Predictive models of emotion from product design features

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Predictive Models of Emotion from Product Design Features

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Abstract

The use of affect as a means of conceptualizing and evaluating designs required the development of a measurement system that is appropriate for the context. Emotions that users experience when they inspect and evaluate products are called pre-purchase affect and consist of a unique set of emotions. Pre-purchase affect is important as this is the stage when consumers are contemplating on buying a product and therefore designs must be able to elicit intense emotions that would prompt them to buy.

A Pre-purchase Emotion Set (PES) was developed in this study that enumerates the emotions that consumers typically experience while shopping. The set was obtained from a field study that considered several products. The set included eighteen emotions that were predominantly positive compared to other emotion sets found in literature. Earlier models of emotions were regarded to be inappropriate for subjective measurement of emotion in pre-purchase product evaluation because the components were broad that includes even the post-purchase context. This makes them insensitive and ineffective in measuring pre-purchase affect (PPA). Further analysis of the PES using multidimensional scaling and factor analysis revealed a four-dimensional solution. The dimensions were labeled: amazement, positive enthusiasm, optimism, and satisfaction.

The Pre-purchase Affect Model (PAM) proposed in this study related product attributes to PPA and PPA to purchase intention. This model is meant to be integrated to the product design framework to inform designers how emotion can be considered in the design process. The PAM is unique as it is the first to predict emotional experience from product attributes and predict purchase intention from this experience. PAM proposed that the source of affective responses in the pre-purchase context is the existence of product attributes that consistently cause emotion for a specific range of products. Designers need to be aware of these attributes to aid them in conceptualizing emotion rich products.

The inclusion of purchase intention in the model intended to illuminate the business sense of considering affect in product design. Although affect was considered as one of the heuristics in consumer decision-making, it is not known which emotions are relevant in making the decisions and how decisions are driven by affect intensities. There are many factors that may affect purchase intention from

literature but these factors were controlled in the case studies conducted to validate the model.

The PAM's proposal that product attributes are related to PPA included the moderating effect of users' criteria. The inclusion of criteria in the model concurs with the "hierarchical structure principle" in Activity Theory (AT). This principle proposes that actions are guided by goals thus making emotional responses goal dependent. Consequently, the emotional impact of perceptual inputs varies according to goal.

Different sets of data were gathered to validate the PAM. In an attempt to find a general trend in data, experiments were conducted in the field and laboratory in two sites, namely; Philippines and Singapore. It was expected that in the field many variables would confound the results so the salient ones were controlled in a laboratory experiment. In this case the effect of brand, store layout, salesperson, and environment can be discounted from the results. Results obtained revealed that product attributes related to dimensions such as weight, body thickness, and display area predicts PPA intensity. The models obtained are statistically significant at 5%. Thin and small phones are associated with novelty as the trend now is towards miniaturization. Attributes that are related to ergonomics and aesthetics also contribute to emotion elicitation such as size of navigation button and ratio of body length to width.

The PAM may be used as a framework for identifying product attributes that are responsible for eliciting PPA. However, the use of this model must be preceded by a clear distinction of a context. So far, the findings using mobile phones as products revealed that product attributes that shows contemporary trend and heightens pleasure are capable of eliciting PPA from customers. Designers should therefore channel their attention in objectifying these in their designs.

Chapter 1: INTRODUCTION

1.1 Background of the Study

Affect is a common experience that most people take for granted without realizing that it significantly influences how they think and behave. Experience of pain and pleasure shapes a person's outlook of the quality of life (Larsen & Fredrickson, 1999). It is also a significant source of human motivation and has bearing on memory and thought processes (Westbrook & Oliver, 1991). Many decisions are made on the basis of emotion rather than complex rationalizations of the mind.

The study of affect involves many problems including definitions and classification as well as measurement issues (Larsen & Fredrickson, 1999). Many authors have contended with their own empirical evidences that affect may be discrete or dimensional and have tried to enumerate the emotions felt in a range of situations (Izard, 1977; Plutchik, 1980; Russell, 1980). The issue of measurement and classification is important in emotion studies as many researchers seek to determine relationships between emotion with performance, decision-making and other variables of interest. The challenge, however, is finding the appropriate measurement system for a particular situation to make the results reliable, valid and meaningful. The models presented by previous researchers such as Russell (1980), Izard (1977) and Plutchik (1980) would need modifications if applied to very specific studies, because not all emotions they have identified may be relevant in a particular context.

The interest in emotional response to product design has been driven by its marketing benefits. Consumers are enticed to buy some products because emotions were activated during the purchase process. Emotions can either be triggered by the environment (Bitner, 1992; Milliman, 1982), the salesperson (Bell, 1999), advertising (Batra & Stayman, 1990) or the product itself (Richins, 1997). The product's "soft functionality" referring to its compliance with users' emotional needs was cited by McDonagh, Bruseberg & Haslam (2002) as a factor that affects product success in the market. Kansei Engineering tries to incorporate customers' feelings into the design of the product by translating these feelings into design elements that are related to form and other sensory characteristics (Matsubara & Nagamachi, 1997; Nagamachi, 1995, 2002). Many companies including those in the automotive, construction and cosmetic industries have adopted this approach. Similarly, Jordan

(1998) tried to determine the feelings of pleasure and displeasure associated with product use. He discovered that satisfaction in using a product is brought about not only by usability but also by the emotions engendered by the product such as excitement and pride.

Product designers have always been in a quandary as to the nature of product attributes that trigger users' emotions. Emotions are compelling human experiences and designers can capitalize on this knowledge by conceptualizing emotion-engendering products that can sell well in the market. Fulton Suri highlighted "design experience" as a key influence in conceptualizing good designs. This entails knowing users' activities, thoughts, feelings, aspirations, goals, ritual, and values and translating them into a product that elicits positive emotional responses. Better designs are capable of provoking positive reactions from people such as achievement, inspiration, and joy. IDEO, a design company, has constantly employed observation techniques to help them understand people's interaction with products and develop designs around this interaction .

Observing people's interaction with products educates the designer on critical users' behavior that can serve as input to design. An alternative to this is "immersion in context", which involves living with the users . Behavioral patterns obtained using these techniques may not be quantifiable but give good cues about user needs in the natural setting. The end result is a richer concept that encompasses users' conscious and unconscious aspirations about the product. This concept, however, can still be improved by using quantitative techniques to compare alternatives. It can also be tested for its potential to engender emotion.

Bloch (1995) identified product form as an antecedent to consumers' psychological responses, namely; cognitive and affective. Product form represents a number of elements that designers combine to enable users to interact with the product (Lewalski, 1988). These elements include shape, color, materials, ornamentation, and texture. Color, for example, can elicit tension, calmness, and arousal (Bellizzi & Hite, 1992) while shape can indicate intensity of emotion (Fagerberg, Stahl, & Hook, 2004). Round shapes connote softness and continuity while angular and sharp ones are perceived as abrupt. Product form gives an overall picture of the product that users may either desire or avoid.

Product form is a component of aesthetics (Lewalski, 1988). People perceive product form and construct evaluative judgments based on cultural, social, historical, experiential and technological factors (Bloch, 1995; McCracken, 1986, 1988; Taylor & Taylor, 2004). Crozier (1994) asserted the difficulty of finding universally accepted aesthetic principles due to evident differences in people's tastes and preferences. However, there are design forms that are considered by everyone to be ideal (Coates, 2003). Great works of art and natural patterns that define beauty follow the golden section, approximately 1.618. This "divine proportion" was intentionally used centuries ago in designing Gothic cathedrals that have become architectural wonders. The German psychologist Fechner empirically proved human's cognitive preference for golden section proportions in a study of rectangles (Elam, 2001). Gestalt psychologists, on the other hand, believe that people have the innate tendency to see order in visual perception (Detrie, 2002; Zakia, 1997). Gestalt principles of proximity, similarity, symmetry, continuance, repetition, and closure were constantly used by designers to construct good designs. The use of these principles is still seen in the development of products and artwork up to the present time.

Designers normally use their intuitive judgments when designing products. Creativity is believed to be innate and some people are gifted with the talent of conceptualizing visually pleasant forms. The application of the scientific method to design was not deemed appropriate because artistry is the way to a good design. Coates (2003), however, did not completely adhere to this belief asserting the need to measure consumer response to products and relate the response to product features. Such a method scientifically aligns design elements to consumers' aesthetic preferences. The use of the scientific method in design has the benefit of optimizing the process by focusing efforts on few significant aspects of the product.

The crucial role of product form in product success prompted some researchers to identify product characteristics that are related to customer satisfaction. Han & Hong (2003) investigated product characteristics that influence eight satisfaction dimensions in the use of audio/visual products. Attractiveness and overall satisfaction were included in the satisfaction dimensions that were feelings of arousal, pleasantness and contentment. Yun, Han, Hong & Kim (2003) conducted a related study where design features of cellular phones were correlated to the perceived satisfaction of users expressed in ten dimensions, namely; luxuriousness, simplicity, attractiveness, colorfulness, texture, granularity, harmoniousness, salience, ruggedness and overall satisfaction. These two studies, however, did not

consider emotion as dependent variable. Customer satisfaction was distinguished by Cohen & Areni (1991) from emotion defining it as an attitudinal post-purchase evaluation of the product and not a feeling state. Khalid & Helander (2004) on the other hand, proposed a framework for integrating affective customer needs in product design. They surveyed customers' preferences of 15 product attributes of four devices. These three studies, however, did not necessarily considered emotional responses as dependent variable. As such, it is not possible to know which product characteristics are responsible for positive or negative feelings of affect.

Norman (2003) pointed out the importance of considering the positive emotion evoked by a product because it may lead consumers to overlook the product's faults. A product that is beautiful can make people smile and may affect a person's purchase decision. Designing a good product also involves making it pleasurable and exciting to use. Pleasure is now considered by many to be more important than usability and is seen as an improvement in user-centered approaches in design (Cayol & Bonhoure, 2001). Marketers, nowadays, are interested in understanding the influence of affect in decision-making and response to marketing variables (Barone, Miniard, & Romeo, 2000; Garbarino & Edell, 1997; Gorn, Goldberg, & Basu, 1993; Westbrook, 1987). However, there have been no experimental studies to determine the relationship of affect evoked by product characteristics in the pre-purchase context and the intention to buy. Only post-purchase affective responses were noted by Westbrook & Oliver (1991) in their study to determine the dimensionality of consumption emotions. Some studies on the relationship of purchase decision and affect focused on the effect of physical environment (Kotler, 1974) and interaction with salespeople (Gardner, 1985). Barone, Miniard & Romeo (2000) as well as Gorn, Goldberg & Basu (1993), on the other hand, investigated the effect of positive mood on the purchase intention of consumers.

1.2 Objectives of the Study

This study aims to:

1. Conceptualize a model of affect that will encapsulate the emotions associated with customers' pre-purchase affective states.
2. Identify product-characteristics that discriminate intense positive and negative emotions.

3. Investigate the effect of affective states on the intention of consumers to buy a product.
4. Construct a model to predict sales potential of the product based on affect ratings.
5. Identify cross cultural differences in affect ratings and intention to buy a product.

1.3 Hypotheses

Four hypotheses were formulated that correspond to the aims of the study. The practical implications of the hypotheses/research problems were also explained.

Hypothesis 1: There are product characteristics that consistently invoke intense positive and negative emotions.

The identification of product characteristics that cause positive and negative emotion will help product designers improve the affective qualities of their design. It has not been investigated if some product characteristics consistently cause a certain valence of emotion if employed to assess a certain product category.

Hypothesis 2: Intense positive emotions are highly correlated with a desire to buy a product.

It is reasonable to believe that when a consumer experiences positive emotion, favorable actions will ensue such as increasing the likelihood of buying the product. However, the strength of correlation between purchase decision and intensity of positive emotion had not yet been investigated. If a strong correlation is established in this study, one can reasonably suggest that designers should aim at maximizing consumers' experience of positive emotions through their design.

Hypothesis 3: Product sales potential can be predicted using product characteristics that engender intense positive emotions.

Product characteristics that contribute to positive emotions can subsequently contribute to the sales potential of the product. If previous hypotheses were proven to be true, the value of integrating affect in design would be proven.

Hypothesis 4: Culture influences the intensity of emotions in product evaluation.

Cultural differences have been used by product marketers to segment markets and formulate effective promotional strategies. In this study, it is desired to know if these variables have a significant effect on the type and intensity of affect experienced while evaluating a product and the subsequent decision to purchase. Conclusions obtained from experiments will guide product designers to emphasize product attributes that foster the preferences of certain groups. Cultural influence on affective and behavioral response was included in the analysis due to previous findings that preferences and emotional experience vary between cultures. Scollon, Diener, Oishi, & Biswas-Diener (2004), for example, discovered that Europeans experience pleasant emotions more frequently than Asians.

1.4 Significance of the Study

This research is significant for the following reasons:

- ❑ It ameliorates the understanding of psychology in product design. The pre-purchase model of affect developed may be used by designers to analyze the impact of emotion in product design. This model presents emotions when making a purchase, which was not considered in previous studies of affect. The model developed by Russell (1980) was based on the evaluation of physical environments and may not be applicable in the domain of purchasing. Izard's (1977) taxonomy of affective experiences based on facial expressions may not be relevant, because facial expression may not be a discriminating factor for understanding emotions associated with purchasing.
- ❑ The output of this research can help product designers incorporate important product characteristics into their design to enhance positive emotion. Past research have not considered relating product attributes as discriminant factors of emotional intensity in the context of buying products.
- ❑ Before finalizing the design of the product, the model derived can help companies to predict if a product will be marketable, based on the consumers' emotional evaluation and intention to buy.
- ❑ The discriminant model will help market analysts and product development specialists to better understand what personal characteristics influence the experience of positive affect in the pre-purchase context.

- ❑ The study contributes to the dearth of knowledge in measuring affect and incorporating it in product design. The statistical analysis will open new avenues for further research on the relationship of affect and product marketability.

1.5 Limitations of the Study

The study is subject to the following limitations:

- ❑ The model did not take into account the changes in emotion intensity through time. The emotional intensity at a certain time period may change as a result of developments in technology and changing fashion trend.
- ❑ It is most applicable to products that are either very expensive or personal. The results may be insignificant for products that are not differentiated.
- ❑ There is only one validation of the model done in this study and the results obtained may not be generalized for another group of product.

1.6 Outline of the Study

An outline of the study is provided to guide the reader on the structure of the report. The report is divided into 6 chapters, namely; introduction, literature review, pre-purchase affect model development, structural analysis of pre-purchase affect model, predictive models of affect, and conclusion. The research framework is shown in Figure 1. A detailed discussion of the chapters follows.

Figure 1 Research Framework

The introduction chapter discusses the background of the study and the motivation for conducting the research. It includes the research problems that are addressed in the dissertation and corresponding hypothesis for each problem.

The second chapter includes a literature review on relevant concepts and theories on affect measurement, consumer-decision making, affective design theories, and culture. The focus of the literature review is to present relevant models and measurement methods for emotion research. Shortcomings of existing models were pointed out, and these were used in developing a new model that is more appropriate for measuring emotions in the pre-purchase context. Consumer decision-making was also included in the review to highlight the use of affect as a heuristic in product judgment and its antecedents in consumption. Several models of decision-making were discussed and related to the present study. Theoretical bases of

affective design were also reviewed such as activity theory; affect infusion model, and theory of satisficing. A section on culture was included to illustrate that affect experience varies between cultures.

The third chapter presents the development of the pre-purchase affect model that related product attributes, pre-purchase affect (PPA), and purchase intention. The moderating effect of purchase criteria such as appropriateness to personality and design preference were also included in the model. The first part of the chapter focuses on the theoretical basis of the model, while the second part showed the derivation of the 18 pre-purchase affect from a field study. The chapter ends with a discussion of how the model can be used in product design.

After identifying the relevant emotions in the pre-purchase context, its structure was analyzed in the fourth chapter. The method of statistical analysis conducted such as factor analysis and multidimensional scaling were discussed in detail. The results obtained were compared to existing models of affect that are related to the study.

In the fifth chapter, eighteen different pre-purchase emotions were used in the validation of the PAM. Studies were conducted in the field and laboratory to substantiate the model. Different sets of data gathered were analyzed using a variety of tools such as discriminant analysis and hierarchical linear modeling that were deemed appropriate for the structure of data. Several models were obtained that related the three variables included in the model.

The concluding chapter recapitulates the conclusions that were obtained from the study and their theoretical and practical implications. Future directions in the area of affective design were also enumerated together with other research areas that may be considered in the future.

Chapter 2: LITERATURE REVIEW

2.1 Definition of affect

Affect or affective response is an encompassing term that includes feelings, emotions, moods and evaluations (Simon, 1982). Such a definition, however, obscures the concept because of the numerous ideas contained therein. Stone (1995), for example, interchangeably used the terms mood and affect in his discussion of affective response measurement. It is therefore imperative to define the ideas that underlie the concept of affect to understand it better.

Feeling is defined as a reaction that may be positive or negative as a result of an experience or something that affects the function of the human body (Arnold, 1960). It is sometimes thought of as causing emotion or a subset of emotion. Solomon (2000) asserted that feeling is not enough to produce emotion which suggests that it is of lesser intensity and does not prompt action. The subject of feeling is not well documented in the affect literature as many theorists think that feelings are sometimes indescribable and immeasurable. For example, it is difficult to describe and measure when one feels like one of the characters in a movie.

Just like feeling, emotion is a concept that is hard to define. However, Forgas (2001 p. 15) defined emotion as “intense, temporary and highly conscious affective states that have a salient cause”. Some authors described emotion by enumerating its different types (Izard, 1977; Plutchik, 1980) while others focused on the level of arousal (Russell, 1980). Emotion, therefore, is a difficult construct to define because it is a complex phenomenon. Izard (1977) suggested that emotion can be described by taking into account the following three components:

1. the experience or awareness of the emotion
2. the processes that occur in the brain, and
3. the expression of emotion that can be gleaned from the face or from the use of language

Moods are generally differentiated from emotion and are described as “low intensity, diffuse, and enduring affective states that have no salient antecedent cause and therefore little cognitive content (Forgas, 2001 p. 15).” It is characterized as general, pervasive and not directed at specific targets (O'Shaughnessy, 2003). Some typical examples of mood are sadness and happiness.

Evaluation, on the other hand, is a kind of affect that enables categorization of positive and negative reactions (Simon, 1982). It is the aspect of affect that is used to assess a situation or a product if it is attractive, pleasurable or disgusting.

Moods, feelings and emotions can therefore be distinguished from each other based on intensity, source and complexity. Peter & Olson (1999) came up with a similar classification of affective responses considering only the level of physiological arousal and intensity of feeling to differentiate one affective response from another. Moods and feelings are characterized by low intensity of arousal unlike emotion, which can captivate and prompt people to action. Unlike moods, feelings and emotions have known causes that may come from the environment such as the action of another person or a negative experience. A bad mood, on the other hand, may prevail without identifying its cause. The most complex of these three expressions of affect is emotion, which cannot just be labeled as positive or negative. The valence of emotion is still a subject of research by many psychologists, who have led to a variety of conclusions. It is still being contested whether emotion is discrete or dimensional, and whether it is possible to feel contrasting emotions at the same time.

Affective responses have the following characteristics as understood from the works of different researchers (Peter & Olson, 1999). An affective response:

- ❑ is largely reactive – People react immediately to what they see in the environment without actually planning or thinking about it. When one sees a beautiful flower, one reacts quickly to it. However, there are some instances when the experience of emotion does not immediately produce a reaction. It may take time to digest the information inherent in the situation. When someone dies, the onset of grief occurs after a few hours or days.
- ❑ cannot be controlled – When a person is insulted, one cannot help feeling anger and frustration.
- ❑ is felt physically in the body – Anger is characterized by reddening of the face while joy can be seen by the twinkling of the eyes.

- ❑ responds to virtually all types of stimulus – feelings of affect can be brought about by anything such as the environment or even one's thoughts. One can choose to think of happy situations and experience joy.
- ❑ is mostly learned – there are some innate affective responses but most of them came from social interactions. Essentially, affective responses are expected to vary across different cultures and social groups.

In the context of this study, the word affect considers feelings and emotions. Feelings were considered because the experiments may not always invoke intense emotions that are observable.

2.2 Theories on Affect and Its Structure

In order to study and measure affect, it is important to understand its taxonomy, dimension and order. Many theorists have conceptualized the components of affect and its structure. There are two main frameworks in the study of emotion based on how it is conceptualized. One framework asserts that emotions are discrete or categorical which means one can experience one emotion at a time (Izard, 1977; Plutchik, 1980). The other one presents emotions as a dimensional construct (Osgood, Suci, & Tannenbaum, 1975; Russell & Mehrabian, 1977). Some of the most relevant theories in this area will be discussed in the following sections.

2.2.1 Emotion Classification from Facial Expression

Research on facial expressions has enumerated fundamental emotions (Ekman, Friesen, & Ellsworth, 1982; Tomkins, 1962). They were termed “fundamental” emotions, because each of them has a “specific neural substrate” (Izard, 1977 p. 83), a distinct facial expression and a unique subjective or phenomenological quality. The idea of the fundamentality of emotion, however, has been questioned at length by Ortony & Turner (1990), as there are many researchers who have enumerated their own versions of basic or fundamental emotions. The number of basic emotions ranges from a minimum of two (Weiner & Graham, 1984) to a maximum of 18 (Frijda, 1986). Researchers, therefore, are still in a quandary as to the real number of basic emotions and the reasons for classifying emotions as basic or not.

The Differential Emotions Theory has been used to distinguish basic emotions from facial expression (Izard, 1977). It has its roots in the study of animal

behavior. Darwin in particular believed that facial expression is a form of social communication and developed from the evolutionary process (Izard, 1977). Essentially, a facial expression is an external and observable indication of a person's internal states.

Ten fundamental emotions are discussed by Izard (1977) as follows:

1. Interest – excitement – in this kind of emotion, the person shows signs of attentiveness, curiosity and fascination. It is positive in nature and is responsible for the development of skills and learning.
2. Joy – is another kind of desirable emotion. This kind of emotion is associated with doing something that a person likes such as work, adventure and games. In facial expression research, this emotion is associated with a smile.
3. Surprise – is an emotion that is a result of something that is unexpected. This is neither negative nor positive, because when a person is surprised, his mind is cleared up of thoughts, and he is faced with something that he is not prepared for. Widening of the eyes and holding of breath characterize this emotion.
4. Distress-anguish – is a negative emotion. It is associated with a painful experience that results in sadness or loneliness such as losing a loved one. A wrinkled forehead characterizes this emotion.
5. Anger - is a negative emotion. This feeling may be caused by a rude remark or a personal attack. An angry person may look red in the face.
6. Disgust – may be experienced together with anger but it is a distinct feeling. Unlike anger where there is an impulse to hurt a person, disgust causes a person to flee the situation. The face shows disgust through a wrinkled forehead coupled with an open mouth that may show the tongue as if one wants to vomit.
7. Contempt – is a feeling of superiority over other people or groups. It is an emotion that occurs together with anger or disgust or both. Izard (1977p. 89) names these emotions as the “hostility triad”, and this feeling can motivate

one to commit gruesome acts such as killing another person. This is a “cold” emotion that may not be as observable as anger.

