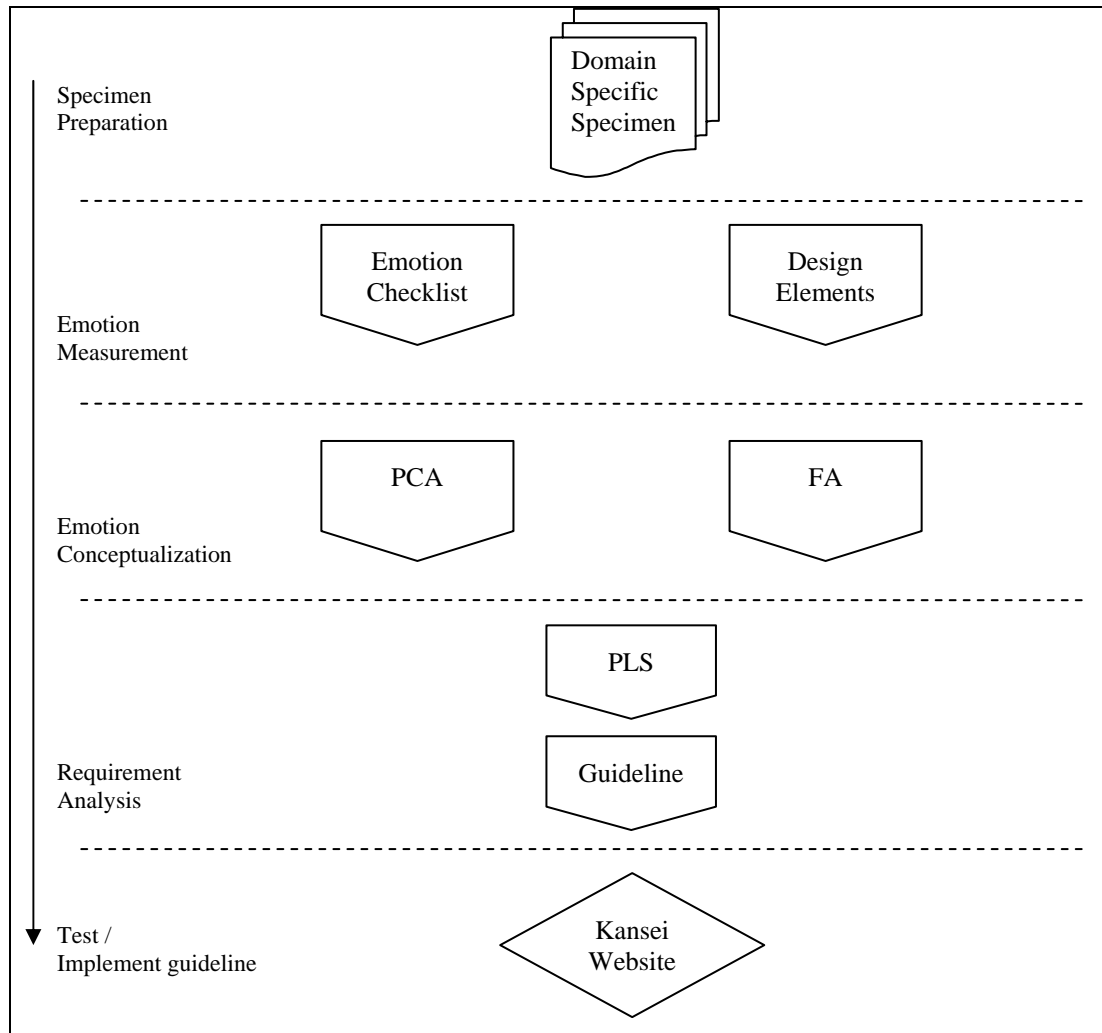


Figure 6.13: Method to Engineer Kansei Website.

The method enables the identification of the concept of emotion, analysis of design requirement, development of guideline based on the design requirement, and implementation of the guideline. Although the name implies the implementation only to website, transferability to other domain is considerable.

Additionally, the success of this research has motivated the research to build a useful Method of Emotion Detection for Website UID. The method is presented in Figure

6.14. This method could be used when one plans to identify the kind of emotion elicited by particular website. The usefulness can also be seen in the potential application to a competency test to become Kansei Website Designer, i.e. a certified web designer to develop Kansei Website.

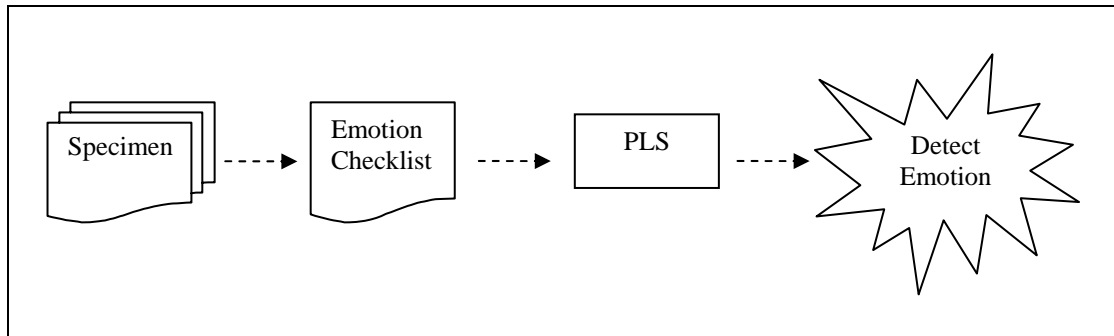


Figure 6.14: Method of Emotion Detection.

6.9 Summary

This chapter has described the detail of the outcome of the Confirmatory Study performed to validate the result from Exploratory Study. In this phase, the research has developed five prototypes according to the proposed guideline and performed Emotion Measurement to obtain evidence that emotion can be engineered in Website UID. In conclusion, the chapter has described the achievement of one of the research objective, which is to propose a design guideline that enables the incorporation of target emotion in Website UID.

As an outcome, this chapter has described the establishment of the followings:

- Kansei Web Design Guideline©, a guideline to the design of Kansei Website,
- Kansei Website Taxonomy, a taxonomy of emotion in Website UID,
- Periodic Table of Kansei Web Design Elements ©, a periodic table that enables the display of design requirements according to target emotion at one view,

- Method to Engineer Kansei Website, method to enable the engineering of emotion in Website UID, and
- Method of Emotion Detection, method to detect emotion in a particular product or website.

All of these outcomes were described neatly towards the end of this chapter. Finally, the success of developing website that embeds target emotion in this research phase could be used to serve some hypothetical credence that by following the proposed guideline generated by the application of the developed Kansei Design Model, it is possible to engineer the five selected emotion in Website UID. Further testing of the experiments in a larger and more diverse population and variables are needed to provide support of internal validity for the research claims.