8. Fear – is a feeling that may paralyze or kill a person. It may be brought about by a traumatic experience in the past that the person always remembers. Fear shows in the face through widely dilated eyes, wrinkling of the forehead and opening of the mouth.
9. Shame – is brought about by a person’s non-conformance to a standard set by society. This emotion results from a person’s need to belong to a group. If one does anything that is not attuned to the values of the group, shame is felt. Bowing the head usually indicates shame.
10. Guilt – is an emotion that is closely akin to shame. If shame is brought about by one’s failure to comply with society’s standard, guilt is brought about by one’s failure to do something right as dictated by religion or ethics.

The reliability of facial expression as a way to judge emotion has been proven by the study by Tomkins and Carter (1964). Their study showed that observers have high agreement on the interpretation of emotion through facial expressions. Tomkins also influenced future studies done by Izard and Ekman on the effect of culture on emotional expression.

Cross-cultural studies suggest that there is universality in interpreting emotion in facial expression (Keltner & Ekman, 2004). The studies were able to disprove the ideas that there are cultural differences in facial expressions. Moreover, Ekman & Friesen (1978) were able to devise a way to classify facial expression from the movement of facial muscles. The evaluation of facial muscles, however, is very difficult to learn and only a handful of people are well versed in it.

The fundamental emotions that were identified through facial expression research, provide a list of emotions that researchers can use to identify what subjects feel in emotion studies. It is implied from this classification that a person can possibly experience several emotions at the same time at different intensities. However, combinations of emotions may not show in the face distinctively. In the context of studying affect in the pre-purchase stage, the ten fundamental emotions would probably be only partially useful for characterizing what consumers feel when they see a product. There are some emotions that consumers are not likely to feel when

they see a product, such as anger or contempt. Moreover, there is a need to identify the resulting feelings if there is a mix of emotions. The Differential Emotions Scale which considered 30 adjectives does not consider all emotion combinations. If one were to determine the number of emotion combination from this list, it would amount to 45. In this case, the analysis can be likened to the derivation of colors in which the combination of primary colors result in other colors. However, facial expression can only show a limited number of emotions and cannot differentiate between two related emotions of different intensities.

Facial expressions are limited to those emotions that are observable. There are emotions that can be felt without being observed. Contempt, for example, is difficult to detect in the face because the person might want to hide it. Therefore, emotion will show on the face only if the person would like others to know.

2.2.2 Russell's Circumplex Model of Affect

Russell (1980) proposed that affective dimensions are not independent but are related in a systematic fashion. Russell based his hypothesis on the earlier work of Schlosberg (1952) who posited that emotions are arranged in a circular manner.

Russell (1979 p. 345) defined affect as "emotion as represented in language". As such, his conceptualization was based on studies of using the semantic differential technique, which considered evaluation, activity and potency to be the primary dimensions of the meaning of words (Osgood, 1969). Russell and Mehrabian (1977) thought that these dimensions engender affect, so they proposed a parallel framework to express emotion in words, namely; pleasure, arousal and dominance or PAD. They identified the three dimensions by asking subjects to rate environments using several adjectives and used statistical data reduction methods such as principal components analysis, factor analysis and cluster analysis to identify the structure. Later, Russell & Pratt (1980) concluded that dominance is not a dimension of affect. In this later study, only pleasure and arousal were used and these concepts accounted for a large percentage of the variance.

The cognitive representation of affect was also characterized as having bipolar dimensions. Russell (1979) showed the bipolarity of affective space using regression analysis. He asked subjects to indicate what they were feeling on a particular day by using eleven sets of adjectives with a total of 58 items using unipolar scale of different formats. He hypothesized that if affect is really bipolar, then

words that are opposite will have a high negative correlation and those that have the same meaning will have high positive correlation. Considering the effect of acquiescence (the tendency to agree-disagree to an item regardless of content) it was shown that affect is bipolar.

Since there are only two dimensions of affect found in the early studies of Russell, it had been a problem where to place the myriad affect terms such as anger, disgust, and excitement in this framework. Russell & Pratt (1980) studied this in greater detail and found that the other affect terms that are not synonymous with pleasure – displeasure or degree of arousal can be actually arranged in a circular order around the space defined by the two axes as shown below.

Figure 2 Russell's Circumplex Model of Affect

As can be seen in Figure 2, “exciting” is a feeling that is characterized by high arousal and pleasure while “boring” is characterized by low arousal and pleasure. In this model, Russell points out that other feelings can well be represented as a combination of a level of arousal and pleasure.

The Circumplex model of affect may not be relevant in all emotion studies, particularly in studying consumer behavior during the pre-purchase stage. When a consumer goes to a mall or a showroom, feelings of sleepiness or distress may not apply. Most people buy products that capture their attention and the moment of seeing a product one likes is basically stimulating. The faculties of perception such as eyes or ears receive a signal that is transmitted to the brain for further processing and this cognitive activity enhances brain activity that prevents sleepiness. Distress,

on the other hand, may not be felt because people will not be drawn to products that will distress them.

It is possible that the model of affect may differ depending on the situation.

2.2.3 Plutchik's Structural Model of Affect

Plutchik (1980) proposed a model of affect based on a psychoevolutionary theory. This theory suggests that as species evolve, they perform key adoptive functions that help them survive at each stage of the evolution process. According to Plutchik, there are eight adaptive functions and each of these functions is tied up to a basic emotion, and behavior as shown below.

Table 1: Plutchik's Basic Emotions

Adaptive Function	Basic Emotion	Behavioral Expression
Incorporation	Acceptance	Affiliating
Rejection	Disgust	Repulsing
Protection	Fear	Escaping
Destruction	Anger	Attacking
Reproduction	Joy	Cooperating
Reintegration	Sadness	Crying for help
Orientation	Surprise	Stopping
Exploration	Expectancy	Exploring

The need to protect one self, for example, results in the emotion of fear and a person expresses it by escaping the object or situation that is fearful.

Plutchik (1980) also presented a structure of emotion based on this theory (See Figure 3). He posited that the eight emotions (located at the top of the figure) and their combinations might be structured in a conic shape that is three-dimensional. The eight emotions can be paired as opposites in a circle at the top of the cone, and the height of the cone conveys the intensity of the feeling. For example, grief, which is located on top of the cone, is more intense than sadness and sadness is more intense than pensiveness. Grief is placed opposite ecstasy while loathing is opposite adoration. The level of arousal is maximum at the top and minimum at the bottom.

The structural model of affect is a cross between Russell's (1980) circumplex model and the identification of fundamental emotion presented by Izard (1977).

However, unlike Russell (1980), Plutchik only considered one dimension of emotion, which is pleasure. In consumer research, the dimension of pleasure is considered important because it is an index of customer satisfaction. The model only explored the resulting feelings if the basic emotions became more intense and did not take into account what people felt if arousal and intensity varied at the same time.

Figure 3 Plutchik's Conic Structure Model of Affect

Richins (1997) thought that the nature of emotion in the consumption experience may be different from the framework of emotion developed by psychologists. As such, the measures used in the consumer experience may be different. Richins, therefore, proposed an alternative method for assessing consumption related emotions and tested its validity. However, her study focused on consumption experience and not necessarily on the pre-purchase situation, which is the concern of this study. Richins' (1997) work will be discussed further in the next section.

In relation to the contention of Richins, Plutchik's (1980) model was conceptualized to consider emotion that people feel in all possible circumstances. Consumers while purchasing a particular product may not experience some of the emotions enumerated in the model. It is posited that consumer emotions are often less intense and they may be unique to the pre-purchase context. It is possible that a different model of affect should be used to describe the feelings of consumers when they are about to buy a product.

2.2.4 Positive and Negative Affect

The previous theories of affect identified basic emotions and their corresponding structure. However, it can be seen that these emotions were not classified according to their valence. In Izard's (1977) taxonomy and Plutchik's (1980) models, there were more negative than positive emotions. In both theories, only joy is positive and the rest are either neutral or negative. In Russell's model, on the other hand, it was not explicitly identified which quadrant corresponds to negative or positive affect.

In an earlier study, Bradburn (1969) investigated the structure of subjective well-being and identified a two-dimensional construct: positive and negative affect. He developed scales of positive affect (PAS) and negative affect (NAS) consisting of ten feelings each. Positive affect (PA) pertains to a state where a person is full of energy, concentrated and is pleurably engaged, whereas negative affect (NA) is a state of subjective distress and unpleasurable engagement (Watson, Clark, & Tellegen, 1988). Negative affect comprises of anger, disgust, fear, nervousness, guilt and contempt. A factor analysis found that PA and NA were largely independent of each other (Watson, 1988). This only means that it is possible that a person can feel both positive and negative affect at the same time but maybe at different intensities. Diener & Emmons (1985) validated the independence theory of PA and NA and concluded that there is a strong negative correlation between the two affects when the person is emotional. However, for longer time period independence is observed in the data.

The validation of PA and NA as two independent constructs leads to the development of the Positive Affect and Negative Affect Scales (PANAS) by Watson, Clark & Tellegen (1988) of a joint reliable measure of PA and NA. The scale consists of 10 words of NA and 10 words of PA that subjects have to rate from 1 – very slightly to 5- extremely. The words used in the scale are shown in Table 2 below. It should be noted that these words should not be construed as pairs.

Not all of the words describing PA and NA may be applicable to the pre-purchase context. Strong, for example is a vague word that may be construed as being physically fit to lift weights. As such, people who answer this questionnaire, especially women might not think that they are strong.

Table 2: Words in the PANA scale

<i>Positive Affect</i>	<i>Negative Affect</i>
Interested	Distressed
Excited	Upset
Strong	Guilty
Enthusiastic	Scared
Proud	Hostile
Alert	Irritable
Inspired	Ashamed
Determined	Nervous
Attentive	Jittery
Active	Afraid

2.2.5 Psychophysiology of Emotion

In the late 19th century, William James and Carl Gustav Lang independently pointed out that “emotion is a function of sensory and motor areas of the neurocortex, and that the brain does not possess a special system devoted to emotional functions (Le Doux & Phelps, 2000 p. 157).” This theory asserts that emotion is a result of physiological changes in our body and not the opposite (See Figure 4).

Figure 4 James-Lang Theory of Emotion

This idea was challenged by Cannon and Bard who asserted that the reverse happens as shown in Figure 5. Emotion is first felt and then the physiological changes follow such as muscular tension, reddening of the face, etc. The diagram below shows how emotion is formed according to the Cannon-Bard theory of emotion.

Figure 5 Cannon-Bard Theory of Emotion

Both theories acknowledge the role of brain functions in the formation of emotion. The Cannon-Bard theory, in particular, identified at least two brain areas involved in emotion processing, namely; the thalamus and hypothalamus. Based on this theory, the circuit theory of emotion was proposed that involves the hypothalamus, anterior thalamus, cingulated gyrus, and hippocampus. These parts of the brain together with the amygdala, septal nuclei, orbito-frontal cortex, and portions of the basal ganglia were later called the limbic system to describe the center of human emotions. The limbic system shown in Figure 6 is the part of the brain that commands emotions that help humans survive by modulating specific functions such as caring for children and protecting oneself (Le Doux & Phelps, 2000).

The amygdala is one of the most important parts of the brain for emotion processing as it determines the emotional significance of stimuli (Amaral & Oliviera, 2003). Damage to the amygdala may result in the Kulver-Bucy Syndrome characterized by loss of fear response and hypersexuality, among others. The amygdala is related to other sub-cortical structures of the brain such as the medulla, hypothalamus and hippocampus. The medulla is the cortical input to the Vagus nerve that regulates the heart rate and carries sensory messages to and from the brain. The hypothalamus, on the other hand, regulates motivated behaviors such as hunger, thirst, sexuality and combativeness. In relation, the hippocampus is the part of the brain that enables storage in long-term memory. Its function enables a person to compare a threat experienced in the past with the present situation. The comparison facilitates identification of possible strategies for survival (Amaral & Oliviera, 2003).

Figure 6 The Limbic System

The two hemispheres of the brain are also believed to control different kinds of emotions according to the Valence Theory of Emotion. This class of theories posits that the frontal lobes are involved in the experience of emotion (Achuff, 2003). The left hemisphere is more involved in cheerful emotions while the right hemisphere is more involved in negative emotions. This theory has been validated by tracking brain activities using electroencephalogram (EEG). Empirical data show that when a person feels sad, there is relatively more EEG activity on the right hemisphere whereas if one is happy the activity increases in the left hemisphere (Davidson, Schwartz, Saron, & Bennett, 1979). A related study done by Damasio (1994) revealed the relationship of emotion and reason. People with damage in the frontal lobe experience affective disorders such as the inability to feel sadness in the event of a misfortune. Although these individuals have their reasoning capability intact, they cannot seem to make wise decisions and are not able to handle their affairs well. The experience of these people contradicts the belief that emotion and reason are at odds with each other. Rather, reasoning is guided by emotions.

The proponents of the theories presented above have empirical evidence to support their claims. There is not one theory that offers a comprehensive explanation of the causes of emotion. It is reasonable to believe that emotion is caused by many factors which include both outside stimuli and memory recall of good or bad experiences. The neuroscience theories of emotion suggest that healthy brains are capable of discerning the appropriate emotion in a particular situation. In the search

for relevant emotions on the pre-purchase affect, it is assumed that consumers are of sound mental health, and they will experience the relevant emotions for a given stimulus.

2.3 Measurement of Affect

Emotion is hard to define and even harder to measure. Devising a way to measure affect is important because people's actions are connected to the type and intensity of affect that they feel. If decisions and actions must be predicted through statistical means, there is a need to devise a way to measure affect in a context and integrate this measure in a model to allow prediction.

Before identifying an acceptable way of measuring emotion, it is first necessary to select or develop a model of affect that is appropriate for the context of the study (Plutchik, 1989). Such a model will serve as guide in recognizing the kinds of emotion to be measured and the number of dimensions to be assessed in the measurement.

Researchers have devised many ways of detecting affect and measuring its intensity. Some of the more relevant measurements to this study are discussed in the following sections.

2.3.1 Self-reports of emotional experience

One way to measure the emotional experience of a person is to identify the emotion and its intensity felt through the use of rating scales and adjective checklists (Larsen & Fredrickson, 1999). One methodological dilemma is to use a scale to measure emotion or to just identify the types of emotions experienced. This is one reason why so many techniques have been devised to describe emotional experiences. Many techniques assume that participants can recall what they have felt in a certain situation and that they can assess the intensity of what they feel using a scale. It also implies that the participants are capable of identifying the types of emotions they feel and distinguish it from another.

One of the simplest and most logical ways of measuring emotion is to ask a person what s/he feels at that moment. It can be a statement of intensity of a particular emotion such as degree of sadness (Larsen & Fredrickson, 1999), or a rating of an affective dimension such as degree of pleasure and arousal (Russell, 1980). Likert scales are commonly used for this type of measurements. In using the

Likert scale, the subject is required to respond to a series of statements and express agreement or disagreement usually a five-point scale (Murray, 2001). One of the advantages of this kind of measurement is its effectiveness and efficiency in assessing emotional experiences (Mano & Oliver, 1993). Participants can easily understand the scale and answer it. Moreover, the results are easy to interpret. However, if the scale is not constructed properly, it may lead to a response bias such as participants avoiding “undecided” responses or feeling forced to respond to irrelevant emotions (Russell, 1979). Moreover, if there is only one type of emotion being studied, the simplicity of the process may lead to greater sampling error, since extraneous variables may not be considered in the study and may cloud the results. However, despite the disadvantages mentioned, this kind of technique is widely used in emotion research (Larsen & Fredrickson, 1999).

Aside from the Likert Scale, the Visual Analogue Scale (VAS) may also be used to determine the feeling of a participant such as the Minot Mood and Emotion Scale (American Psychological Society, 2004). The VAS is usually shown as a line that is 100 mm in length that corresponds to the scale from 1-100. It uses two word descriptors as anchors on both sides of the scale such as “not sad” and “extremely sad”.

Some scales have been developed to measure specific subsets of emotions such as negative affect, positive affect, and level of arousal. There are also a few scales developed to exhaustively enumerate emotions and rate the intensity of experience. These scales are discussed below.

One exhaustive measurement technique that also uses rating scales is the Mood Adjective Checklist (MACL). Although this is a checklist, a rating of affect is indicated on the description of the emotion felt by the participant (Larsen & Fredrickson, 1999). This checklist consisted of 130 items initially, but after factor analytic study, 36 items were retained in the short form of MACL (Larsen & Fredrickson, 1999). The MACL used a four bipolar dimensions of mood, namely; (a) level of activation, (b) level of control, (c) social orientation and (d) hedonic tone (Lorr, 1989). The MACL was replaced by the Multiple Affect Adjective Checklist (MAACL) developed by Zuckerman and Lubin . The MAACL was designed to measure negative affect such as anxiety, depression and hostility, and is not very applicable in the study of affect in consumer behavior. The MACL is a better scale to assess consumer feelings, because it also considers positive affect.

The Activation-Deactivation Adjective Checklist (A-D ACL) was based on the theory of activation. This theory considered only words that are related to being active or inactive such as lively, active, and sleepy, and asked the participants to rate their feelings using a four-point scale ranging from “definitely do not feel” to “definitely feel”.

The Differential Emotions Scale (DES) uses a five-point rating scale to describe how subjects feel at the present time (Izard, 1977). It consists of 30 adjectives, three for each of the 10 fundamental emotions identified by (Izard, 1977). The DES was modified to include the frequency a person experiences a particular emotion, which resulted in DES II. This frequency scale aims to determine not only momentary experience of emotion, but also the emotional traits of a person. The original DES may be used for studies of affect in product design, albeit not all of the emotions may be relevant.

A more recent addition to the many emotion rating scales is the Positive Affect – Negative Affect Scale (PANAS) developed by Watson, Clark & Tellegen (1988). This scale is based on Russell's Circumplex model of affect where 10 adjectives are included for each of positive affect and negative affect. The adjectives are then rated using a five-point scale. A related approach is the Affect Grid which is also based on the Circumplex model. This grid is constructed using the affect dimensions of pleasure and arousal. The grid is a “nine-by-nine matrix where the emotion adjectives are placed at the midpoints of each side of the grid, as well as the four corners (Larsen & Fredrickson, 1999 p. 45)”. The participants are asked to identify the kind of emotion they experience by checking a cell in the grid. It has the advantage of being easy to use as compared to other measures of pleasure and arousal.

The discussion on the various scales shows that most of them are developed with a particular context in mind, specifically, counseling psychology. This may also be the case in studying affect in product design because consumer's feelings may not be adequately captured by the models and scales previously discussed. There is a need to identify from empirical studies, the most significant feelings during the act of shopping and integrate these feelings into a model.

2.3.2 Facial measurement of emotion

The studies by Ekman & Friesen (1975) on facial expression paved the way to the Facial Action Coding System (FACS), which is a system of measuring and describing facial behaviors (Dataface, 2003a). The system consists of 46 action units (AU) that are based on the movements of the face. For example, two muscles, corrugator supercilii and the depressor supercilii, cause AU4 or the lowering of the eyebrow. This only shows that the technique involves identifying the movement of the face and then determining the appropriate action unit to describe it.

FACS was developed by studying the muscles that produce characteristic facial expressions. During its inception, the participants were asked to pose and illustrate facial expressions that they believed were result of certain emotions (Sayette, Cohn, Wertz, Perrott, & Parrott, 2001). The use of FACS, however, does not aim to define the emotion felt by an individual at a certain moment. It only seeks to describe the movement of the face because its developers were aware that facial expressions do not fully correlate with emotions (Larsen & Fredrickson, 1999). Some people tend to control the movement of their face when they experience extreme emotions such as anger. Not all emotions that are experienced show in the face.

Studying FACS is not very easy as it takes much time to discern one split second facial movement from another. A person who wants to learn the use of FACS needs several weeks of training (Wirtz, 1992). As a result only a handful of researchers have used this technique.

Another less comprehensive method of measuring facial activity is Izard's Maximally Discriminative Facial Movement Coding System (MAX), which is widely applied in analyzing facial expressions of infants (Sayette et al., 2001). Izard's units in MAX are based on appearances associated with the eight emotions and not the facial muscles. This method is easier than FACS as the analysis is limited to the eight emotions. However, facial expression does not have a one to one correspondence with emotion. People have a tendency to suppress their emotion and not allow others to observe it. This is especially true of men who try to conceal their feelings as it is construed as a sign of weakness. As such, it is reasonable to assume that facial expression research may not be adequate to be used in consumer behavior research. It should be used in conjunction with other emotion measurement techniques to ensure that even emotions that are not observable may be measured.

A more recent technique developed by Desmet (2003b) called Product Emotion Measurement Instrument (PrEmo) combines facial expression and self-report measures. The main advantage of this technique is that it can measure specific emotions and can be used in different cultures. This measurement technique uses 14 expressive cartoons that represent 14 emotions. These 14 emotions are classified into equal number of pleasant and unpleasant emotions. The pleasant emotions are desire, pleasant surprise, inspiration, amusement, admiration, satisfaction, and fascination, while the unpleasant ones are indignation, contempt, disgust, unpleasant surprise, dissatisfaction, disappointment and boredom. In lieu of words, the respondent chooses the cartoon that best represents one's emotion at the moment and when this cartoon is chosen, a 3-point scale will automatically shown with the following ratings: "I do feel the emotion," "to some extent I feel the emotion," and "I do not feel the emotion expressed by this animation." The 14 emotions may not be all relevant in describing the emotions in the pre-purchase situation because these are the only ones that afford distinct facial expression. There are emotions in the pre-purchase context that cannot be captured in the face and exists only in the mind of the subject.

2.3.3 Autonomic measures of emotion

The James-Lange theory of emotion emphasizes the role of the autonomic nervous system in the definition of emotion (Whissel, 1989). According to this theory, emotions are felt because of some physiological responses to stimuli. If a person sees something fearful such as a snake, one trembles and that is a sign of fear (Dataface, 2003b). Although many researchers have contested this theory, the contention that emotion is related to visceral activity has been supported in numerous studies.

The relationship of emotion to visceral activities provides the logic for measuring the activity of the autonomic nervous system (ANS) to document the experience of an emotion. Some of the more useful autonomic measures of emotion include electrodermal activity, respiratory activity and cardiovascular activity (Larsen & Fredrickson, 1999).

A problem with autonomic measures is that they fail to identify a specific emotion. For example, an increased heart rate may be caused by excitement as well as fear, while low heart rate may indicate boredom and disgust. As such, the autonomic measure can only compare two identified emotion and cannot identify the

emotion just from the measurement. Moreover, Cacioppo et al. (2004) observed that the early work done to relate autonomic activity to affective reactions has not resulted in consistent findings.

In the study of consumer behavior, autonomic measures may not be practical to use because of the intrusiveness of the method, high cost of measuring equipment and the slow reaction of the ANS. Most equipment that measure ANS such as the biofeedback and respiratory flow meter are bulky and expensive. Earlier models are also not very accurate which severely affect the generalizability of the findings. Moreover, visceral activity is too slow and diffuse to determine an emotional experience. Detenber, Simons & Reiss (2000) found out that the use of color in film clips only affect self-reports of emotion and not the viewer's physiology. This may also be true in consumer behavior, because customers' emotions may not be strong enough to result in an observable physiological response. Peter and Olson (1999) asserted that weak affective responses and low arousal levels characterize product evaluations.

2.4 Affect and Consumption

Most of the studies on affect in marketing focused on the relationship of affect with customers' response to advertisement, purchasing decision, and product evaluation (Adaval, 2001, 2003; Batra & Ray, 1986; Gardner, 1985; Mano & Oliver, 1993; Mattila & Wirtz, 2000; Maxwell & Kover, 2003). These studies explored how mood, experience of positive and negative affect can help or hinder the consumers' intention to purchase or consume a product or service. However, consumption in this study does not only include the actual usage of the product. Consumptions as will be discussed in the succeeding section, also include anticipatory consumption, which does not necessarily involve purchasing the product.

2.4.1 Affect and product judgment

People's judgment of products depend not only on quality or price but also on the affect related to its purchase and consumption (Adaval, 2003; Gorn et al., 1993). The affect experienced by a shopper may come from an earlier interaction with another person, the store environment, the salespeople or even the inherent mood trait of the individual. Garbarino & Edell (1997) affirmed that in the product categorization process, negative affect may be generated. Basically, shoppers do not want to be confronted with a situation loaded with cognitive difficulty, and if faced

with such it can change one's assessment of the product. Negative affective states may generate negative views about the product or service and this leads the consumer to evaluate the experience worse than expected (Babin, Darden, & Babin, 1998).

Positive mood is generally associated with positive evaluation of a product (Adaval, 2001; Barone et al., 2000; Norman, 2003). Positive mood is characterized by feeling happy or elated. Swinyard (1993) explained that people in a positive mood have the desire to sustain this mood state which in turn leads to biased evaluations. This bias prompts shoppers to emphasize the positive attributes of a product. However, the effect of mood is evident only if the subjects are not aware of their current mood state at the time of experiment. If they are made aware of their mood, then it does not affect their judgment (Gorn et al., 1993). In relation to this, Adaval (2003) contended that information that is similar in valence with the mood experienced at that time is given importance in product judgments. This means that if a person sees a pair of Levis jeans and notices that the price is quite unreasonable, s/he will give a good evaluation if s/he feels happy. Similarly, the affective qualities of a product are also given more weight when the time to evaluate the product is limited (Shiv & Fedorikhin, 1999). Given a binary choice situation, the consumer is inclined to choose a product that conforms with one's hedonic goal if processing resources is restricted. This explains the behavior of people who impulsively buy products because they do not have time to think about it from an objective point of view. Rather, they rely on what they feel at the moment and the possible reinforcement from antecedent information such as low price.

Swinyard (1993) cited the role of involvement in product evaluation. Involvement is not mentioned in any taxonomy of affect, but it plays a significant role in evaluating a product positively. He affirmed that when consumers are engrossed with the product, they likely give a positive evaluation. Mano & Oliver (1993) stressed that involvement is very important in product evaluation because consumers who have high involvement in the product, experience high levels of arousal and stronger reactions. However, a positive evaluation of a product does not necessarily translate into an intention to buy the product.

The antecedent state of a person can also affect product evaluation (Gardner, 1985). This state refers to all the financial, psychological and physiological baggage that a consumer brings to the shopping experience. If the antecedent state is

negative, the consumer may confuse these feelings with the evaluation of a product. One tends to look at the negative aspects of the product, because one is not in the mood to think positively in the given situation.

These previous studies related affect in general terms to product evaluation. The valence of affect determines the kind of evaluation given to the product, although there are no particular emotions identified. Most of the studies considered mood instead of emotions because it was believed that the shopping experience does not evoke enough feeling intensity.

Affect in the studies previously mentioned was induced before the product evaluation process was conducted. The induction process was done by either manipulating the environment or the subjects' feelings by giving gifts or verbal complements. Affect, therefore, did not come from the product itself but from the experimenters. This study, on the other hand, will focus on the capability of the product to induce affect and the relationship of this to product characteristics.

2.4.2 Affective responses in consumption

The taxonomy of affect devised by Izard (1977), Russell (1980) and Plutchik (1980) considered all emotions that can possibly be experienced in various situations. Richins (1997) inquired whether these classifications are relevant in the consumption experience. Some of the basic emotions are too strong to be felt by a shopper while looking for a product to buy. In a related study, it was found that advertising brings about low intensity emotions that were limited in nature. Richins (1997), therefore, found it necessary to identify the emotions relevant to the different stages of consumption experience.

The result of Richins' (1997) study yielded the Consumption Emotion Set (CES), which was derived from the analysis of three consumption situations, namely; automobile, recreational and sentimental. There were seventeen sets of emotion: anger, discontent, worry, sadness, fear, shame, envy, loneliness, romantic love, love, peacefulness, contentment, optimism, joy, excitement, surprise and others. Westbrook (1987), in a related study, observed the experience of joy in the evaluation of a vehicle. However, this emotion set was constructed considering all facets of consumption from anticipation to actual use of the product. Therefore, this list is still very wide in scope and may not be very relevant in the pre-purchase

situation. Moreover, non-valenced emotions such as interest and surprise were not included in the analysis.

Mano & Oliver (1993) made a similar study but considered only the post-consumption experience. They identified three aspects of post-consumption experience: evaluations, feelings and satisfaction. They proposed that satisfaction is closely related to affect but affect precedes satisfaction. Their study sought to validate the two dimensions of affect proposed by Russell (1980), namely; pleasure and arousal. The results suggested that the dimensions of affect proposed by Russell are tenable in the consumption experience, but a three-factor solution included positive affect, negative affect and low arousal and warmth. These results coincide with the findings of Westbrook (1987) that positive and negative affect influence consumption experience. Furthermore, Havlena & Holbrook (1986) were also able to confirm that Russell and Mehrabian's (1974) pleasure, arousal and dominance (PAD) paradigm is consistent with the consumption experience. It is worth noting that the study of Havlena & Holbrook (1986) addressed only the post-purchase experience.

Desmet (2003c), on the other hand, classified emotional responses in five categories, namely: instrumental, aesthetic, social, surprise and interest. Instrumental emotion refers to the perception that the product can help the user achieve one's objectives, whereas aesthetic emotion pertains to the capability of the product to appeal to the consumers. Social emotion results from the use of products that adhere to socially determined standards. Surprise emotion is brought about by the consumer's perception that the design is new, while interest emotion is elicited by the combination of challenge and promise (Tan, 2000). In comparison with the work of other researchers, Desmet's work is limited in the sense that he only classified emotions and did not enumerate them. His study could have been extended by identifying emotions that may be classified under each heading through the use of factor analysis. However, his classification brought a new way of looking at the classification of emotion as not only positive or negative or pleasure and arousal.

2.4.3 Stages of affect in consumption

In discussing the sources of affect in consumption, it is necessary to divide the situation into pre-purchase and post-purchase stages. The pre-purchase stage refers to the time when the consumer is looking for a product to buy, which is already determined before hand. Post-purchase stage, on the other hand, refers to the actual consumption or use of the product.

Pre-purchase stage. A consumer who enters a store may already have decided to purchase a particular item or may be just window-shopping. For example, a newlywed couple may have decided to buy a dining set, but they still have to decide which style to select and where to buy it. Whereas, an office worker who still does not want to go home, may hang out in a shopping mall to explore the latest fashion on sale.

Both situations offer an opportunity for shoppers to buy. However, their decision depends on many factors, foremost of which is the price. Another important factor is affect, which is acknowledged as a means to motivate people, and shop owners are interested to know the manner it influences them to buy (Westbrook, 1987).

In the pre-purchase context, there are numerous sources of affect, namely; the surroundings, sales personnel, and the experience of disease. Each of these sources is discussed in detail below.

In the early work of Russell (1980), the interplay of surroundings and affect was explored. The emotions in the Circumplex Model of affect were derived from experiments involving emotions elicited by the physical environment (Russell & Pratt, 1980). People who were exposed to an environment either choose to avoid or stay depending on what they felt about the surroundings. A typical situation is when buying a house. Aside from the price and location, house buyers look for affective qualities including layout, color, and style. The same thing would be true in the shopping experience where shoppers were also affected by the physical surroundings. Managers of department stores have recognized the effect of environmental design on the behavior of consumers, although little experimental study has been done on this topic (Bitner, 1992).

Physical surroundings encompass the layout of a store, temperature, music and decoration. Marketers manipulate these variables to induce the mood they want in a store or service encounter (Gardner, 1985). Music, for example is believed to spur sales and enhance the image of the store (Milliman, 1982). Layout, on the other hand, may be confusing and may generate feelings of frustration that may discourage people to buy. This is particularly true in the grocery store when a person looking for a particular product cannot find it and decides to leave.

Another relevant source of affect in the pre-purchase context is the interaction with sales personnel. Bell (1999) noted that consumers like to visit shopping areas where sales personnel are customer oriented, friendly and courteous. If the experience of the customer had been the opposite of this, negative affect may set in and influence purchase intention (Maxwell & Kover, 2003). For example, if the sales personnel is not very knowledgeable about the product and is not helpful, the customer may become irritated and decide not to buy. At the extreme, some people may be annoyed by sales personnel who are over attentive.

Negative affect is caused not only by interaction with other people, it may also be inherent in the person who is suffering affective disorder. It is reported that 11 to 15 million people in the United States are suffering from this, and this represents a significant part of the market (Maxwell & Kover, 2003).

Although it is logical to believe that a shopper's bad mood may not lead to a purchase, Swinyard (1993) showed that mood does not directly affect shopping intention. The interaction between involvement and shopping experience has a more significant effect.

For the author, the source of affect during the pre-purchase stage is important to control or take note of during experimentation. It is necessary to design an experiment environment that will not bias the results caused by extraneous factors.

Post-purchase stage. The post-purchase stage includes the time when the consumer has already purchased and used the product. At this stage, affect is caused by the experience of satisfaction. Satisfaction is a broad concept that can be defined by emotions of joy and pleasure whereas dissatisfaction is related to feelings of disgust, anger and disappointment.

Jordan (1998) reported that pleasure as well as displeasure are experienced during the use of a product. Displeasure is brought about by poor performance, poor reliability and poor usability. Disconfirmation of expectation is another source of negative affect in the post-purchase stage. This happens when the performance or quality of a product does not conform to the customer's assumption.

The preceding discussion on the role of affect in consumption showed that affect has a great influence on consumer's judgment of a product but it is not certain if a positive judgment will lead to a purchase. In the studies reviewed, many outside

factors influence pre-purchase affect. However, there are no studies that considered product characteristics as a source of affect. This is the focus of the present inquiry. As the product itself has its own affective qualities that may influence customers to buy the product, it is important to understand how product qualities can affect the moods and feelings of consumers. It is also worth investigating if different cultures have different judgments of product attributes.

2.4.4 Consumption measure

The most logical and accurate measure of consumption is the amount of sales generated. In the case of a product manufacturer, this can easily be traced by referring to sales records. However, in marketing studies consumption cannot be measured because the products have not yet been launched. Moreover most marketing studies done using surveys or interviews with rating scales to predict the amount of consumption referred to this as the “hypothetical purchase intention” (Gorn et al., 1993).

Morwitz (1997) used a 5-point scale to determine the likelihood that consumers will purchase a product. The scale has the following anchors: 5 – “definitely will buy,” 4 – “probably will buy,” 3 – “may or may not buy,” 2 – “probably will not buy,” 1 – “definitely will not buy.” Swinyard (1993), on the other hand, asked 5 questions using a 7-point likelihood scale ranging from very likely to very unlikely. Similarly, Garbarino & Edell (1997) as well as Gorn, Goldberg & Basu (1993) used a 10-point scale (very likely – very unlikely).

The items may include questions that pertain to the time that a consumer spends inside the store, likelihood that one will ask help from the store assistant, buy other items from the store and make an actual purchase. This method is more comprehensive. More information is obtained which may be correlated with one another.

Other measures of purchase intention include binary choices of yes or no while some researchers use semantic differential scale with anchors “definitely avoid” and “definitely buy” (Bredahl, 2001). Morwitz (1997) also mentioned that purchase intention can be expressed in terms of the time when a consumer plans to actually make a purchase (4 = “0 – 12 months,” 3 = “12 – 24 months,” 2 = “> 24 months,” and 1 = “never”).

Each of these measures can be used to determine hypothetical purchase intention as a substitute for a real value. A 10-point scale is favored because it contains more information and does not have a middle point to indicate neutral response. This will prevent respondents from “fence sitting”.

2.5 Affect and Consumer Decision-Making

Decision-making in any context is guided by principles that may be unique for different individuals. The rationality of decisions is subjective and depends upon the criteria that people use to arrive at a particular choice. The following section discusses theories of consumer decision that are relevant in the pre-purchase context.

2.5.1 Models of consumer decision-making

In their analysis of the consumer decision-making process Schiffman, Bednall, Cowley, O’Cass, Watson & Kanuk (2001) enumerated four models, namely; (1) economic man model, (2) passive man model, (3) cognitive man model, and (4) emotional man model. The economic man model assumes that a person makes rational decisions in an economic sense, and that he knows all possible alternatives in the market. This model had been criticized for being unrealistic because of its presumption of perfect knowledge. It is also not appropriate in the affective product design context because affect is not an economic variable.

The passive man model, on the other hand, depicts a person as someone who is submissive to the promotional efforts of marketing people. The main premise is that a person can easily be influenced by advertisements. It is thus implied that the product that is constantly promoted will be bought more by consumers. This model has been criticized for portraying people as irrational and not analytical. Some consumers research potential products and decide on a purchase based on the information gathered. The passive man model is not relevant in this study, because affect is not promoted although it is experienced by consumers when they evaluate a product. Information on affect is valuable since it includes important aspects of an existing situation.

The cognitive model of consumer decision-making depicts the consumer as a thinking problem solver. The cognitive model focuses on the processes by which consumers seek and evaluate information about product brands and retail outlets. In this case, the consumer is seen as an information-processing system that forms

preferences leading to purchase intentions. The preference formation strategy may be based on the input of other people such as friends, experts or relatives who help consumers establish their preference (Schiffman et al., 2001).

Consumers have a limited capability to process and remember information. The concept of bounded rationality proposes that consumers cannot be rational in an economic sense but try to make the best decisions given their information processing limitations. Consumers stop searching for product information if they think that they already have sufficient information to make a decision. Most of the time, consumers use shortcut decision rules (called heuristics) to facilitate the decision-making process. Heuristics are also employed to cope with information overload (Schiffman et al., 2001).

Some common heuristics employed by consumers in decision making include the availability heuristic (Folkes, 1988), scarcity choice heuristic, liking choice heuristic (Whittler, 1994), judgment referral heuristic (Mattila, 1998), and elimination by aspects (Tversky, 1972). The availability heuristic is used by consumers because of memory limitations. Information that is readily available at the time of purchase influences their decisions. On the other hand, the scarcity choice heuristic is used when there is an impending increase in price if the item is not bought at a particular time. In this case, the consumer thinks that a good deal will be lost if one does not make a purchase. Liking choice heuristic is influenced by affect as it refers to the feeling of the consumer towards the seller. This heuristic is commonly used by consumers when the items available are not extremely differentiated. Judgment referral is a heuristic that depends on what other people said about the product. Since most consumers avoid cognitive effort when making decisions, they rely on the input of other people. Another simplifying heuristic is the elimination by aspect proposed by Tversky (1972). Products that do not conform to criteria formulated by the consumer are immediately eliminated using this heuristic. As such, the choice is eventually limited to only a few items. This heuristic prevents cognitive overload on the part of the consumer.

The last model of consumer decision-making is based on emotion. In this model, consumer decision is based on deep feelings or emotions such as joy, fear, love, hope, etc. Consumers buy products because their emotions are activated during the purchase process. Emotions can be triggered by the environment (Bitner,

1992; Milliman, 1982), the salesperson (Bell, 1999), advertising (Batra & Stayman, 1990) and the product itself (Richins, 1997).

Impulse buying is triggered by emotion and happens when consumers do not have enough time to think about the decision (Shiv & Fedorikhin, 1999). However, it is not fair to say that decisions made by the use of emotions are irrational, because some products are meant to satisfy people's emotions and are perfectly rational.

Moods are also important in consumer decision-making, because they have significant influence when consumers shop. Barone, Miniard & Romeo (2000) found that positive mood influences consumer evaluations of brand extensions. Specifically, positive mood enhances consumers' evaluation of brand extensions viewed as similar to a core brand evaluated favorably by consumers. Swinyard (1993) also discovered that mood interacts with consumer involvement in the purchasing process. Shoppers in a good mood have biased evaluations of products, because they want to preserve the good mood they experience.

The emotional model of consumer decision-making asserts that some decisions are made because of strong emotions. The emotions are brought about by a number of things that also include the product itself. However, it is not known what product attributes trigger emotions and if the emotion is enough to form a purchase intention. Personal products, that indicate the user's personality, can evoke more intense emotion. If a consumer goes to a shop where ten wristwatches of the same price are displayed, at the end of the day this shopper will buy only one particular watch. The decision would not be based on price, utility, environment or salesperson interaction, because these are constant for all the ten designs. In this case, the design of the watch itself determines the decision of the shopper. The design could have activated some emotions that motivated one's decision to buy.

2.5.2 Emotion and consumer choice

A consumer is faced with many choices when buying a product. As such, there is a need to form a set of decision criteria to compare available options. These criteria can be complex or single criterion such as brand name, appeal, or design. The weighting of the criteria is influenced by emotion, and this entails giving emotional significance to choice criteria appropriate to a person's purchasing objectives. O'Shaughnessy (1987) enumerated six categories of criteria and discussed their emotion potential:

1. Technical criteria – The technical function of a product is the main reason for its existence. For example, a car functions to take a passenger from one place to another. A car can only be labeled as good if it is able to perform its core function satisfactorily. However, marketing people may include special features and describe their products to evoke emotions. Words like user-friendly and easily adjustable used to suggest pleasure when using the product. Positive emotions are usually felt when the performance or feature of the product is better than expected and negative emotions when expectations are not satisfied.

2. Economic criteria – One of the most important criteria that consumers use is the price, because the money they have to pay represents a sacrifice for buying the product. Paying for the product dampens the enjoyment that it brings to the consumer (Brittan, 1997). The maximum price of a product depends on its uniqueness, the social perception of the wisdom of paying the price, the perceived fairness of the price and the store location. All these factors evoke emotion on the part of the consumer.

3. Legal criteria – Some buying criteria are decreed by others, thus the name legalistic criteria. When a husband shops using a list prepared by the wife, it can be stressful, because the buyer may not find the appropriate things to buy or may encounter budget problems. Such shopping experiences can evoke frustration.

4. Integrative criteria – refer to the need of a person for social integration and integration with one's sense of identity. These integrative criteria involve social acceptance, self-identity, status, fashion, and personal integrity. Consumers think that they should buy products that will conform to the standards set by society and their own social milieu. Some people feel embarrassed if they do not conform to these standards and feel proud otherwise.

People buy products to express and distinguish themselves from others. Products that are bought to express self-identity link to emotions (Flanagan 1996, cited in O'Shaughnessy, 2003). These products include photographs that convey historical continuity, collections that symbolize artistic or intellectual interests, expensive items that indicate status and products that express social persona such as make-up.

5. Adaptive criteria – These refer to the desire of the consumer to minimize risk related to the purchase. Risks can be financial, physical, social, performance or

hassle in having to return the product. Many products are not evaluated thoroughly before the purchase, and as a result uncertainties arise. A high risk purchase, such as a cheap product of an unknown brand may bring anxiety to the consumer. In order to avoid risks, consumers tend to rely on what others such as experts or friends have to say. Most people opt to buy products of known brands or those that are endorsed by an advertisement.

6. Intrinsic criteria – These refer to the characteristics of a product such as its look, texture, smell, sound, etc. Products are bought to please the senses, and one reason for buying then is enjoyment. Consumers sometimes make irrational decisions because they seek pleasure. Markets abound of food that is nutritious but lacking in good taste. For example, non-fat mayonnaise is available for people who would like to reduce their fat intake. However, only a few people buy it because they prefer to enjoy the good taste of the real mayonnaise. This example shows, that even though some choices can be beneficial in the long run, consumers elect to maximize short-term pleasurable benefits.

Intrinsic criteria, however, are molded through education and experience. A person will not appreciate something as good unless one knows its benefit. Works of art, for example, may not mean so much for a person who does not know the artist and how the artwork came about. It may also be shaped by culture that somehow dictates the criteria for beauty.

The appreciation of beauty has emotional implications. Aesthetics pervades in products we buy, e.g. cars, clothes, furniture, food, painting, music, etc. Novelty invokes the emotion of wonder that draws attention to the product (O'Shaughnessy, 2003).

From the six criteria reviewed, it can be established that the environment, the situation and product characteristics incite emotions. Aside from rational thinking, emotion is used by many people to guide purchase decisions. Intrinsic criteria enforced the role of product characteristics in influencing consumers to buy a product. These intrinsic criteria were used in the present study as predictors of affect in the pre-purchase context.

2.5.3 Affect Infusion Model (AIM)

The affect infusion model (AIM) is a theory that explains how affective states influence various strategies in social judgments. Although this model had been developed to explain influence of affect in social judgments, the theory was analyzed as to its possible application in product judgments. Affect infusion refers to a process whereby affectively loaded information becomes incorporated into the judgmental process (Forgas, 1995).

Forgas (1995) related the opportunity for affect infusion to four fundamental judgment strategies, namely; (a) direct access strategy (b) motivated strategy (c) heuristic strategy, and (d) substantive strategy. The AIM asserted that little affect infusion would happen in the first two strategies, because they involve relatively closed information search processes, while the last two are more open ended and constructive and allows more chance for affect infusion.

The AIM is a relevant theory in this research because the different processing strategies can suggest if affect is infused in the situation. The type of processing that consumers go through can influence the result of the experiment and should be controlled. The knowledge of different processing mechanisms allows the author to become wary of possible nuisance variables in the study.

2.5.4 Affect heuristic

Decisions are simplified by many people by using heuristics or rules of thumb instead of making numerical comparisons of risks and benefits associated with a decision. One of the heuristics used in decision-making is affect (Slovic, Finucane, Peters, & MacGregor, 2002). Affect as defined by Slovic et al. (2002) is a quality of 'goodness' or 'badness' experienced as a feeling. Affective responses are felt instantaneously and the feeling signifies whether a stimulus is favorable or unfavorable.

Slovic et al's studies showed affect to be associated with images or scenarios that influence judgments and decisions. However, vague words that describe a person or a product do not create a precise image, and therefore the affect associated with the evaluated item is weaker. As such, it becomes more difficult to evaluate it using the affect heuristic.

Another feature of the affect heuristic is its context dependency. Available information may not be difficult to evaluate because there is no point of comparison. On the other hand, information about probabilities and proportion are easier to evaluate, because the decision-maker is aware of the upper and lower limits of probabilities. However, the opposite occurs if the outcome provides precise and clear affective meaning to a particular situation, such as the chance of accident. In this case, probabilities are ignored and the image is given more weight (Slovic et al., 2002).

Damasio (1994) investigated the lack of affect in patients with damage to the ventromedial frontal cortices of the brain. Despite the damage, the brains of these people have preserved their intelligence, although their ability for affect is impaired. As a result of this lack of feeling, they have been unable to make sound decisions in complex situations. The study showed that logical reasoning is not enough in decision-making. Emotional biasing is important to make choices that are practical in the long run.

When evaluating a product or service, the feelings of the consumer must be considered (Pham, 1998). According to Slovic et al. (2002) and MacGregor, Slovic, Dreman & Berry (2000), affect facilitates a person's judgment. When a person sees a product, an evaluation is immediately made on the basis of his/her feelings. The feelings are based on previous experiences about a similar product or the recollection of related information. The images that form in the mind of the consumer translate into good or bad feelings that help in the evaluation process. The quality of decision may not necessarily be good every time but time constraints usually dictate the need to arrive at a "satisficing" solution.

It is therefore important to design products that have more affective qualities to take advantage of the emotions experienced by consumers while inspecting products to buy. The physical characteristics of the product can be improved or modified to cater to the affective needs of customers. Customers need not know all the alternatives in the market and may buy on impulse based on their favorite color, shape, or texture. Product designers must identify the salient characteristics of the product they sell that can capture customers' attention because they can potentially elicit affect. Knowing that humans are not only thinking but also feeling beings, the possibility of them using their emotion must be considered.

2.6 Product Categorization

Before looking into the process of designing a product, and how affect is designed into a product, it is worth noting how various researchers have categorized products. The discussion is beneficial in documenting which types of products are particularly likely to evoke feelings from consumers.

2.6.1 Semantic categorization

Product semantics is a phrase coined by Krippendorf and Butter (Demirbelek & Sener, 2003). It refers to the inherent meaning conveyed by a product. People buy a certain product or brand because they want to express themselves through it. A product, therefore, tells a lot of things about the user. Bih (1992) classified products according to the meaning attached to the, namely;

- ❑ Television - functional and utilitarian
- ❑ Statues - religious or cultural
- ❑ Medals - personal achievements
- ❑ Mementos - memory aid
- ❑ Mobile phone - social exchange
- ❑ Travel - shared personal experience
- ❑ Antiques - personal values

In relation to this, Mono (1997) defined four semantic functions of products, namely: to describe, to express, to signal and to identify. These semantic functions coincide with some of the classification of products presented by Bih (1992). Affect is a psychological response to the semiotic content of a product. Therefore, products with meanings attached to it are likely to arouse emotions such as clothes and personal effects.

2.6.2 Technology-Driven versus User-Driven Products

Products can be classified according to the factors that drive their development. Ulrich and Eppinger (2000) classified products into user- or technology-driven or a combination of the two. Technology-driven products are those

that are bought by the consumers because of their technology and their ability to accomplish a certain task. One typical example is the hard disk drive of a computer. Although these products need to be designed considering ergonomics and other aesthetic aspects, the main selling point of this product is the technical capability.

User-driven products, on the other hand, are products purchased by consumers because of functionality and aesthetic aspects. Users interact with these products very often and they become quite personal. Owning these products give a sense of pride and a “semantic purpose”. An example is a wristwatch that is chosen by the user because of its style and uniqueness.

As a combination of these two extremes there are the technology-and-user driven products that have a high degree of interaction with the users and at the same time highly technological. A typical example is the mobile phone, which has become very personal to most users. Current designs of mobile phones allow more flexibility in terms of designing and personalizing it. At the same time, phone manufacturers are thinking of better ways to get ahead of their competitors by including more features in their product. Later designs of mobile phones include personal data assistant (PDA), camera, radio, and MP3 player.

From this classification, only user-driven technology and the combination of the two are likely to incite true emotion of users or possible buyers of the product. As such, only products belonging to these two categories are included in the present study.

2.6.3 Consumer vs. industrial products

In marketing research, consumer goods are classified as convenience goods, shopping goods and specialty goods (Tull & Kahle, 1990). Convenience goods are easy to buy. Some examples include candies, handkerchief, etc. Shopping goods require more effort on the part of the consumer in terms of travel and decision-making. Specialty goods are typically more expensive and take significant effort to buy. Examples include perfume, cellular phones and jewelry.

Another broad category of products is industrial goods, which include materials, fabricated parts, equipment, installations and supplies. These are purchased by companies and are not directly used by consumers.

In this classification, only consumer goods particularly shopping and specialty goods are likely to evoke feelings from the user or buyer, because they become involved with the product in looking for it and paying a significant price to acquire it.

2.7 Affective Product Design Methodologies

Product manufacturers have realized the importance of considering consumers' needs when products are conceptualized. This is evident in many decision methods which consider customer's input such as Quality Function Deployment (QFD) and Kansei Engineering (KE). Going a step further, consumers' feelings are recognized as essential input in product design (Desmet, 2003a; Nagamachi, 2002). Designers can design a product to elicit emotion through aesthetics, function, behavior and semantics (Desmet, 2003a).

Products can take on several different emotional roles in people's lives considering the emotional aspect. Makela (1999) identified five such roles:

1. Background – The product is part of the common environment and is characterized by low user involvement. Background products include grooming products that people use everyday. These products evoke emotion because although they are not very expensive, they are part of the daily routine.
2. Mediators to human interaction – Some products are used to interact with other people such as mobile phones that are used to communicate. There are also personal collections that may spur discussions. The discussions typically result in emotional experiences.
3. Enhancement – There are products that improve the user or one's well being. People may become emotionally attached to these products. One example is cosmetics that help modify and fix facial imperfections.
4. Expressions of identity – Consumers buy products to represent themselves. People are very emotional about clothing items because they want to communicate their personality to other people through what they wear. A dominant person may want to wear a suit or an expensive dress. For a casual impression, people will wear a pair of jeans and a t-shirt. McCracken (1988) coined the term "symbolic consumption" to describe how people use products as a means of communication.
5. Object of emotions – Sometimes people become highly attached to artifacts to the extent that they may seem more important than relationships with humans. Products such as cars and personal collections can evoke strong emotions.

These roles only show that emotion is involved when purchasing or using different kinds of products. However, the level of emotional intensity dictates the distinction between these roles. A higher intensity of emotion is observed for products that require greater involvement on the part of the owner either in terms of usage, resources or cognitive processing.

In the following section, the stages as well as different methods of product design that consider affect will be discussed thoroughly.

2.7.1 Foundation of product emotions

The capability of products to evoke emotions was discussed by Desmet (2003c) through a “multilayered model” of product emotion. The model proposed can be seen in Figure 7.

Figure 7 Multilayered Model of Product Emotion (Desmet, 2003c)

The model proposes that emotional responses are brought about by an appraisal of the product in terms of novelty, motive compliance, intrinsic pleasantness, legitimacy and challenge (see Figure 8). These appraisal criteria are generated by the concern of the individual for the product. Concern is defined as a point of reference in the appraisal process (Frijda, 1986). Products are judged according to their compliance to the concern.

Desmet (2003c) referred to studies by Lazarus (2001) and Roseman & Smith (2001) to justify his proposal that specific emotions are associated with specific types

of appraisals. Figure 8 shows that specific appraisal criteria result in a specific group of emotions. For example, a product that is appraised as novel will evoke surprise

emotions like surprise, amazement, etc.

Figure 8 Appraisal and Emotion Relationships (Desmet, 2003c)

However, this model does not consider the fact that when a person appraises a certain product, not all emotions are significant. Diener & Iran-Nejad (1986) noted that a person can experience only one affect at a time. Therefore, the emotion felt as a result of a combination of different appraisals for a product can not be predicted using this model. The model fails to consider the possibility that one appraisal criteria may stand out and lead to a different classification of emotion. The consumer considers the compliance of all these appraisals before a thorough evaluation is done on a product, otherwise, the product will be ignored and no emotion will be felt. For example, if a product is not beautiful enough, even if it passes the legitimacy criteria, the consumer may still ignore it.

Demirbelek and Sener (2004) offered a different explanation to how products evoke emotion through the use of cartoon characters in successful products. They correlated the attractive features of products, their childhood heroes and their descriptions of happiness. They hypothesized that understanding childhood interests would enable them to know how to design emotions into a product.

2.7.2 Stages of product development

According to Ulrich & Eppinger (2000) product development undergoes six phases as follows:

Planning – This is referred to as phase zero, because planning takes place even before the actual development of the product. During this phase, marketing objectives and existing technology for production are considered to evaluate the feasibility of offering the product to the market.

Concept development – In this phase, the needs of the market are identified through various means such as quality function deployment, focus group discussions and customer interviews. Alternative concepts that can cater to the needs of the target market are evaluated and further developed. At the end of this phase, a set of specifications, and a justification of the concept chosen from an economic point of view are accomplished. It is in this phase that affect should be considered by the designers because the desires of customers are being incorporated into the design.

System level design – At this phase, the architecture of the product is defined and is decomposed into subsystems and components. At the end of this phase, general details of how to manufacture the product are specified.

Detailed design – At the end of this phase, complete information on how to make the product is determined. The kinds of materials to be used, detailed drawings, type of equipment and process flow are established.

Testing and refinement – During this phase different kinds of prototypes are constructed for the purpose of testing if the product will perform as intended. Many reliability and performance tests are conducted until all problems are sorted out by the production and design team.

Production ramp-up – This phase concerns the actual manufacture of the product using the system identified. Production people are trained at this time and problems with the process are recognized. The output of the ramp up production is usually supplied to preferred customers to ascertain if there are other problems left unrecognized.

Affect is usually incorporated in the design process during the concept development stage when users' needs are identified by the designers. A number of

methods for customer needs identification only consider functional needs and not aesthetic or emotional needs of the users. The succeeding sections will examine methods that are pertinent to affective design.

2.7.3 Kansei engineering (KE)

Kansei Engineering is a design method for interpreting user feelings and translating them into a product design (Nishino, Nagamachi, & Ishihara, 2001). Companies including Honda, Ford, Komatsu, Sharp, Wacoal, Canon and Matsushita Electric Works have introduced KE as a product design method in their organizations (Nagamachi, 2002).

In using KE, the main objective is to translate customers' feelings into product design elements. Kansei is obtained from interviews or observations of customers. A target kansei or a concept is then broken down until a final kansei is reached that can be directly linked to product design elements (Nagamachi, 2002).

After the identification of kansei words, experiments are used to determine the customers' understanding of the words using a semantic differential questionnaire. At this stage, prospective customers are shown pictures of products, which they evaluate using the questionnaire. The results of the product evaluation are submitted to factor analysis to synthesize the number of variables and to find the axes of semantic space. This procedure is called analyzing the Kansei structure (Ishihara, Ishihara, & Nagamachi, 2001). The Kansei words are mapped according to their component loadings where sets of similar words constitute factors.

The last part of KE concerns the development of an expert system where the adjectives and their relationships with the product components and characteristics are translated into logical relations that can be stored and manipulated by the computer. The expert system is used to evaluate design solutions that are consistent with the Kansei words generated by the customer.

KE is a method that integrates emotion into the design of a product. Every time a product is developed the whole process starts all over again. The development of a database of kansei words and their meanings, however, helps in minimizing some activities from being done repeatedly, as the information that is collected in the past can be retrieved and used to create an image of the product (Nagamachi, 2002). However, the method does not predict the marketability of a

product. It is implicitly assumed that since customer feelings have been considered in the design process, the product will sell well in the market. Moreover, the process cannot be generalized because only the target customers' kansei have been considered. It is thus a product and market specific method.

A new method that is comparable to KE is proposed by Khalid (2006). CITARASA Engineering (CE) is a new design framework that elicits users' emotional intent, the meaning of the Malay term CITARASA. It is distinct from Kansei Engineering because it begins with the user's emotional needs, which are more explicit than the feelings considered in Kansei Engineering. This method, however, is still in the process of development.

2.7.4 Activity theory and affective design

Activity theory was used by Aboulafia & Bannon (2004) to analyze the realm of feelings in the context of affective design in human-computer interaction. This theory proposes that knowledge of the world is determined by interaction with it. People experience emotion as a result of their activities. The situation that the person is involved in mediates the kind of emotion that is experienced at that point in time. For example, an unexpected sight of a lion may engender fear but a hunter may feel joy at this sight. Emotions, therefore, depends on the person's expectation at that moment and the objective of the activity that one is engaged in.

Given the importance of the activity, Aboulafia & Bannon found it difficult to accept that affect can be designed into a product. In order to incorporate affect into design, the circumstances of the activities with the artifact must be considered and not only the tools. If the notion of affective computing is to be pursued it would be misguided to think that the computer is causing the emotion, rather than the activity that the person is engaged in.

In the domain of affective product design, activity theory may be used to analyze and predict the generation of emotion. Consumers form goals when they shop and the mere exposure to an item that can satisfy their goals may cause them to feel specific emotions.

2.8 Culture

Culture is defined as "the norms, beliefs and customs that are learned from society that lead to common patterns of behavior" (Assael, 1992 p. 297).

2.8.1 Culture and affect

Peter and Olson (1999) characterized affect as “largely learned from society”. People learn to exhibit acceptable behavior as dictated by culture defined as “norms, beliefs and customs that are learned from society and lead to common patterns of behavior”. The display of emotion is one behavior that is influenced by the social environment and beliefs, which is the main reason for the unique emotional dispositions of different cultures.

Scollon, Diener, Oishi, & Biswas-Diener (2005) investigated the relationship of dialectical experience of emotions across cultures. Dialectical experience refers to simultaneous feeling of positive and negative emotions. Asian, European, Japanese, Indian and Hispanic students were included in the study. The result suggested that pleasant and unpleasant moods are positively correlated for Asian Americans and Japanese, while there is no correlation for the other groups at the between-persons level. Similarly, Scollon, Diener, Oishi, & Biswas-Diener (2004) also found that there are cultural differences in the experience of pleasant and unpleasant emotions for all types of assessment, namely: global self report, experience sampling, and experience recall. It is observed that European-Americans and Hispanics are more inclined to experience pleasant feelings as compared to Asians. Asians are more likely to feel negative emotions and have lower levels of life satisfaction.

These studies show that the kind and intensity of emotions are culturally different. Emotions that consumers feel for the products would depend on their established beliefs and traditions.

2.8.2 Culture and consumer behavior

Howard and Sheth (1969) indicated that culture is a determinant of consumer behavior. Values ingrained in a culture influence the motives for consumption and determine the set of criteria used by consumers. Likewise, cultural issues may inhibit the intention for buying specific products. If a product does not conform to religious beliefs, for example, it is very unlikely that some consumer will purchase it.

Vinson, Scott, & Lamont (1977) also indicated that personal values differentiate customers. People have evaluative beliefs that they use to assess if certain product attributes are desirable. These evaluative beliefs stem from the global values of the consumer and guide them in their judgment and actions. In the study by

Vinson et al. (1977), automobile attributes were rated by customers according to importance. The results indicated that ratings of importance vary across cultures.

Lindridge & Dibb (2003) examined culture as a market segmentation variable. The study found a significant difference between the cultures of British Indians and British Caucasians only in terms of their family values. Other cultural values considered possessions as status symbols, collectivism, and materialism. Using friends as reference groups did not yield any significant difference. The result led the authors to suggest that culture should not be used as a market segmentation variable. They argued that the similarity of the two groups in many aspects did not warrant segmentation.

Although Lindridge & Dibb (2003) dismissed culture as a segmentation variable, it is worth exploring whether some cultural factors contribute to pre-purchase affect and purchase decision. Their study is limited to a certain area (Britain) and it is worthwhile ascertaining whether the same trend may be observed in Asian countries such as Singapore and the Philippines. The cultural factors considered in their paper are thus included in the present investigation.

In this study, the effect of culture on the preference for some product attributes is studied. Since previous studies indicate culture as a determinant of consumer behavior in more general aspects of product choice, it is worth analyzing further if specific product attributes are discriminated by different cultures.

2.9 Research problems and hypotheses

Figure 9 shows a conceptual structure that is helpful in summarizing the literature review. The initial focus of the review is on the definition and structure of affect as well as its measurement. Its relationship with consumer behavior is explored to determine if emotions have a significant influence on consumer decision-making. Product design methods that consider consumer feelings and pleasure are also evaluated to determine their effectiveness in motivating consumption.

Figure 9 Conceptual Structure of the Literature Review

Studies on affect structure indicated that there may be two dimensions (Russell, 1979), that it can be discrete (Izard, 1977) or have a conic structure (Plutchik, 1980). A comparison of the three structures in terms of its contextual derivation and number of dimensions is summarized in Table 3.

Table 3: Summary of Selected Affect Structure

Reference	Emotion structure	Context of origin
Russell (1980)	Two dimensional	Environmental studies
Ekman & Friesen (1975), Tomkins (1962), Izard (1977)	Discrete	Facial expression
Plutchik (1980)	Conic	Adaptive biological processes

The structures of emotion were derived by its authors considering specific contexts such as environmental studies, facial expression, and biological processes. They did not consider the act of purchasing, which is the focus of this study. Richins (1997), on the other hand, considered emotions in the consumption context but also included the post-purchase scenario. The study of pre-purchase affect is necessary because it has unique characteristics compared to post-purchase affect. The pre-purchase context is deficient in terms of product information and consumers rely on their impressions and limited knowledge of the product. The emotions that are generated from pre- and post-purchase may be incomparable and combining them would lead to irrelevant results in product evaluation studies.

One of the challenges in using affect to predict customer satisfaction and purchase intention is its measurement. The assessment of affect is meaningful if identity, intensity and incidence can be established. Physical manifestations of emotions such as facial expressions and bodily signals are used by Ekman & Friesen

(1978) to establish the fundamentality of some emotions, but failed to signify intensity. Moreover, physical measures cannot account for composite or complex emotions such as interest, disgust or contempt. The weakness of physical emotion measures, on the other hand, is countered by the strength of self-reports of emotion. Although these measures are not objective they can identify the kind as well as intensity of affect experienced. These reasons make them widely applied in emotional studies. Some relevant measurement methods are compared in Table 4.

Table 4: Comparison of Affect Measurement Methods

Measurement Method	Advantage/s	Disadvantage/s
Self-reports	<ul style="list-style-type: none"> ❑ Easy to administer ❑ Less costly ❑ Intensity and kind of affect identified 	<ul style="list-style-type: none"> ❑ Too subjective
Facial expression	<ul style="list-style-type: none"> ❑ Transcends cultural differences ❑ Type of affect identified 	<ul style="list-style-type: none"> ❑ Intensity of affect not determined ❑ Composite emotions cannot be seen in the face ❑ Difficulty in learning the technique
Autonomic measures	<ul style="list-style-type: none"> ❑ Has theoretical basis ❑ Very objective 	<ul style="list-style-type: none"> ❑ Requires expensive equipment ❑ Obtrusive ❑ Many confounding factors ❑ Intensity and kind of affect not determined

The study of emotion has found its way into many investigations of consumer behavior especially in the realm of product evaluation. Affect in consumption may be experienced in the pre- and post-purchase stages. Many researchers have established that purchase decisions are made based on experience of affect, especially in situations where there is not enough time to make a decision or if the product is categorized as “high involvement”, such as clothes and personal effects.

Models of consumer decision-making have included affect as one of the components. The affect infusion model (Forgas, 1995) helped to explain how affective states influence strategies in product judgments. According to this model, affect is infused in a decision-making situation if the decision-maker has enough time to make the decision and if the decision does not require accuracy.

Knowledge of the influence of affect on consumer behavior has prompted product designers to consider affect as a factor in conceptualizing new products. New design paradigms that consider consumer feelings and affective needs have also been developed; such as Kansei Engineering, Semantic Environment Description Method, and Product Personality Profiling. These methods are applied in product design and have resulted in increased customer satisfaction and higher sales.

The purpose and method of the present investigation were derived from the review conducted. It was evident that the structure of affect obtained by previous researchers did not consider the pre-purchase scenario and it had not been established which product characteristics were relevant in invoking affect in consumption. Considering these limitations of past research, the following research problems and hypotheses were developed for this study.

1. Conceptualize a model of affect that will encapsulate the emotions associated with customers' pre-purchase affective states.
2. Identify what product-characteristics discriminate intense positive and negative emotions.
3. Investigate the effect of affective states on the intention of consumers to buy a product.
4. Construct a model to predict sales potential of the product based on affect ratings.
5. Identify cultural and demographic variables (race, materialism, collectivism, education, gender, experience, etc) that influence affect ratings and intention to buy a product.

Hypothesis 1: There are product characteristics that consistently invoke intense positive and negative emotions.

Hypothesis 2: Intense positive emotions are highly correlated with a desire to buy a product.

Hypothesis 3: Product sales potential can be predicted using product characteristics that engender intense positive emotions.

Hypothesis 4: Culture influences the intensity of emotions in product evaluation.

Chapter 3: DEVELOPMENT OF PRE-PURCHASE AFFECT MODEL

3.1 Introduction

This chapter presents the development of the pre-purchase affect model (PAM) that relates product attributes, affect, and purchase intention. The pre-purchase context is an essential field of study because it is at this stage that consumers examine the product and decide to proceed with a purchase. The Pre-purchase Affect Model (PAM) is a conceptual model that predicts how product attributes and the compliance of these product attributes to purchase criteria engender affect and triggers decision-making. It may be used by designers in making decisions about product attributes such as color, shape, layout, texture, weight, and size before actual product manufacture. The model includes a product testing method that relates product attributes to emotions and determines the connection between emotions and purchase decisions. The theoretical basis of the model and its implication to product design and development are discussed.

The development of the model entailed gathering data to identify variables that must be included in further studies. Essentially, a series of studies are presented in succeeding sections that illuminates the derivation of the model. One of the limitations of the current inquiry is the use of a limited product types for eliciting purchase criteria, namely; mobile phone and clothes. Such items may generate a unique set of criteria compared to more complicated products such as cars or simpler ones such as stationeries.

3.2 Pre-purchase affect model (PAM)

The pre-purchase affect model (PAM) posits that the interaction between product attributes and consumer's evaluation criteria can elicit positive as well as negative affect. The degree of compliance to a combination of these criteria dictates the intensity and type of affect that is experienced by a consumer. Furthermore, the intensity of affect experienced determines the degree of the intention to purchase the product (see Figure 10).

Figure 10: Pre-purchase Affect Model (PAM)

3.2.1 Product attribute classification

Affect is triggered by a consumer's perception of product attributes, which have been classified in this research as distinctive, integrative and interactive. A similar classification of product properties is proposed by Han & Hong (2003) but expressed in different terms such as: individual, integration, and interaction. Distinctive features include color, size and shape of a product. They are evaluated by consumers independent of the other features. Color, for example, can elicit tension, calmness, and arousal (Bellizzi & Hite, 1992), while shape can convey emotion. Round shapes indicate softness while angular and sharp ones are perceived negatively (Fagerberg et al., 2004).

Integrative features are attributes that are evaluated relative to other features of a product such as keypad layout in a mobile phone or color combination in a shirt. The Gestalt principle may be applied in this case indicating that the whole is more than the sum of its parts (Detrie, 2002; Zakia, 1997). A product is evaluated based on its overall appearance and not the unique characteristics of its parts. Therefore, even if one product characteristic is satisfactory, such as shape, it may not look satisfactory if combined with the other shapes evident in the product. Khalid & Helander (2004), Chuang, Chang & Hsu (2001) and Yun et al. (2003) incorporated the concept of Gestalt in evaluating customer satisfaction in the design of electronic products and mobile phones. In these studies, the interaction of different product attributes was found to be meaningful in promoting pleasure derived from products (product pleasure).

Interactive features, on the other hand, indicate the functional features of the product, for example, the intuitiveness of the buttons on a personal data assistant (PDA) or the ease of manipulating the locking mechanism of a handbag. A product that is easy to use brings pleasure to the user. A study conducted by Jordan (1998) showed that usability is one of the salient properties that affect the level of pleasure and displeasure of product use.

Consumers may feel emotions at different stages of interaction with the product, including the pre-purchase and post-purchase stages. Pre-purchase refers to the stage when the consumer searches for an item to buy, while post-purchase refers to the actual usage of the product. The focus of the model is to elucidate the formation of positive and negative affect in the pre-purchase stage. It is assumed that affect at this stage is experienced as a result of product attribute perception in combination with the purchasing criteria on the minds of consumers.

3.2.2 Identification of product evaluation criteria

Consumers develop their own criteria when making a purchase. Criteria also include constraints imposed by the situation. Such constraints include budget, cultural beliefs, body size, and social standards. Consumers consider their needs and limitations when making a purchase. Depending on the type of product to be acquired, different sets of criteria may be used. The selection of criteria may be conscious or subconscious and sometimes leads to a comparison of the selected criteria with the product attributes that enable the formation of product emotions. A conservative lady who wants to buy a blouse may be disgusted by the sight of skimpy clothing but may be delighted by conventional styles. It should be noted that criteria might change at the point of a product being seen. There are times when a person already identified purchase criteria before the actual buying situation but were suddenly changed by a delightful product feature that was not expected.

In order to validate the criteria selection stage of the model, a field survey was conducted to determine criteria consumers use to purchase electronic products and items of clothing. These products were chosen, because they reflect the personal taste of the user, and thus they have a greater potential for engendering emotion.

Method

Subjects were Singaporeans aged 18-28 years. The age range of subjects was chosen for two reasons: volume of spending and buying behavior. Consumers in

this age range constitute a significant percentage of the buying population. Sixty-seven shoppers in Singapore were interviewed right after they had made a purchase of an electronic product or an item of clothing in a shopping mall. The Product Attraction/Avoidance Survey was used as guide in the interview process (see Appendix 1). The questionnaire consisted of three parts, each part corresponding to the product category. In each part were two questions. The first question aimed to determine the criteria people use to buy the product, and the second question tried to identify the reasons for product avoidance. For the first question, respondents were required to enumerate and rank the criteria.

Most of the respondents were male (61%). The average age was 23 years. They were paid SGD 5 for their time. Each of the respondents was approached after they came out from the store and the interview inquired about the type of item bought and the criteria for purchasing the item. The criteria were generated by the respondents after the investigator enquired why they bought the item and chose it over the other products available from the store.

A total of 27 and 32 criteria were identified for buying clothing and electronic products, respectively. The full list of criteria gathered from the study can be found in Appendix 2. These criteria were analyzed using cluster analysis to discover how consumers classified them.

Table 5 shows the groupings obtained from the cluster analyses. The dendograms of the cluster analysis are included in Appendix 3. As can be seen in Table 5, there were nine clusters of criteria for clothes, namely; personality, aesthetics, budget, brand, design, maintainability, quality, durability, and function. There were also nine clusters of criteria for electronic products: personality, aesthetics, design, brand, popularity, life, features, quality, and reliability.

Table 5: Cluster Analysis Results for Clothes and Mobile Phones

Clusters for Clothes	Clusters for Mobile Phone
1. Personality	1. Personality
2. Aesthetics	2. Need
3. Budget	3. Design
4. Brand	4. Brand
5. Design	5. Popularity
6. Maintainability	6. Expected Life
7. Durability	7. Features
8. Function	8. Quality
9. Quality	9. Reliability/Durability

Discussion

Personality is an important factor and affects the criteria selection, as customers buy products that are appropriate for their personality. Often, they buy products to communicate their personality to other people. This is the main assumption of Product Personality Profiling, a technique that is used to match product characteristics with the personalities of potential clients (McDonagh et al., 2002). This technique relies very much on stereotyping and assumes that members of particular groups will have the same product preference.

The personality projected by a product is capable of injecting emotion into the consumer's learning and valuing process (McEnally & de Chernatony, 1999). These products have a tendency to "get close" to the consumers because s/he feels that they represent her in some ways. A mother, for example, may want to project a caring personality and would patronize products that project this image.

Another relevant criterion in purchasing personal products is visual aesthetics. Visual aesthetics affect the consumer's perception of a product in many ways and provides a symbolic function that influences the evaluation of a product (Bloch, Brunel, & Arnold, 2003). Aesthetics is evaluated upon seeing the product and comparing it with standards of beauty. Good visual aesthetics evoke positive emotion

such as brightening up one's day (Norman, 2003). Bloch(1995) asserted that products with resonant designs can produce intense reactions from customers. The sight of a row of beautiful teapots, for example, can cause extreme joy and excitement to a teapot collector.

The overall design of the product affects its aesthetics. Product design is the combination of shape, form, color, and uniqueness that is evaluated as a whole. The appropriate combination and use of these attributes makes a product beautiful or undesirable from the point of view of customers. Norman(2003) pointed out the importance of considering the positive emotion evoked by a product because it may lead consumers to overlook the product's faults. A product that is beautiful can make people smile and may affect a person's purchase decision.

In close relation to design is function. It includes the ability of the product to service customer's requirements. In the context of clothing, function also includes the comfort that the user experiences when wearing the clothes. Emotion can be derived from the perspective of functionality (Campos, Mumme, Kermoian, & Campos, 1994). A product that functions very well generates positive emotions, while one that fails to perform adequately generates negative emotions. Before making the actual purchase, the consumer may have the chance to evaluate the function of a gadget during which s/he may feel disappointed or ecstatic in using the product.

Closely related to function are durability and reliability of the product. A product that is expected to last a long time is perceived by customers to be good and desirable. Unbreakable plates incite interest among consumers not only because of their unique characteristics, but also because of the expectation that they will last for a long period of time. Reliability was cited by Jordan (1998) as one of the salient terms in influencing pleasure and displeasure in product use.

It is worth noting that appropriateness, which includes color and fit was grouped independent of design in clothing. One possible reason for this is the consumer's sensitivity to color and fit as criteria for selecting clothes. People are very particular about the color of clothes they buy, because they want to match it with their skin or existing colors of their wardrobe. As a result, even if the design is acceptable, they might still choose on the basis of color. Similarly, the personal fit is a separate concept from design, because it depends on the consumer's physique. Designs may

be evaluated favorably by a customer, but may not be selected because the product does not fit. In this case, the consumer experienced negative affect.

Another relevant criterion in purchasing clothing is culture, defined as “norms, beliefs and customs that are learned from society and lead to common patterns of behavior” (Assael 1987 cited in Slowikowski & Jarratt, 1997). Studies of consumer behavior indicate that culture is used as a criterion for choosing products to buy, and may inhibit the intention of the customer to buy certain merchandise (Henry, 1976). Vinson et al. (1977) assert that product attributes are closely related to consumption-related values. As such, product attributes that do not conform to established values can generate negative emotion including shame and disappointment. A consumer who follows strict values related to religion may frown at a shirt with obscene text.

Aside from cultural issues, quality is another significant concern in purchasing. Quality is defined as the degree of excellence of a product. Marketers frequently use the word to indicate the inherent goodness of a certain item (Solomon, 1999). Most consumers want to achieve a level of quality that is proportional or greater than the amount of money they spent. When their expectations of the product are met, they do not think much about quality, but if they become disappointed about the performance, negative affect may result. On the other hand, if quality expectations are exceeded, customer delight is felt which is characterized by strong positive emotions (Solomon, 1999).

One product attribute that indicates quality is its brand. The relationship between brand and popularity is quite obvious. Branded products are usually advertised and capture the attention of target consumers. Brand marketing exploits the emotional connection between people and the brand, more than the benefits of the product (Woods, 2004). People become emotionally attached to a brand because of the satisfaction experienced related to its use. Yu and Dean (2001) further asserted that customers tend to become loyal to a brand that elicited positive emotion in the past. They also found that emotion has a better correlation with brand loyalty than with cognition. The cognitive component in this context refers to customer's evaluation of the product in terms of adequacy with respect to some established standards.

Aside from quality, maintainability is an important consideration in buying clothing items. Maintainability is defined as the ability to keep a product in good

condition. In the context of clothing, maintainability refers to minimal effort and cost in upkeep. Items that are not considered easily maintainable are those that require dry cleaning and other special washing or ironing instructions. Maintainability, in this case, is largely dependent on the type of material used for the clothing that is evaluated by the consumer before the actual purchase. There are no studies that specifically related maintainability of clothes with consumer behavior, but it seems reasonable to hypothesize that clothes that are easily maintained will elicit positive emotional reactions from consumers, because they signify an easy and stress-free lifestyle.

In the realm of electronic products, the presence of advanced product features is something that customers look forward to. They feel excited to learn about novel features in new mobile phones and personal data assistants (PDA). The Infotrends Research Group estimated that the development of camera phones have increased phone sales, because people experienced excitement at the thought of taking and sending pictures (O'Keefe, 2004).

Since most electronic products are expensive, consumers want to get their money's worth by buying products that have long expected life span and provide reasonable warranty periods. Balachander (2001) and Wiener (1985) asserted that the length of warranty signals the quality of a product to the consumer. Generally, a superior warranty is associated with better quality. Since warranty is a desired attribute of a product, it engenders satisfaction for the consumer.

Budget is a consumption limitation and in the pre-purchase context, it is a primary criteria in decision-making. If a desirable product has been identified and the interest to purchase already heightened during the shopping experience, a budget limitation would cause the consumer to experience negative feelings such as disappointment and disgust. Budget, however, does not directly cause affect in consumers. It is a practical criterion that is considered by the customer towards the end of the evaluation process. It is possible that the consumer had already formed a preliminary evaluation of the product that results in positive emotions but the shortage of budget may turn it into a negative one. Conversely, budget may also lead the consumer to ignore a product that is known to be expensive because there is no point in further evaluating it.

Before making a purchase, the customer uses all or a combination of these criteria depending on the product to buy. It is expected that since customer's selection time is limited, only a small percentage of products will meet all of the criteria. Some product characteristics may positively or negatively contribute to the evaluation criteria. It is hypothesized that a consumer develops emotions towards products that are either positively or negatively evaluated in most or all aspects. Otherwise, the consumer will avoid the product. The level of conformance to the various criteria dictates the emotion that a customer will feel for the product. For example, when all criteria have been met fully, the customer may be ecstatic. However, if quality, for example, has not been satisfied, the customer may feel unhappy about the product.

It is important to point out that four groups of criteria are found to be the same for both types of products, namely; personality, aesthetics, design, and quality. These common criteria may be interpreted as basic needs of consumers to feel pleasure in the consumption of personal products. However, since only two products were considered in the survey it is possible that other criteria may be discovered if a greater number of products were included.

It is assumed that most of the purchase criteria whether taken individually or in combination with the others, engenders affect and influence the decision of the consumer. It is therefore essential to know how they can be incorporated into the design of the product.

3.2.3 Criteria Selection

Criteria selection is a part of product evaluation where a customer examines a product by holding, touching, and trying. The identification of criteria enables the consumer to use the "elimination by aspect" (EBA) heuristic in making a decision (Tversky, 1972). EBA is a model of choice based on the features of the product. This decision-making model simplifies the consumer's choice by eliminating those products that do not conform to the criteria specified.

The product appearance triggers consumers to judge and form initial impressions (Yeung & Wyer, 2004). The judgment is based on identified needs and constraints dictated by the situation. People buy products because they fulfill basic or complex needs. Basic needs are readily satisfied and do not require much evaluation such as food products. On the other hand, complex needs are difficult to satisfy

because there are many variables to consider such as in choice of clothing. Constraints also figure importantly in the selection of items to buy. These constraints maybe classified as economic, personal, and social. Limited disposable income, for example, is a constraint that limits the choices available to the consumer. Other items available that are not within the budget may be inspected by the consumer, but an attraction to an expensive item may bring on negative affect such as frustration and disappointment. Personal constraints, on the other hand, encompass physical limitations such as body size, skin tone, and disabilities. A person who is either too tall or too short may find it difficult to choose a product because of extreme physical characteristics. Similarly, social norms such as dictated by family, friends and community also pose constraints to the consumer. People who grew up in conservative environments cannot easily accede to more daring fashion trends; the opinions of immediate family members constrain them in their decision.

Consumers generate criteria consciously or unconsciously during the purchase process. The affect infusion model (AIM) is a theory that explains how affect is generated in the criteria selection stage (Forgas, 1995). This theory was originally developed to explain how affective states influence various strategies in social judgments. Although this model had been developed to explain the influence of affect in social judgments, the theory may be applied in product judgments. Affect infusion is defined as “the process whereby affectively loaded information exerts an influence on and becomes incorporated into the judgmental process, entering into the judge’s deliberations and eventually coloring the judgmental outcome (Forgas, 1995 p. 39).”

Forgas (1995) relates affect infusion in four fundamental judgmental strategies, namely; (a) direct access strategy (b) motivated strategy (c) heuristic strategy, and (d) substantive strategy. As mentioned in the review, little affect infusion happens in the first two strategies because they involve relatively closed information search processes while the last two are more open ended and constructive that allows more chance for affect infusion.

In direct access strategy, a person retrieves pre-existing stored evaluation. A person who dislikes the color red because it does not fit her personality, would deliberately ignore products with red colors. In this situation, there is little chance for affect to set in because there has been a quick judgment on the part of the consumer.

Motivated processing occurs when there are strong and specific motivational pressures to achieve something after making a judgment. The judges are likely to involve themselves in highly selective, guided and targeted information search to support a pre-existing motivational objective (Forgas, 1995). This is common when consumers have specific intentions to buy products that are not differentiated, such as washing machines or air-conditioning systems. These kinds of products cater to particular needs, and affect may not enter the evaluation process.

There are instances when the two situations mentioned above are not applicable, that is, there is no prior evaluation or strong motivational goal in the pre-purchase situation. Heuristic processing occurs when the judgment has low personal relevance, the judge has limited cognitive capacity and the situation does not demand accuracy or detailed consideration (Forgas, 1995). In the pre-purchase situation, heuristics processing occurs when a person goes to a department store to just look around in the hope of finding interesting to buy. Such a situation is more susceptible to affect because the mood at that particular time may prompt the person to buy a product on impulse.

Substantive processing is the last and most demanding processing mechanism in producing a judgment. This processing mechanism “requires judges to select, learn, and interpret new information about a target and relate this information to preexisting knowledge structures (Forgas, 1995 p. 47).” The strategy is used when heuristic processing proves insufficient because of the need for accuracy and if there is adequate cognitive capacity. Affect can be infused in this situation because the subject has more time to deliberate about the situation, and one can access selective information from memory (Forgas, 1995). In consumer research this kind of processing happens when a customer thinks of buying an expensive item like a hand phone or a laptop computer. Since the purchase involves much money there is a need to deliberate. This may take a long time and more information may be recalled from memory to aid the appropriate judgment. In this situation, recalling previous experiences may easily infuse affect. A positive experience may evoke good emotion that may prompt a person to buy the product whereas a negative experience would prevent the purchase. Mood can then easily affect the purchase decision.

3.2.4 Pre-purchase affect identification

After the consumer has selected the appropriate criteria and compared the criteria to the product attributes, pre-purchase affect results. Pre-purchase affect is

defined as a set of emotions felt by consumers before they buy a product. This is differentiated from the post-purchase affect because in the post-purchase scenario consumers have more time to experience and evaluate the product.

In this study, the components of pre-purchase affect was gathered from a field study of shoppers in Singapore who recently made a purchase of clothing, watch and electronic products (Seva, Duh, & Helander, 2005). Since there are no previous studies that enumerated emotions in the pre-purchase context, primary data should be gathered to identify them and so that they may be used in future research. The succeeding sections discuss the details of the study conducted.

Method

Subjects were Singaporeans aged 18-28 years old, who had recently purchased clothing, electronic products and watches. A total of 69 subjects consisting of 40 females and 29 males participated in the survey voluntarily and were paid SGD 5 for their time. The average age of the subjects is 23 years old.

Clothing and electronic products were chosen because they are relatively personal and have the potential to engender emotion among users. The age range of 18-28 years was considered for two reasons: volume of spending, and buying behavior. Consumers in this age range constitute a significant percentage of the buying population. Wood (2004) indicated that this group is worth investigating because of the volume of their spending aside from the fact that they share many common characteristics such as their aptitude for new technology and impulse to purchase new things. A survey done in UK estimated the spending of 18-24 year olds to be about £10 billion. On the other hand, young adults from 18-34 years of age are most concerned about their image according to a study done by a US-based market research firm (Fetto, Whelan, & Yin, 2001). They are meticulous in choosing products to buy because of their intention to exhibit their unique personalities. Considering their concern for their image, their purchases are guided by emotions aside from reason.

A questionnaire was developed to determine the components of pre-purchase affect. Appendix 4 shows the survey form entitled "An Exploratory Survey of Pre-purchase Affect". The first part of the survey aims to determine the mood of the consumers when they enter the shopping mall. The list of moods in the questionnaire was taken from the Positive Affect-Negative Affect Scale (PANAS), (Watson et al.,

1988). The PANAS scale was chosen as a mood identification method, because it had shown much influence in the self-report literature of mood evaluation because of its reliability and validity (Watson & Clark, 1997). A mood evaluation part was included in the survey so that participants with extreme moods may be dismissed from the study.

The questionnaire presented three scenarios that the consumer may have experienced while shopping, namely: purchase an item of clothing, electronic product and watch. The questions for each scenario sought to identify the affect they experienced while they were examining the products they bought or chose from. The interviewer prompted the subjects to recall their feelings while shopping and determine the most appropriate words to describe their feelings. The consumers were prompted to think of the words on their own at first in order to generate a set of affect descriptors independently. However, a list of emotions was also provided to assist the consumer in identifying pre-purchase affect that they may have missed in the process. The emotions in this list were taken from the Consumption Emotion Set gathered by Richins (1997) in her study of consumption-related affect.

Although pre-purchase affect was to be identified in this process, a post-hoc survey was utilized because it was rational to think that all pre-purchase affect would have been experienced only until the end of the shopping activity. If the interview had been done before the end of the shopping activity and that the consumer had not made a decision, it was possible that some pre-purchase affect may have been missed by the interviewer. Moreover, although it was a post-hoc survey, the survey was done immediately after the shopping activity; thus, the consumer's memory of the experience was still fresh in the mind. This method, however, had its limitations. The method depended on memory recall. It assumed that the experience could be recalled perfectly and comprehensively because the experience happened a short while ago. This assumption may not always be true because some people may not be able to recall feelings as readily as information.

An initial list of pre-purchase affect was identified from field studies conducted by the researcher. A total of 94 emotions were initially gathered (see Appendix 5). The list of words obtained was deemed too many to be subjected to multidimensional scaling analysis. As such, these words were reduced in number by considering the frequency of their mention in the survey. A streamlining method was used to accomplish this and the results can be seen in the following section. Only words that

were used “often” and “always” by at least 40% of the respondents were considered for further analysis. The following table reflects the final list of pre-purchase affect labeled as Pre-purchase Emotion Set (PES).

Table 6: Pre-purchase Emotion Set

1. Amazed	7. Enthusiastic	13. Hopeful
2. Cheerful	8. Excited	14. Interested
3. Concerned	9. Fulfilled	15. Joyful
4. Contented	10. Glad	16. Pleased
5. Delighted	11. Good	17. Surprised
6. Encouraged	12. Happy	18. Thrilled

In Table 6, there is a predominance of positive feelings. Only 1 emotion can be classified as negative (concerned), while the rest indicate gladness, pleasure, enthusiasm and hopefulness. One possible explanation is the fact that people ignore products or situations that engender negative feelings. Since they are still in the pre-purchase stage they can choose to ignore situations or products that can cause them to experience negative feelings. People often shop to enjoy and repair bad moods. Maxwell & Kover (2003) signify that only 10% of shoppers are in a negative mood, and they are interested and willing to try new products because of their desire for mood alleviation.

The set of pre-purchase emotions in Table 6 is applicable to the identification and measurement of emotions experienced by the consumer when evaluating a product. The emotion set obtained by other researchers did not particularly consider the pre-purchase context and as such, some emotions may not be relevant. Richins (1997), for example, proposed the Consumption Emotion Set (CES), which was derived from the analysis of three consumption situations, namely; automobile, recreational and sentimental. However, this emotion set was constructed considering all facets of consumption from anticipation to actual use of the product. Therefore, the CES is very wide in scope and may not be relevant to the pre-purchase situation addressed in the model.

One possible concern in the study about language description of emotion is the fact that emotion precedes language and people look for the right words to

describe what they feel. More often than not, there is a difficulty in finding the right description because people do not possess enough vocabulary. It is also possible that people will choose the words are not appropriate to describe their emotions because of there are not enough on the list. In order to prevent this, the subjects must be very good at using a certain language. In this study, the participants were well versed in the use of the English language so this problem was minimized.

3.2.5 Implication of the Model for Product Development

Ulrich & Eppinger (2000) enumerated six stages of product development as shown in Figure 11. The model developed may be incorporated in the concept development stage of the product development process.

Figure 11: Product Development Framework (Ulrich & Eppinger, 2000)

The concept development stage is maybe the most appropriate phase to integrate affect in the design of a product. At this point, the needs of the market are identified through various means, such as quality function deployment (QFD), focus group discussions and customer interviews. Alternative concepts that may cater to the needs of the target market are evaluated and further developed. At the end of this phase, a set of specifications, and a justification of the concept chosen from an economic point of view are accomplished. However, product developers at this stage are more concerned with the technical needs of the customers that can be translated into engineering specifications rather than pleasure and enjoyment of customers. QFD for example, aims to translate customer requirements to engineering specifications that aid the manufacturing department. Applications of QFD does not, however, consider the affective needs of customers, as its main objective is to improve design quality (Akao, 2003).

A different product conceptualization framework is presented below that discusses how our model can be used to integrate affect in design (see Figure 12). The first stage of the framework deals with the determination of the needs of customers, and the criteria they use to buy a specific product. Needs are differentiated from criteria at this stage because needs are virtually limitless. Consumers desire to integrate more features to a product without considering issues of manufacturability or cost. Criteria, on the other hand, serve as limiting factors that can give a designer a more specific direction in designing a product. While needs enable the designer to conceive product attributes, purchasing criteria streamline these attributes into a more realistic and practical set. The needs and criteria should be jointly considered in conceiving initial product attributes.

As part of conceptualization, empirical evaluation is needed to determine if identified product attributes are capable of engendering strong emotions that can prompt a purchase. Experiments need to be conducted that allow subjects to appraise the emotion evoking capability of product attributes in relation to selected criteria, and relate them to felt emotions and purchase intention.

Figure 12: Product Conceptualization Framework

Customers can then rate different kinds of emotion they felt while inspecting the product and a rating of desire to purchase the product is obtained. Rating of the various criteria, emotion and desire to purchase may be related to each other using regression analysis. The statistical model developed may be used to determine the

appropriate setting of product attributes that can spark the right emotions to make a purchase. The model is also an effective feedback on the part of the product developer to improve some product attributes that customers do not find emotionally stimulating.

The development of this model is helpful in future efforts of measuring emotion in the pre-purchase context and relating these measurements to the success of product design like electronic products.

Most people make decisions on the basis of their emotion, and this knowledge may be used to conceptualize designs of products that are enjoyable and pleasant. Previous design methods translate customer needs into technical specifications, but the model presented here may be used to incorporate affect in the product conceptualization stage. The Pre-purchase Affect Model may be able to predict how product attributes and the compliance of these attributes to purchase criteria engender affect and trigger decision-making. Designers incorporate different features in the product during the conceptualization stage without knowing their relationship to the emotion of the buyer or the compliance to purchase criteria. The use of the model will help designers define which attributes are capable of eliciting different kinds of affect. Such discovery will help in making better designs in the future because the relationship between attribute, affect and decision has already been validated empirically in previous studies.

Although the current study only considered clothing and electronic products, the same model may be used to study other products that are capable of eliciting emotions. It is interesting to know if purchase criteria may be generalized for a certain group of products or if there are criteria that are consistent across different products.

Chapter 4: STRUCTURAL ANALYSIS OF PRE-PURCHASE AFFECT

4.1 Introduction

This chapter presents the analysis of pre-purchase affect structure using statistical analysis. After identifying the relevant emotions in the previous chapter, the dimensionality of the descriptors is investigated further by conducting an exploratory study.

Pre-purchase is defined in this study as the stage when consumers are attracted to the product and consider buying it. At this point, one or more products are evaluated according to their physical characteristics and are also tried or fitted if vendors permit. The usage of the product, however, is superficial due to time constraints and limitations imposed by the vendor such as not giving the actual unit for inspection.

During the pre-purchase stage, the emotion felt for the product can be a deciding factor in making a purchase. As such, a method for measuring emotions in this situation needs to be devised for researchers who are interested to investigate the capabilities of products to engender emotion. Self-report is one of the methods that can reliably do this, but the checklists available enumerate numerous emotions that may be irrelevant.

The purpose of this study was to examine the nature of pre-purchase affect and determine its structure. The empirical investigation focused on “high-involvement” products that were likely to invoke emotional responses in the consumer. Two studies were conducted. The first study sought to enumerate pre-purchase affect from a field study of consumers. The second study investigated the dimensionality and structure of the affect obtained from the first study using data reduction techniques.

4.1.1 Method

Participants. A total of 91 participants were included in this study. The participants were undergraduate and graduate engineering students. They were selected because the research task involved word comparisons and required a good understanding of the English language. It was assumed that University students have a better understanding of the English language because they took more English

courses. Aside from this, the terms involved in the survey are relatively simple terms that University students are expected to know. The complete list of words compared is given in Table 6 and as can be seen there is no word that is very difficult to understand. Aside from this, students in the graduate and undergraduate fit into the target age range of the study. The average age of the participants was 22 years. They were compensated SGD 5 for participation.

Measures. The similarity matrix was generated by asking the participants to rate word pairs according to their similarity. A total of 153 ($18 \times 17/2$) pairs of words that were randomly arranged were compared by the participants. The 153 pairs were obtained by taking all possible combinations of words from the 18 affect words obtained from the previous study. A seven-point Likert scale was used to indicate the similarity of the words. The scale was anchored at “1” – totally different and “7” – almost the same. The participants indicated in a column the rating of similarity for each pair presented.

The task of comparing the words was done using an Excel file that contained all the word pairs arranged randomly for each trial. The outcome of the rating process generated an 18×18 lower triangular matrix, which was the average of the 91 matrices from the participants.

Multidimensional scaling (MDS). The MDS procedure was performed using the ALSCAL procedure of the SPSS software, with the Euclidean distance option. This procedure made it possible to view the relationship of the different emotions in a two-dimensional graph. Solutions for one to six dimensions were obtained and the stress values obtained were: 0.216, 0.124, 0.098, 0.070, and 0.055. Stress values were expected to decrease as the number of dimensions increase and in order to determine the number of dimensions, a sharp decrease in the stress value must be apparent. The values of stress obtained showed a sudden decrease from 2 to 3 dimensions. This indicates that a 2-dimensional solution was evident. The outcome of the multidimensional scaling can be seen in Figure 13.

Figure 13 Two-Dimensional Plot of Pre-Purchase Affect

The emotion descriptors are widely dispersed in the two dimensional space and are clustered into four main groups. The cluster on the upper right hand corner of the graph represents words that are used to describe feelings of amazement. The clusters on the right are somewhat spread compared to the other clusters on the left of the map. This might indicate that words to describe amazement and encouragement are not consistently used by the subjects in the experiment.

The second cluster consists of feelings of happiness. The descriptors joyful, glad, happy, and cheerful are all used to express feelings of happiness when a captivating or exceptional product is chanced upon in the marketplace. The cluster located on the lower left hand corner exemplifies positive feelings associated with satisfaction such as pleased, good, contented, and fulfilled. The group on the lower right hand corner includes words used to express optimism such as hopeful and encouraged. It can be seen from the graph that the emotion “concerned” is almost an outlier since it is almost at the boundary of the graph. This emotion is the only one with a negative connotation and does not mix well with the predominantly positive pre-purchase affect. The distance of the affect words in the graph indicates their similarity.

Factor analysis (FA). The similarity ratings obtained from the study may also be used to indicate correlations between the emotions investigated. As such, they were submitted to factor analysis using the SPSS software. The principal component method was used for extracting factors and varimax was used for rotation. The factor loadings are shown in Table 7.

Four factors were found after the analysis. The first three factors explained 50% of the variance while the fourth one explained 12% of the variance. The first five emotions were related to “satisfaction” and the next five were associated with “positive enthusiasm”. The other two factors refer to “optimism” and “amazement”. Unlike glad and delighted, the emotions contented, fulfilled, pleased, and good loaded highly on the first factor and not on the remaining three factors. The emotions cheerful, joyful, and enthusiastic were highly correlated to the second factor, which was labeled positive enthusiasm. The word positive was added as a descriptor to the second set of factors to distinguish it from negative types of enthusiasm that may also be experienced by the consumer. Enthusiastic also loads slightly to the third factor called optimism. The emotions hopeful and encouraged loaded highly in this category and not on the remaining three. It can also be seen that “concerned” loaded negatively to the second factor. The last factor included the emotions amazed, surprised, and thrilled. Contrary to amazed and surprised, the emotion thrilled loaded slightly to cheerful enthusiasm.

Table 7: Factor Loadings after Varimax Rotation

Emotions	Factors			
	1	2	3	4
	Satisfaction	Positive Enthusiasm	Optimism	Amazement
Contented	0.82	0.06	0.08	0.01
Fulfilled	0.80	0.14	0.08	0.06
Pleased	0.76	0.18	0.07	0.17
Good	0.65	0.12	0.26	0.06
Glad	0.64	0.45	-0.02	0.12
Delighted	0.51	0.50	-0.03	0.32
Cheerful	0.37	0.71	0.08	0.06
Joyful	0.45	0.69	0.00	0.08
Enthusiastic	0.03	0.63	0.46	0.19
Happy	0.59	0.61	-0.09	0.06
Excited	0.02	0.57	0.34	0.42
Hopeful	0.05	0.15	0.74	0.02
Encouraged	0.14	0.15	0.70	0.04
Concerned	0.05	-0.26	0.65	0.08
Interested	0.08	0.18	0.64	0.30
Amazed	0.21	0.09	0.15	0.81
Surprised	0.07	0.05	0.06	0.83
Thrilled	0.04	0.45	0.22	0.60
Exp. Variance %	20.87	16.41	13.09	12.03

4.1.2 Discussion

The results of the study showed that emotions in the pre-purchase context are mostly positive emotions and are fewer in number compared to the Consumption Emotion Set (CES) proposed by Richins (1997) which considered pre- and post-consumption scenarios. The PES is derived to measure emotional experience before deciding a purchase. Such measurement is important for researchers who are interested to know how product attributes influence the experience of affect before purchase.

The predominance of positive emotion in the PES may be explained by the fact that shopping is an entertaining activity for many people. A study made by Jin & Stemquist (2004) showed that consumers derive great pleasure from shopping which they referred to as a “hedonic shopping value”. Many consumers look forward to a day of shopping because it gives them a chance to see new and attractive products in the market, and spend money on products that they evaluated positively according to their purchase criteria. It is reasonable to assume that people who have the objective to enjoy the pleasure of shopping will try to preserve positive mood and attitude that they have the beginning. In other words, consumers try to avoid negative feelings while shopping and therefore look for products or services that can influence them to have positive feelings. The only negative emotion in the PES is the feeling of “concerned” which is inevitably felt by consumers when they consider buying products that are not well publicized and may not be promising in terms of quality and reliability.

The findings obtained from factor analysis and multidimensional scaling show considerable similarities. The clusters obtained from MDS can be paired to the factors obtained using FA. Clusters 3 (satisfaction) and 4 (optimism) can be matched with Factors 1 and 3, respectively, but Factor 2 emotions were somewhat scattered in clusters 1 (amazement) and 2 (happiness). As can be seen from the two-dimensional map, “concerned” is too distant from the other emotions in the cluster. It is almost an outlier because it is the only negative emotion in the PES. It is closest to the word hopeful because both words indicate a feeling attached to a vision of a future incident.

The result of the factor analysis showed that the greatest variance is explained by “satisfaction” followed by “enthusiasm”. The emotions under each factor are not all well defined. There are emotions that load on more than one factor such as “glad” and “delighted” which both load on satisfaction and enthusiasm. This result can be visualized in the multidimensional map where these two emotions clustered with “happiness” instead of “satisfaction”. This suggests that some emotion words may be used to describe two constructs at the same time.

The structure of pre-purchase affect deviated significantly from the Circumplex model proposed by Russell (1979) and Plutchik (1980). The emotions in Russell’s model are derived by studying physical environments. This context is different from the shopping context where people seek pleasure. Plutchik’s model, on

the other hand, considered people's adaptive biological processes. The emotions enumerated by Russell and Plutchik are not all relevant in the assessment of emotion in a pre-purchase experience. The feeling "sleepy" for example that is included in Russell's model is irrelevant in the process of inspecting a product because the inspection process itself is already stimulating. Similarly, "fear" and "anger" which are basic emotions from Plutchik's model are insignificant.

The MDS solution showed clusters of emotions that illustrated the kinds of affect that exist before purchase. The clusters of emotion may be interpreted as occurring simultaneously or in sequence. The author favors the latter interpretation because during the data gathering process the participants were asked to identify the emotions they felt when they saw the product that attracted them, without regard to the stage of the information processing. From the results obtained, it was reasonable to think that emotions follow the information processing stages proposed by Wickens & Hollands (1999). Lee (2006) supported the idea that affect had selective influences at different stages of information processing. Affective stimuli capture attention and were processed in parallel with non-affective stimuli. A mixture of emotions may be experienced depending on the context of the activity.

Amazement is something that one feels when one sees an attractive product that one plans to buy or a product that is very outstanding that it captured one's attention. Such feelings of amazement are followed by enthusiasm to perform cursory product evaluation. During this evaluation, s/he becomes optimistic that user trials will yield positive results and that the decision to purchase can be arrived at. Satisfaction is a feeling that is experienced towards the end of the evaluation process as a result of a perceived accomplishment of a sound decision or a fulfilling product trial.

It is not plausible to assume that upon seeing an interesting product, the consumer is able to feel all these emotions at the same time. Two clusters of emotion that are not possible to occur at the same time are amazement and satisfaction. People become amazed when they see something they do not expect. In the shopping context, it can be a product that is so unbelievably beautiful or ugly. Satisfaction, on the other hand, is a feeling that is associated with a deeper understanding and experience of the product that cannot be attained by immediate perception. Product trial takes time and emotions change from awe to satisfaction.

Chapter 5: PREDICTIVE MODELS OF AFFECT AND PURCHASE INTENTION

5.1 Introduction

This chapter presents predictive models of affect and purchase intention from data gathered in a number of contexts. Four studies were conducted to validate the PAM in different countries and settings. Each of the study validated the hypotheses put forth in this dissertation. The first study was conducted in a laboratory setting in the Philippines, while the remaining two studies were conducted in the field both in Singapore and Philippines. These studies were discussed separately in this chapter.

5.2 Study 1: Laboratory setting (Philippines)

This study sought to determine the relationship of the following variables: product attributes, purchase criteria, pre-purchase affect, and purchase intention in a conceptual model of product emotion called the Pre-purchase Affect Model (PAM) (Seva et al., 2005). Pre-purchase affect is a term that is used to describe a consumer's feelings before s/he purchase a product. This type of affect is different from post-purchase affect because the set of emotion is predominantly positive (Seva et al., 2005).

In the model proposed, pre-purchase affect is triggered by the consumer's perception of product attributes that are classified as distinctive, integrative and interactive (Han & Hong, 2003). *Distinctive features* include color, size and shape of a product which are evaluated independent of other features. Color, for example, can elicit tension, calmness, and arousal (Bellizzi & Hite, 1992). Round shapes indicate softness while angular and sharp ones are perceived negatively (Fagerberg et al., 2004).

Integrative features are evaluated in relation to other features of the product such as color combination or layout. The Gestalt principles of perception are relevant in this case; a product is evaluated based on its overall appearance and not the unique characteristics of its parts (Detrie, 2002; Zakia, 1997). Therefore, even if one particular product feature is satisfactory, it may not look satisfactory if combined with the remaining features.

Interactive features, indicate the function of the product, for example, the intuitiveness of the controls on a personal data assistant (PDA) or the ease of

manipulating the locking mechanism of a handbag. A product that is easy to use brings pleasure to the user. A study conducted by Jordan (1998) showed that usability is one of the salient properties that affects pleasure in product use.

5.2.1 Hypotheses

The study posits three hypotheses derived from the PAM:

H₁: *Some product attributes are responsible for eliciting strong affective responses from users.* This study aims to identify the nature of these product attributes. Designers need to know these attributes, so they can exploit them in the design of the product. The attributes may differ from product to product, but it is desired to know their relative importance - if related to form, function or usability.

H₂: *The adherence of a product to consumers' purchase criteria moderates the relationship between product attributes and pre-purchase affect. Strong adherence to a certain criteria will enforce the relationship between product attribute and pre-purchase affect.* Purchase criteria interact with the perception of product attributes. These criteria include personality, design and quality, which consumers look for in items that they purchase. Products with attributes that conform to the users' needs would trigger strong emotions.

H₃: *Strong experiences of pre-purchase affect influence the consumer's purchase intention.* The validation of this hypothesis will strengthen the marketing advantages of considering affect in product design frameworks. Product designers are aware of the marketing power of emotion but previous studies did not empirically confirm the relationship of the two.

5.2.2 Methods

Subjects

Sixty two subjects from the Philippines aged 18-28 years old participated in the study. The subjects' average age was 22 years. Forty three percent of the sample was male and half of them were University students. They were paid SGD10.00 for participating in the study. The age range of 18-28 was considered for two reasons: high volume of spending, and dynamic buying behavior.

Assessments

A questionnaire was designed to gather data on pre-purchase affect and purchase intention (see Appendix 6). The first part of the questionnaire inquired about the pre-purchase affect that subjects felt while examining a product. Several affect responses such as amazed, content, cheerful, and hopeful were validated in a previous study by Seva, Duh & Helander (2006b) and included in the questionnaire. There were eighteen emotions, which were rated by subjects using a five-point rating scale to indicate the intensity of their emotional experience. In this study, however, not all eighteen emotions were analyzed to validate the model. A previous study that classified these emotions using factor analysis yielded the results that pre-purchase affect can be expressed using four dimensions, that can be adequately represented by the following emotions: amazed, hopeful, content, and cheerful (Seva, Duh, & Helander, 2006a).

The second part of the questionnaire examined user's purchase intention after evaluating the product. A five-point rating scale was used to indicate the intention to buy the product with "1" – definitely not buy and "5" – definitely buy. Finally, the questionnaire included evaluations of how well the phone design corresponded to possible purchase criteria. The list of purchase criteria was obtained from a cluster analysis of criteria carried out for electronic products (Seva et al., 2005). A five-point scale was used to indicate conformance to each of the criteria enumerated. Although there were nine clusters of criteria identified by Seva et al. (2005) work, only three criteria were considered in this study: personality, design, and quality, because they can possibly moderate the attribute-affect relationship. Other criteria such as budget, popularity, and the need for the product were deemed irrelevant for the purpose of the study because they are not product design variables.

To determine if the terms could be understood easily or if there were problems that may be encountered in the administration, the questionnaire was pre-tested using five persons

Dependent and independent variables

The model can be divided into two segments, namely; attribute-affect segment and affect-purchase intention segment. The PAM presented in Figure 10 was simplified in Figure 14 for validation purposes. For the attribute-affect segment of the model the dependent variables were the pre-purchase affect ratings of amazed, content, hopeful, and cheerful. The independent variables were the characteristics of

the mobile phone shown in Table 8 and the adherence of each phone to purchase criteria. The measurements of these phone attributes (independent variables) were obtained from the company's website or actual measurements done by the author. These variables were chosen because they are published by phone companies and easily researchable in the Internet where consumers usually get their information for comparison.

Figure 14 Simplified PAM

For the affect-purchase intention segment, the independent variable was pre-purchase affect and the dependent variable was the rating of purchase intention.

Table 8 Mobile Phone Design Attributes (Independent variables)

Color	Weight of body (grams)
Shape of navigation button	Ratio of body height to width
Number of differently shaped buttons	Number of colors in the body
Number of colors in display	Size of navigation button (cm ²)
Ratio of body weight to height	Ratio of display width to height
Horizontal length of the body (cm)	Area of display (cm ²)
Vertical length of body (cm)	Display size (pixels)
Thickness of body (cm)	

Color, a categorical variable, was coded prior to statistical analysis.

Experiment products

Ten Nokia cellular phones were evaluated in this study. Mobile phones were chosen because they can be classified as “high involvement” products. They are expensive and exhibit users’ personalities. To prevent the brand from influencing the emotion of the consumer the phones were of the same brand. A study by Yu and Dean (2001) asserted that customers’ loyalty to a brand may cause them to have stronger emotions and this can introduce bias in the experiment.

The ten models used for the study were: Nokia 3315, 8250, 2100, 3200, 3220, 6610, 6610i, 3100, 8210, and 8250. Three of these phones had cameras and 5 had colored displays. The choice was limited to Nokia phones in order to eliminate the effect of brand in the evaluation.

Data collection procedure

The study was conducted in a laboratory so that possible nuisance variables such as sales personnel and store atmosphere could be controlled. In the laboratory, the phones were displayed on top of a table and were numbered for identification. To simulate the scenario in retail shops the phones were not operational. The subjects could hold and study the phone but could not use them.

Before actual phone evaluation, the subjects were briefed regarding the purpose of the study. They were asked to fill in a preliminary questionnaire that included mood identification. This was done to identify whether the subject had an extreme or unusual mood that could influence the evaluation. Subjects with extreme moods were dismissed from the experiment.

Subjects were asked to evaluate eight cellular phones that attracted their attention. They were supposed to evaluate the phones in the order that they were attracted. The subjects were then instructed to fill in individual questionnaires for each of the phone evaluated.

5.2.3 Results

Outline of statistical analysis

To validate the three hypotheses, a multi-level regression model was fitted to the data. This method of analysis was employed to account for the within-person

clustering of responses. The statistical approach outlined by Hox (2002) was followed for each of the two segments of the model. Prior to conducting the statistical analysis, all independent variables were centered using grand-mean centering. This was done to improve interpretability of data (Hox, 2002).

A null model was fitted to each dependent variable to determine the extent to which pre-purchase affect ratings were influenced by the subject. Full maximum likelihood (FML) was used as the estimation method. Since FML was used in the estimation process the null model can be used as a baseline comparison of deviance value. The intra-class correlation (ICC) was computed for each of the pre-purchase affect estimates and the results are shown in Table 9. Since all ICC's computed were greater than 20%, use of multilevel modeling in the analysis was justified.

Table 9: Intra-class Correlations

Pre-purchase Affect	ICC
Amazed	0.46
Content	0.37
Cheerful	0.46
Hopeful	0.56

The second part of the statistical analysis included first level variables (product attributes and purchase criteria) into the model and fixed the variance components of the slopes at first to zero (Hox, 2002). As there were many variables included in the analysis, a preliminary screening was deemed necessary. This was done to avoid the model becoming over-parameterized and convergence could not be achieved. To determine the statistical significance of the parameter estimate and the variance component, each variable was included in the null model one at a time. The variables that were identified to be significant in the screening were then included one at a time in the final model. After each addition of the previously significant variable, the deviance was computed for comparison until the final model was obtained.

To test the moderating effect of purchase criteria on the relationship between product attributes and pre-purchase affect, the interaction terms were also screened by adding subsets of interactions into the model. Each significant product attribute in

the final model was paired with the purchase criteria and inspected for significant interaction parameters.

The ICC was computed for purchase intention and the value obtained was 0.11. This correlation was not as strong as the pre-purchase affect but multilevel modeling was used because it conformed to the structure of the data.

5.2.4 Models fitted

The full model tested in the attribute-affect segment was as follows:

Level1:

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_{1j} + \dots + \beta_{15j}X_{15j} + \beta_{16j}T_{1j} + \dots + \beta_{18j}T_{3j} + \beta_{19j}X_{1j} \bullet T_{1j} + \dots + e_{ij} \quad (1)$$

$$\begin{array}{ll} \text{Level 2:} & \begin{array}{l} \beta_{0j} = \gamma_{00} + u_{0j} \\ \beta_{1j} = \gamma_{10} + u_{1j} \\ \vdots \\ \beta_{18j} = \gamma_{180} + u_{18j} \end{array} \end{array} \quad \begin{array}{l} \text{Slopes of product attributes} \end{array}$$

(2)

Y_{ij} = pre - purchase affect rating of person i for mobile phone j

X_{ij} = measurement of product attribute i for mobile phone j

T_{ij} = rating of adherence to criteria i of mobile phone j

Where: $X_{ij} \bullet T_{ij}$ = interaction terms of product attribute and purchase criteria

γ_{ij} = fixed effects

u_{ij} = random effects (variances)

The model considered the interaction of the product attribute and the purchase criteria to test for moderating effects. For the affect-purchase intention segment of the model, the following multilevel model was fitted to the data:

$$\text{Level 1:} \quad P_{ij} = \beta_0 + \beta_{1j}Y_{1j} + \beta_{2j}Y_{2j} + \beta_{3j}Y_{3j} + \beta_{4j}Y_{4j} + e_{ij}$$

(3)

$$\begin{array}{ll} \text{Level 2:} & \begin{array}{l} \beta_{0j} = \gamma_{00} + u_{0j} \\ \beta_{1j} = \gamma_{10} + u_{1j} \\ \vdots \\ \beta_{4j} = \gamma_{40} + u_{4j} \end{array} \end{array} \quad \begin{array}{l} \text{Slopes of the pre-purchase affect} \end{array} \quad (4)$$

Where: P_{ij} = purchase intention of person i for mobile phone j

Attribute-affect segment results

After screening the product attributes and purchase criteria for their significant individual effect and their covariance parameters, the results obtained for the four dependent variables are shown in Table 10.

As can be seen in the table, the dimensions of the phone and its screen display had the most significant effects in the pre-purchase affect ratings of the subjects. This was also evident in the three purchase criteria that were included as independent variables in the model. Most of the variance components of the slopes were not significant except for personality and design. This meant that the subjects had almost the same slopes for the independent variables, but significantly varying intercepts except for personality and design.

Some of these variables were included in the final model by analyzing which ones contributed significantly to the model equation. The variables that had the most significant effects during the screening process were included first, and the deviance was computed each time by comparing the model with predictor variables to the null model for each pre-purchase affect. The parameter estimates of the best fitted model are given in Table 11.

Exploratory analysis of interaction effects between product attributes and purchase criteria was done by including subsets of interaction in the model. Each of the significant product attribute was paired with all the purchase criteria, one at a time, until all the attributes were considered. However, the exercise did not yield any significant results and so were excluded from Table 11. Most variance components of the slopes were also not significant except for personality.

The fitted models show that phone dimensions and the relationship of these dimensions (i.e. ratio of height to weight) trigger strong pre-purchase affect in consumers. However, it is worth noting that adherence to purchase criteria also have contributed strongly to the models.

Table 10: Test of individual effects and covariance parameters

Independent variables	Amazed		Content		Cheerful		Hopeful	
	β	cov	β	cov	β	cov	β	Cov
Intercept	***	***	***	***	***	***	***	***
Color								
Shape of navigation button			***					
Number of differently shaped buttons			**					
Number of colors in display								
Ratio of body weight to height	***		***				**	
Horizontal length of the body (cm)	***		***				***	
Vertical length of body (cm)	***		**				**	
Thickness of body (cm)					*			
Weight of body (grams)	***		***				***	
Ratio of body height to width	*						*	
Number of colors in the body			***				**	
Size of navigation button (cm ²)			***					
Ratio of display width to height	***		**				***	
Area of display (cm ²)	***		***		***		***	
Display size	***		*				***	
Personality	***	**	***	*	***		***	
Design	***	**	***	*			***	
Quality	***		***		***		***	

*** p<0.001; **p<0.01; *p<0.05

Table 11 Parameter Estimates of Fitted Model

	Amazed		Content		Cheerful		Hopeful	
Independent variables	β	p	β	p	β	p	β	p
Fixed Intercept	2.47	***	2.71	***	2.40	***	2.13	***
No. of differently shaped buttons			0.06	*				
Ratio of body weight to height	3.52	*	-1.02	**				
Horizontal length of the body (cm)	6.35		-2.54	**			-0.56	
Vertical length of body (cm)							0.02	
Thickness of body (cm)					0.49	*	0.19	
Weight of body (grams)	-0.32	*	0.1	**				
Ratio of body height to width	11.91	*						
Size of navigation button (cm ²)			0.26					
Ratio of display width to height							-0.57	*
Area of display (cm ²)	0.18	***			0.15	***	0.01	
Personality	0.26	***	0.32	***	0.24	***	0.18	***
Design	0.03		0.1	*			0.13	**
Quality	0.12	**	0.04		0.24	***	0.06	
Significant Covariance parameters	β	p	β	p	β	p	β	p
Random Intercept	0.6	***	0.43	***	0.64	***	0.71	***
Personality variance	0.08	**			0.04	*	0.06	**
Personality + Intercept covariance	0.09	*	0.06	*	0.07		0.15	***
Residual	0.51	***	0.59	***	0.60	***	0.38	***

*** p<0.001; **p<0.01; *p<0.05

To justify the inclusion of the variables in the final model, the difference in the deviance of the final models and the null model for each dependent variable were computed. All likelihood ratio statistics (LRS) computed were statistically significant (p<0.01), which affirmed the good fit of the data to the derived equation.

The results shown above validated the first hypothesis of the study that product attributes are responsible for eliciting strong affective responses from users, but failed to confirm that adherence of the product to purchase criteria moderates the relationship of pre-purchase affect and product attributes. Since exploratory analysis of interaction effects between purchase criteria and product attributes does not show significant results, regression models that only included product attributes are identified to eliminate the influence of purchase criteria from the equation. Parameter estimates of “attribute-only” models for each of the dependent variables are shown in Table 12. The width, weight, ratio of body weight to height, number of colors in the body, and display size are significant parameters in at least two of the pre-purchase emotions analyzed. The other attributes are either significant for only one type of affect or individually insignificant. For example, the shape of navigation button is only significant for content while vertical length of the body is insignificant for all affect.

Table 12 Parameter Estimates for Attribute Models

	Amazed		Content		Cheerful		Hopeful	
Independent variables	β	p	β	p	β	p	β	p
Fixed Intercept	2.52	***	2.72	***	2.42	***	2.16	***
Shape of navigation button			0.42	***				
Ratio of body weight to height	1.33	***	-1.52	***				
Horizontal length of the body (cm)			-7.35	***	-1.19	***	-0.99	*
Weight of body (grams)	-0.1	***	0.15	***			-0.01	
Ratio of body height to width	2.38							
No. Of colors in body			0.46	***				
Size of navigation button (cm ²)	0.7	***						
Area of display					0.14	***		
Ratio of display width to height							-2.18	**
Display size	5.8E-05	***					-4E-05	*
Random intercept	0.74	***	0.80	***	0.78	***	0.57	***
Residual	0.78	***	0.58	***	0.76	***	0.86	***

*** p<0.001; **p<0.01; *p<0.05

The difference in the deviance of the attribute model and the null model for each dependent variable was also computed and are found to be all significant at 5%. As such, the attribute models can be accepted as fitted to the collected data.

Affect-purchase intention segment results

Pre-purchase affect -purchase intention segment was validated by fitting the data in the multilevel model discussed in the method section. There was only one dependent variable in this model, namely purchase intention, and four independent variables which were the pre-purchase affect considered in the previous section. In order to avoid over-parameterization problems, each of the pre-purchase affect was screened for significance in predicting an intention to purchase. The screening showed that all fixed parameters were significant as well as the random intercept. As such, all of them were included in the final model. The parameter estimates for the purchase intention model are shown in Table 13. It can be seen that the most influential emotion in purchase intention was content. The result confirmed the third hypothesis of the study that the intensity of pre-purchase affect influenced the consumer's purchase intention.

Table 13 Parameter Estimates for the Purchase Intention Model

Parameters	Parameter Est	p-value
Fixed intercept	0.97	***
Amazed	0.21	***
Content	0.36	***
Hopeful	0.22	***
Residual	0.57	***
Random intercept	0.67	**
Cov random int + content	-0.14	*
Variance of content	0.04	*

*** p<0.001; **p<0.01; *p<0.05

The difference in the deviance of the purchase intention model and the null model for each dependent variable was also computed and found to be significant at 1%. In essence, the purchase intention model can be accepted as fitted to the collected data.

5.2.5 Discussion

Designing products to appeal to consumers' emotions is a new paradigm in the area of product design. However, it is not clear which aspects of a product drive consumers' emotions. The results of this study demonstrate a strong relationship between design attribute of mobile phones and pre-purchase affect. The width of a phone's body, for example, significantly affected feelings of contentment and cheerfulness. The slimmer the phone the more these two emotions are triggered perhaps because slimmer phones represent new technology that is preferred over bulky older technologies. Moreover, slimmer phones are easier to hold and carry around.

The display size of the phone is another attribute that elicits emotion in the design. A large display size increases the intensity of amazement because it enhances the image of the information displayed on the phone. Although the subjects are not given the opportunity to turn on the phone during the experiment, they are well familiar with Nokia phones and the display characteristics of each phone. They have either used some of these phones before or have seen friends use them. It is noticed, however, that smaller display size results in a greater feeling of hopefulness. This maybe attributed to the fact that smaller display sizes are difficult to read and users might feel hopeful that they can still read despite of the small display.

The number of colors in the body also reinforces feelings of contentment. More colors increase the intensity of the feeling because color can make a product more interesting and unique. The study, however, only considered the number of colors and not the color combinations on the phone. It is possible that an increase in number of colors may not necessarily increase contentment if the colors used do not match. It is interesting to note that although the number of colors in the body was a statistically significant, color per se is not significant. This may be attributed to the limited number and type of colors used in the experiment. The colors of the phone used may not have been the colors that are likely to engender strong emotions from a consumer.

The result of this study confirms some of the earlier findings of Seva, Duh & Helander (2006b). In this study, affect was predicted using discriminant analysis. Phone dimensions and the ratios of these dimensions provided good discrimination and involved a greater intensity of affect experience. The size of the navigation control button was the strongest discriminant variable in the study and larger buttons

were associated with higher intensities for most, but not all, pre-purchase affect. Since the results obtained were consistent for the two studies, it seemed likely that the size of the navigation control button is a good predictor of pre-purchase affect experience.

There were no significant interactions between adherence to purchase criteria and product attributes. It may also be noticed that adherence to purchase criteria had a more significant influence on pre-purchase affect than attributes especially for personality because products were also used as social representations (Taylor & Taylor, 2004). The results may imply that these two sets of variables independently influence pre-purchase affect or that adherence of product attributes to purchase criteria is a mediating variable between attributes and emotion. Future studies can deal with the investigation of the direction of relationship. The absence of interaction may also have been caused by some methodological problems in gathering the data for this study. Since the rating of adherence to purchase criteria was based on the product as a whole it cannot be ascertained which product attribute is causing the value of the rating. This inadequacy can be addressed in the future by conducting a correlation analysis of the attributes and purchase criteria.

The validation of the affect-purchase intention segment revealed that all pre-purchase affect except cheerful were meaningful predictors of purchase intention. The predictability of purchase intention from affect intensity affirmed the employment of affect as a heuristic in decision-making. The “affect heuristic” was tested in many situations and findings from previous studies also confirmed that affect associated with images influence judgments and decisions (Slovic et al., 2002). This implies that customers are operationalizing various criteria for purchasing and there is no probability assessment of purchase success such as those implied in the decision models based on operations research models. Rather a “simplistic” reliance on emotions forms the basis for purchase decisions.

Similarly, Schiffman, Bednall, Cowley, O’Cass, Watson & Kanuk (2001) identified emotion as the basis of consumer decision-making. In this model, consumer decision was based on deep feelings or emotions such as joy, fear, love, hope, etc. Consumers buy products because their emotions are activated during the purchase process. Emotions can be triggered by the environment (Bitner, 1992; Milliman, 1982), the salesperson (Bell, 1999), advertising (Batra & Stayman, 1990) or the product itself (Richins, 1997).

The main limitation of this study is the small number of models (ten) that were used for data collection. The participants did not have much choice. Other variables that were considered in the analysis such as color and shape were not sufficiently evaluated because the selection was too limited. Moreover, fatigue may have also affected the evaluation process because the experiment was not randomized to give way to consumer choice. Subjects were asked to select products according to the degree of their attraction until they reach the quota of eight models to evaluate. They were not given a randomized list of models to evaluate.

5.2.6 Conclusion

Some product attributes can cause intense emotional experience. Examples are attributes related to the phone's dimensions and the relationship between these dimensions. The design attributes of the navigation button that users interact frequently with, is also a significant predictor of emotion. The multilevel analysis revealed that the contribution of each of the significant product attribute is the same for each person, and variation is brought about only by the intercept, which simply indicates that only some people experience more affect than others.

The hypothesis that if phone characteristics adhere to some purchase criteria, the relationship between product attributes and affect will be stronger was not validated in the study. "Adherence to purchase criteria" may be an independent variable with strong influence on affect or a mediating variable between design attribute and affect. More studies need to be done to validate which relationship is true.

Affect strongly influences purchase intention. However, of the four affective states that have been studied only "amazed", "content", and "hopeful" have influence. The results of this study generally confirm the necessity of considering affect in designing "high involvement" products.

5.3 Study 2: Field Study (Philippines)

This study aims to identify which attributes of a cellular phone are capable of discriminating the intensity of emotional experience during the evaluation process and determine the relationship between mobile phone attributes and pre-purchase affect. The moderating effect of purchase criteria to the relationship between attributes and emotion was also investigated. The study posited three hypotheses, namely; (a) there are product attributes that consistently cause positive and negative

emotions, (b) some product attributes have strong potential to engender positive emotion, and (b) greater adherence of the product to identified purchase criteria results in stronger association between attributes and emotion. Mobile phones were studied because they were relatively expensive and reflect the owner's personality (Brier, 2004; Dedeoglu, 2004).

5.3.1 Method

Subjects

Forty two subjects voluntarily participated in this field survey conducted in selected shopping malls in the Philippines. A field study was done in order to replicate the natural setting for purchasing mobile phones. As such, the subjects have more phones to choose from and they are in a real shopping environment. Although the field setting may introduce nuisance variables such as sales personnel and store environment, this had been controlled by conducting the study in only one store.

The sample included 21 males and 21 females. Participants belonged to the 18-28 years age range. The average age for the sample was 22 years.

At the time of the interview, the participants were looking for cellular phones to buy in the shopping malls visited. After the interview, each participant is given a token of Php 100 (SGD 3) for their participation in the study.

Questionnaire development

The "Pre-purchase Affect and Purchase Intention Questionnaire" was used to gather data during the field study (see Appendix 6). The first part of the questionnaire inquired about the type and intensity of pre-purchase affect that subjects felt while examining the product that attracted their attention during the shopping process. The list of affect included in this questionnaire was obtained from a previous study on the existence and structure of the pre-purchase affect (Seva, Duh, & Helander, 2006c). There were 18 pre-purchase affect in the original list but only ten were used in this study because they are distinctly positive and negative affect in the list. Positive affect was defined by Watson, Clark, & Tellegen (1988) as a state of pleasurable engagement and high energy while negative affect is characterized by sadness and unpleasurable engagement. The affect words used aside from concern were categorized by Russell (1980) under pleasure and were therefore considered positive

affect words in this study. This distinction was important since discriminant analysis was used. This required that the kind of affect must be definitely positive or negative. The affect words used in the evaluation were: cheerful, concerned, contented, delighted, encouraged, enthusiastic, excited, good, happy, and pleased. A five-point rating scale was employed for participants to rate the intensity of emotion they felt while examining the product. A rating of “5” meant “felt very much” while a rating of “1” meant “not felt at all”.

Product features

Measurable distinctive and integrative features of the mobile phones were used as independent variables in this study. These features were chosen because they are obvious to the shoppers and are available for evaluation when they search for cellular phones to buy. Interactive features were usually not assessed because the shoppers either had limited time for consideration or only dummy phones were available for scrutiny in the shops.

Table 14 shows the phone features considered in the study. These features were either measured directly during the field study or obtained from information published in relevant phone websites.

Procedure

The field experiment was conducted in some mobile phone stores located in big shopping malls selected by the researcher. Prospective subjects were approached and screened according to the characteristics required for the survey and asked if they were willing to participate in the study. They were compensated for their successful participation in the study.

A standard instruction sheet was read to ensure the consistency of information furnished to the participants. Each of them was asked to fill out a personal data sheet before the experiment. They were then asked to examine 2 mobile phones in the store that caught their attention. The researcher took a picture of the mobile phone examined and the characteristics of these items were measured on site.

At the end of each product examination, each subject was asked to complete the questionnaire to indicate the pre-purchase affect experienced and his/her purchase intention.

Table 14 Phone Features Analyzed

Phone feature	Variable name
Number of differently shaped buttons	NUMSHAP
Number of colors in display	DISPCOLR
Ratio of body weight to height	WT_HT_RT
Horizontal length of the body (cm)	WIDTH
Vertical length of body (cm)	LENGTH
Thickness of body (cm)	THICKNES
Weight of body (grams)	WEIGHT
Ratio of body height to width	HT_WT_RT
Number of colors in the body	NOBODCOL
Size of navigation button (cm2)	SIZE_BUT
Ratio of display width to height	DISPHTWD
Area of display (cm2)	AREADISP
Width of display (cm)	WD_DISP
Height of display (cm)	HT_DISP
Display size	DISPSIZE
Number of fonts in display	FONTDISP
Font size of menu items (cm)	FONTSIZE

5.3.2 Results

Discriminant analysis

Data gathered from the survey were analyzed using discriminant analysis. This is a statistical technique that differentiates between two groups with respect to several variables simultaneously (Klecka, 1980). In this study, it is desired to identify which product features are capable of classifying the intensity of emotional experience when evaluating cellular phones. Ratings of 4 and 5 using a five-point Likert scale were classified as intense emotional experience while ratings of 1 to 3 were classified as not intense. Intense emotional experience was coded “0” and less

intense as “1”. The categorical variables were recoded, as discriminant analysis is a technique that requires the dependent variables to be dichotomous. Recoding is the process of assigning numerical values to unquantifiable variables. A Likert scale was used instead of a dichotomous scale at the first instance because the verbal descriptors in the scale used accurately captures the possible intensities of pre-purchase affect that subjects can possibly experience. The intensities can then be recoded to indicate intense and less intense experiences.

Group means for phone attributes were analyzed to determine if significant differences could be observed across emotion intensities. Table 15 shows the significant p-values obtained from conducting mean difference test for measurable phone features for classified intensities (intense or less intense). As can be seen from this table, some phone features show univariate differences across emotional intensities (intense and less intense) and can therefore be subjected to discriminant analysis.

Table 16 shows the classification results obtained from discriminant analysis. Cellular phone attributes can be good discriminating variables in the experience of affect. This can be seen particularly in cheerfulness, concern, contentment, and pleasure where the percent correct classification for original and cross-validated groups were quite high at more than 50%. Klecka (1980) asserts that 50% is the threshold for saying that the correct classification is high because if there are only two groups where items can be classified, the expected value is about 50% per group. If the discriminant function is good, then more than 50% should be correctly classified by the function.

The list of standardized canonical discriminant function coefficients for all emotions considered can be seen in Table 17. These coefficients signify their partial contribution to the discriminant function. A large value of the coefficient indicates a greater contribution of that phone feature to the discrimination between emotional intensities.

Table 15 Test of Group Means of Two PPA Classification Intensities

Phone Attributes	Cheerful	Concern	Content	Delighted	Encouraged	Enthusiastic	Excited	Good	Happy	Pleased
number of differently shaped buttons										
number of colors in display										
ratio of body weight to height							*			
horizontal length of the body (cm)	*		**	*	**		*			
vertical length of body (cm)					*					
thickness of body (cm)										
weight of body (grams)										
ratio of body height to width	**		**	*	*		*			
number of colors in the body			*							
size of navigation button (cm ²)	**	**	**	**	**		*		**	*
ratio of display width to height										
area of display (cm ²)										
width of display (cm)	*		*							
height of display (cm)										
display size										
number of fonts in display							**			
font size of menu items (cm)										

* significant at 0.05 ** significant at 0.01

Table 16 Classification Results of Two PPA Intensities

	Percent correctly classified		
	Selected original grouped	Unselected original grouped	Cross- validated grouped
cheerful	0.81	0.67	0.75
concerned	1.00	0.89	0.93
contented	0.81	0.44	0.64
delighted	0.76	0.56	0.63
encouraged	0.73	0.50	0.49
enthusiastic	0.70	0.44	0.44
excited	0.80	0.72	0.61
good	0.75	0.61	0.41
happy	0.75	0.61	0.59
pleased	0.76	0.72	0.61

Table 17 Standardized Canonical Discriminant Functions

	Cheerful	Concern	Content	Delighted	Encouraged	Enthusiastic	Excited	Good	Happy	Pleased
NUMSHAP	0.71	0.34	-0.13	0	0.18	0.32	0.15	-0.23	0.33	0.78
DISPCOLR	-0.09	-0.13	0.32	0.41	0.05	-0.05	0.18	-0.36	-0.53	-0.06
WT_HT_RT	-2.09	-5.09	-2.78	-6.37	2.13	-7.21	1.81	0.07	-2.41	-10.55
WIDTH	3.25	4.35	6.61	9.48	0.69	8.52	2.1	1.17	2.07	16.14
LENGTH	-2.85	-4.5	-4.91	-8.22	-0.83	-7.06	-1.01	1.13	-2.83	-14.86
THICKNES	-0.35	0.49	-1.38	-1.76	1.15	-1.19	-0.34	-1.32	0.91	-1.87
WEIGHT	2.92	5.37	3.77	7.72	-1.97	8.04	-1.49	-0.75	2.64	14.25
HT_WT_RT	1.79	3	3.03	4.48	1.7	4.74	1.03	-0.28	2.47	8.08
NOBODCOL	0.13	0.15	-0.28	-0.26	-0.09	0.23	0.12	0.14	-0.1	0
SIZE_BUT	-0.67	-1.73	0.23	0.52	-0.41	-0.89	0.47	-1.44	-0.81	0.58
DISPHTWD	0.26	-0.44	-0.18	-0.66	-0.17	-0.04	-0.18	-0.15	-0.57	-0.53
AREADISP	0.45	-4.31	-1.3	2.99	2.36	-4.25	-0.9	-2.05	-1.05	-0.18
WD_DISP	-2.34	3.83	1.14	-1.68	0.28	0.13	1.83	0.21	1.41	-2.58
HT_DISP	1.14	1.04	0.44	-1.66	-1.85	3.91	-0.41	1.65	1	1.95
DISPSIZE	0.27	-0.2	-0.19	-0.13	-0.16	0.3	-0.13	0.22	-0.4	-0.65
FONTDISP	0.34	1.2	-0.37	0.22	0.22	1.32	-1.33	1.32	1.05	0.41
FONTSIZE	-0.28	0.38	-0.17	-0.51	0.4	-0.18	0.54	0.69	0.8	-0.4

Multiple linear regression

The second and third hypotheses in this study were validated by constructing linear models. Independent variables were included in the model at the same time. The moderating effect of purchase criteria to the relationship of product attribute and emotion was validated by conducting a moderated multiple regression (Cohen & Cohen, 1975). This method involved a hierarchical regression technique where main effects of the relationship between emotion and product attributes were first tested. Significant attributes during the first screening were then paired with the moderating variables to test significant interaction effects. Out of the many possible interactions screened using the hierarchical method of regression, only one interaction turned out to be significant which was the interaction of the size of the navigation button and

design criteria for the dependent variable encouraged ($p < 0.05$). This result partially validated the third hypothesis in the study.

The parameter estimates for the significant models obtained were given in Table 18. The size of the navigation button was the most significant product attribute that determined pre-purchase affect compared to the other attributes considered in this study. This was followed by the height of the display and the display size.

Table 18 Parameter Estimates for Significant Linear Models

	Cheerful	Concern	Content	Delight	Encoura	Enthusi	Excited	Good	Happy	Pleased
MODEL	***	***	*	**	***	*	***	**	*	**
Intercept	1.77	9.47	3.394	3.55	2.386	1.78	8.04	2.89	9.98	1.88
color		†								
butnshap		†								
length							-0.1			
thicknes									-0.57	
ht_wt_rt							-1.92		-1.78	
size_but	0.55	0.5	0.27	0.48	0.58	0.27		0.32	0.32	0.53
disptwd				-1.75						
areadisp		0.43	0.2							
wd_disp		-2.85							-0.96	
ht_disp		-1.06	-0.96			0.24				
dispsize		7.2E-06						-2.6E-06	9.28E-06	
fontdisp		-0.43				-0.5	-0.63	-0.41		
fontsize							2.2			
size_but*design					0.266					

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

† Parameter estimates for each category

	COLOR	Par Est	BUTNSHAP	Par Est
1	Grey	-1.75	Circle	0.81
2	Silver	-1.35	Semi-circle	1.21
3	Black	-1.35	Dot	2.1
4	Red	-0.73	Square dot	0.8
5	Blue	-2.2	Square	1.45
6	Green	-0.93	Rectangle	0.93

5.3.3 Discussion

The intense emotions triggered by the cellular phones evaluated in this study were almost all positive. The feeling of concern was least likely felt by the participants of the study. The results support earlier findings of Richins (1997) that the consumption experience is laden by positive affect.

The results of the study suggest that some phone features can discriminate the intensity of emotion experienced by consumers. The strong discriminating variables were related to the dimensions of the cellular phone, the ratios of these dimensions, and the size of the navigation button. This trend was observed for almost all emotions considered except “concerned”, which is the only negative affect on the list. Phone features related to the display type and size did not appear to be good discriminant variables. Such result may be attributed to the fact that during the pre-purchase context, phone shoppers do not have the time to go into the detailed evaluation of the display and the interface because of time limitations.

It is worth noting that the size of the navigation button showed to be a good discriminating variable for almost all pre-purchase affect. Comparison of means revealed that larger sizes of navigation buttons are associated with higher intensities of positive affect and low intensity of negative affect. The size, however, may have an interaction with the shape of the navigation button which was not considered in the study. Nevertheless, this result is an important input for phone designers who might not realize the impact of the size of navigation button in engendering emotion through cellular phone design.

The ratio of body width to height also figured to be a good discriminating variable in the intensity of emotion. There are other ratios of dimensions considered in the study but this is the only one that exhibited good discriminating power. Ratios of

dimensions were considered in this study to validate if the cognitive preference for golden section proportions elicit intense emotion in the context of phone design. The golden section proportion was widely studied and applied in works of art and researchers investigated human responses to its aesthetic qualities (Elam, 2001). The results of this study did not validate the preference for the golden section in the ratio of body width to height.

Width is another variable that has good discriminating power. Further analysis of data gathered showed that phones with smaller widths evoked more intense positive emotions. Consumers have always been in search for gadgets that are compact and easy to handle. A small width provides this compactness and allows the user to hold the phone securely with one hand.

The results of the multiple linear regression showed significant relationships between mobile phone attributes and pre-purchase emotion. The size of the navigation button was one of the most significant predictor of the intensity of pre-purchase emotion except for excitement. Since the navigation button was the frequently used button when using the phone, it is reasonable to think that the potential user will be concerned about its size. The positive sign of the parameter estimate indicate that an increase in the size of the button also increase the intensity of the emotion experienced. A bigger button size enables a user to manipulate it easily and this might explain the positive emotion evoked by bigger buttons. Phone designers can learn from the outcome of this study by paying closer attention to the size of the navigation button when designing. This information can also be augmented by the outcome that navigation buttons that were shaped like dots evoked higher intensities of concern. Concern is the only negative emotion among all the pre-purchase emotion considered and designers should try to minimize its intensity. As can be seen from the results, circular, rectangular, and square-dot shapes engendered lesser intensities of concern. As such, designers must try to incorporate these shapes in their future designs.

Color was a crucial attribute in eliciting feelings of concern. The parameter estimates for all colors indicated that they were all negatively correlated to concern. Considering the results, the color blue must be utilized to minimize concern. Blue is a color that is associated with “coolness” and literature regarding color consistently found that colors with short wavelengths such as blue are more preferred by consumers (Valdez & Mehrabian, 1994). Designers can therefore utilize colors that have shorter wavelengths such as blue and violet for phone bodies to downplay negative emotions.

The shape of the navigation button also figured to be a significant attribute for the dependent variable “concern” and the result suggested that the square dot (a very small navigation button that is square in shape) and the circular shaped button have the least contribution to feelings of concern. The dot, on the other hand, elicited the most contribution for concern. This finding corroborates the earlier result regarding the preference for larger buttons. Basically, navigation buttons that are small are shaped like dots that are difficult to use.

The dimensions of the phone such as length and thickness negatively contributed to excitement and happiness, respectively. However, the area of the display was desired to be larger. This result was expected because although consumers desire more compact phone designs they want the screen to be big enough so it would be easier to read messages and other information. Similarly, bigger font sizes evoked more intense feelings of excitement as manifested by a positive parameter estimate. Nevertheless, the presence of too many fonts in the display is negatively correlated to positive emotion. Too many types of fonts in the display make the information presentation unattractive and confusing.

The moderating effect of consumer’s personality and design preference to the relationship of some identified phone attributes and emotion was weakly validated in the study. The result indicated that the size of the button interacts with design preference of the consumer and this triggered feelings of encouragement to buy the product. The positive sign of the parameter estimate connoted that as the size of the button increases the preference for the design also increases and vice versa.

The method employed in this study had many limitations that are worth mentioning. Since a field study was conducted there can be many possible factors that may have confounded the results such as the mood of the consumer. The mood, nonetheless, was examined before the start of the survey, such that people with extreme mood were not asked to participate. It is also possible that prior knowledge of the phone model may have contaminated the evaluation process. Some consumers may already have been positively biased over a certain phone design.

5.3.4 Conclusion

This study focused on identifying phone features that can discriminate between low and high intensity of pre-purchase affect. Data gathered from the field survey indicated that dimensional features of cellular phones such as width, height to width

ratio, and size of navigation button are good discriminating variables. Phones with smaller widths and larger navigation buttons can evoke intense positive emotion.

The limitation of discriminant analysis as a statistical tool limited the number of discriminating variables included in the study. Phone features that are more important to the consumers such as color and shape could have been good discriminating variables but the problem of quantifying them in a continuous scale presented a challenge. Other means of analyzing these unquantifiable phone features must be used in future studies to counteract the problems.

Phone attributes related to dimension and form can predict intense feelings of pre-purchase emotion. The most important phone attribute in evoking emotion is the size of the navigation button, which showed statistically significant result for almost all emotions except excitement. The relationship of the size of the navigation button and the intensity of excitement is moderated by the consumers' design preference. The relationship becomes stronger if the consumer preferred larger buttons.

Companies that are involved in phone design can learn from the output of this study. Not all phone attributes must be given priority in design. As the result showed, there were more important characteristics that must be emphasized such as the area of display, font size, and number of fonts in the display. Basically, phone features that users constantly interact with are good predictors of emotion.

5.4 Study 3: Field Study (Singapore and Philippines)

In this study consumer affective and behavioral response to cellular phone design were investigated. Cellular phones were chosen for evaluation because they are used for self-expression (Dess, Lumpkin, & Eisner, 2006). Essentially, they are emotion rich products appropriate for the objectives of the study. It is hypothesized that a set of product attributes trigger emotional responses in users and positive responses influence purchase intention. Cultural influence on affective and behavioral response was included in the analysis due to previous findings that preferences and emotional experience can vary between cultures. Scollon, Diener, Oishi, & Biswas-Diener (2004), for example, discovered that Europeans experience pleasant emotions than Asians more frequently. Participants from two countries were examined in this study, namely; Singapore and Philippines. Although both countries belonged to Asia, the Filipino culture is influenced by Spain having been under its rule for 300 years (Zaide, 1999) while Singapore was under the British rule for more than 100 years. It is inferred that

phone users from these two countries would look into different sets of product attributes and their desire to purchase may be driven by unique sets of affect.

5.4.1 Method

Participants

Two sets of participants were involved in this study. One set consisting of 99 persons were from Singapore and the other set of 62 persons were from the Philippines. Participants' age varied between 17-35 years. Consumers in this age range constituted a significant percentage of the buying population according to Wood (2004). They have high volume of spending and have common characteristics such as aptitude for new technology and impulse to purchase new things. The average age of participants from the Philippines is 22 years while the average age of participants from Singapore was 24. Both samples were gender balanced to avoid bias.

Measurements

A questionnaire was designed to gather data on pre-purchase affect (PPA) and purchase intention (see Appendix 6). The first part of the questionnaire aimed to determine the mood of the consumers when they enter the shopping mall. The list of moods was taken from the Positive Affect-Negative Affect Scale (PANAS) (Watson et al., 1988). The PANAS scale was chosen as a mood identification method because of its reliability and validity in the self-report literature of mood evaluation (Watson & Clark, 1997). Mood was measured using a five point scale anchored at 5-very much and 1-not at all.

The second part of the questionnaire inquired about the PPA that participants felt while examining the phone. The list of affect included in this questionnaire was obtained from a previous study conducted by Seva, Duh, & Helander (2006a) that identified the PPA. The study yielded 18 PPA, namely; amazed, cheerful, concerned, contented, delighted, encouraged, enthusiastic, excited, fulfilled, glad, good, happy, hopeful, interested, joyful, pleased, surprised, and thrilled. This list was included in the questionnaire and participants rated the intensity of their emotional experience using a five-point rating scale (1 – not at all to 5 – very much). In this study, however, not all 18 emotions were analyzed. A previous study that classified these emotions using factor analysis showed that PPA can be expressed along four dimensions (amazement, optimism, satisfaction, and positive enthusiasm) with four reliable measures, namely; amazed, hopeful, content, and cheerful (Seva et al., 2006c).

The third part of the questionnaire looked into the purchase intention of the user after evaluating the product. A five-point rating scale was used to indicate the intention to buy the product where “1” – definitely not buy and “5” – definitely buy.

5.4.2 Dependent and independent variables

There were two sets of dependent variables in this study: PPA intensity and rating of purchase intention. The independent variables used to predict PPA consisted of 24 phone attributes enumerated in Table 19. This table lists down in no particular order the phone attributes considered in the study. The list contains dimensional attributes, form attributes, and ratios of dimensions. These phone attributes were selected for analysis because they were obvious to the users and relevant to the aesthetic and functional value of the phone. The measurements for these phone attributes were obtained from the company’s website or actual measurements made by the author. PPA was used as independent variable to predict purchase intention of the users.

Table 19 List of Phone Attributes

Frontal shape of the body	Horizontal length of the body (cm)	No. Of colors in the body	Height of display (cm)
Shape of navigation button	Vertical length of body (cm)	Size of frequently used button (cm ²)	Display size
No. Of differently shaped buttons	Thickness of body (cm)	Ratio of display width to height	Number of fonts in display
Number of colors in display	Weight of body (grams)	Area of display (cm ²)	Type of opening
Ratio of body weight to height	Ratio of body height to width	Width of display (cm)	Presence of camera
Deviation of body dimension ratio from golden proportion	Deviation of display dimension ratio from golden proportion	Horizontal body symmetry	Vertical body symmetry

Procedure

The two field studies were conducted in cellular phone stores located in large shopping malls in Singapore and Philippines. Potential participants were approached and screened according to desired characteristics as required in this study. Participants were screened according to age, gender, and employment status in order to avoid bias in the sample.

Before the actual phone evaluation, the participants were briefed regarding the purpose of the study. They were asked to fill in a preliminary questionnaire that included mood identification. This was done to identify the presence of extreme mood that may influence the evaluation process. Participants with extreme moods were dismissed from the study.

Participants were asked to evaluate two cellular phones that attracted their attention positively or negatively. They indicated the model of the phone in the questionnaire and then filled in individual questionnaires for each phone evaluated.

5.4.3 Results

Nationality difference in emotional experience

Data gathered from the survey were grouped according to country. Table 20 shows the mean and standard deviation of PPA intensity. A one-way ANOVA was conducted to determine if there are significant mean differences between PPA intensity between countries. All were found to be insignificant for the dependent variables considered. Filipinos experienced more intense PPA than Singaporeans, but the difference was not statistically significant.

Table 20 Descriptive Statistics on Pre-purchase Affect Intensity for Each Nationality

Country	n	Amazed		Content		Cheerful		Hopeful	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Singapore	197	2.52	1.43	2.49	1.48	2.41	1.45	2.4	1.44
Philippines	118	2.62	1.42	2.70	1.4	2.47	1.37	2.15	1.39

*a 5-pt scale was used

Product attribute and PPA

Multiple linear regression was used to develop the models to predict PPA and purchase intention. Since cluster sampling was conducted, a possible grouping of responses may occur for each country. This possibility was explored by computing the intra-class correlation (ICC) of dependent variables. The computed ICC's were all less than 0.0001 indicating that data has no hierarchical structure. Since there was no variation in the intensity of PPA experience per race, deviations may have been brought by the type of attraction to the product. One way analysis of variance (ANOVA) was conducted to determine significant differences in emotional experience

in evaluating positively and negatively attractive phones. Significant results ($p < 0.001$) were obtained for all PPA's and greater mean intensity was computed for positively attractive phones as shown in Table 21.

Table 21 Mean and Standard Deviation of PPA Intensity Rating

	Positively Attractive		Negatively Attractive	
PPA	Mean Rating	SD	Mean Rating	SD
Amazed	3.37	1.23	1.66	1.07
Contented	3.65	1.12	1.32	0.62
Cheerful	3.48	1.2	1.31	0.6
Hopeful	3.55	1.13	1.26	0.54

Multiple linear regression (MLR) specifically backward elimination (stepwise) regression was used to analyze the data. Backward elimination regression is a regression technique that first enters all predictor variables into the model and drops insignificant ones until a suitable model is constructed. The probability associated with the change in the coefficient of determination (ΔR^2) is used as basis for removing a variable (Keith, 2006). In this case, the computer program chose the order of variable elimination. This method has the advantage of handling a large number of predictor variables that if included all at the same time will produce insignificant results. This technique is capable of narrowing down the number of independent variables and predicts the response variable efficiently (Keith, 2006).

The modeling process comprises four steps, namely: relevance screening, multicollinearity diagnosis, model construction and standardization (see Figure 15). Relevance screening of product attributes and PPA was done in order to reduce the number of variables to include in the model. Attributes of cellular phones can reach up to 56 (Yun et al., 2003). Only salient characteristics that are related to form and display were included in the study. Similarly, the initial list of 18 PPA was also narrowed down to include only reliable measures obtained from a previous study by Seva, Duh and Helander (2006c).

Figure 15 Affective Design Modeling Process

The independent variables were further reduced by diagnosing for multicollinearity which is a potential problem in regression. This occurs when independent variables are highly correlated or when one variable can be expressed as a linear combination of other independent variables (Keith, 2006). Multicollinearity may result in models that may be misleading and deviant from expectations. It may be diagnosed by computing for the variance inflation factor (VIF). As a rule of thumb, VIF values greater than 10 signal the presence of multicollinearity (Cohen, Cohen, West, & Aiken, 2003). After checking for multicollinearity a reduced subset of 15 independent variables were obtained. The length and height of display and the width and length of the phone body were eliminated in the analysis.

The reduced subset of independent variables was then used to build the model using backward elimination (stepwise) regression. Significant models obtained were standardized. Since the independent variables assessed using different scales, standardization is needed to compare the relative importance of each in the predictive equation.

The result of regression analysis for each PPA was segregated for each country. The standardized predictive models are summarized in Table 22 and Table 23. The multiple correlation coefficient, R, for the models were all statistically significant at 5%. For Singaporean participants, weight, thickness of the body, and display area were significant predictors of almost all PPA. As the phone becomes thinner and heavier emotion is stimulated. Smaller display areas also triggered intense PPA. Other attributes such as the presence of camera, number of differently shaped buttons and deviation of body ratio from golden proportion contributed to only one PPA in the analysis.

Table 22 Predictive Model for Pre-Purchase Affect – Singapore Participants

Intensity Rating	Predictive model (standardized coefficients)	R
Amazed	$4.146 - 0.258 (\text{thickness of the body}) - 0.273 (\text{area of display}) + 0.307 (\text{weight})$	0.30
Cheerful	$2.759 + 0.174 (\text{number of differently shaped buttons}) - 0.239 (\text{thickness of the body}) - 0.342 (\text{area of display}) + 0.309 (\text{weight})$	0.35
Contented	$4.581 - 0.353 (\text{thickness of the body}) - 0.369 (\text{area of display}) + 0.156 (\text{number of fonts in display}) + 0.154 (\text{presence of camera}) - 0.174 (\text{deviation of body dimension ratio from golden proportion}) + 0.261 (\text{weight})$	0.35
Hopeful	$2.241 - 0.215 (\text{thickness of body}) - 0.277 (\text{area of display}) + 0.167 (\text{presence of camera}) + 0.46 (\text{weight})$	0.33

Predictors of PPA in the Philippines are mostly related to display characteristics such as display size and colors in the display. Display size refers to the resolution of the screen and the results suggest that as the resolution gets better, PPA also intensifies. The negative coefficient of the number of colors in the display implies that a lower color capability triggers emotion. It can be observed that Filipino's emotions were triggered by lighter phones unlike Singaporeans. However, both sets of participants were stimulated by body dimensions that do not deviate considerably from the golden

proportion. Comparatively, Singaporean's PPA's have more predictors than Philippine participants.

Table 23 Predictive Model for Pre-Purchase Affect – Philippines Participants

Intensity Rating	Predictive model (standardized coefficients)	R
Amazed	$2.378 + 0.267$ (display size)	0.27
Cheerful	$5.102 - 0.219$ (number of differently shaped buttons) – 0.254 (number of colors in display) – 0.351 (deviation of body dimension ratio from golden proportion)	0.44
Contented	$6.072 - 0.322$ (number of colors in display) – 0.453 (number of colors in the body) + 0.336 (number of fonts in display)	0.47
Hopeful	$4.692 - 0.247$ (number of colors in display) + 0.306 (display size)	0.38

It was evident that participants coming from different sites were influenced by distinct product attributes. The outcome of regression also shows that product attributes can adequately predict affect intensity.

PPA and purchase intention

Regression for PPA and purchase intention also followed the process shown in Figure 14. After conducting stepwise regression, the following predictive models were obtained (see Table 24). All models were significant at 1%. The results showed completely different results between Singapore and Philippines. Purchase intention of Singaporeans can be predicted by a combination of PPA while only one PPA is needed to predict purchase intention in the Philippines. The results convey uniqueness in the psychological trait of participants and its implication for the purchase process.

The significance of the regression model obtained for both sets of participants illustrates that affect can be used to adequately predict purchase intention.

Table 24 Predictive Models of Purchase Intention

Purchase Intention Rating	Predictive model (standardized coefficients)	R
Singapore	$0.427 + 0.259$ (cheerful) + 0.325 (hopeful) + 0.306 (contented)	0.84
Philippines	$2.692 + 0.325$ (amazed)	0.33

5.4.4 Discussion

Consumers of different nationality had the same intensity of emotional response when inspecting products. It was not evident that one nationality is more emotional than another. The absence of clustering in emotional response confirms this phenomenon. The difference in affect experience is brought about by the kind of attraction that drove them to examine a particular product. Consumers are drawn by phones that attract their attention in a positive or negative way. Positively attractive products results in intense PPA. In essence, negatively attractive products do not incite positive emotions as characterized by the PPA's in the study.

The significance of the attribute weight, thickness, and area of display in all PPA's among Singaporean participants is a critical input for designers of cellular phones. Contrary to expectations, heavier phones incite intense PPA for Singaporeans. Since thinner phones also stimulated emotion a contradiction seems apparent. Such a diversion may have existed because of users' expectation that thinner phones would logically be lighter. Users may not like lighter and thinner phones because it exudes flimsiness and lack of durability. Although the trend for new technologies is being small, users still prefer them to be sturdy and one sturdiness index is weight. Considering this, designers must strike a balance between these two attributes. Further experiments may be conducted to determine the optimum relationship of weight and thickness in phone designs.

A smaller display area triggered users' emotions in this study which is contrary to emerging trend of making screens bigger to enhance information presentation (Karjaluoto et al., 2005). Small screen size is especially problematic for displaying large images (West, Hafner, & Faust, 2006) and providing good usability (Parush & Yuviler-Gavish, 2004). However, since the participants of the study are all less than 40 years of age, reading information from small screens may not have presented a problem. It is possible that a different outcome could have been obtained if older participants had been employed. The display area is also dependent on the area of the phone body, thus, a smaller display area was preferred because of users' preference for small gadgets (Karjaluoto et al., 2005). Furthermore, since the participants were not allowed to switch the phone on during the evaluation, it is possible that the problem of readability of screen had been unconsciously ignored.

Singaporean's taste for state of the art technology can be gleaned from their contentment with the presence of camera. Price Waterhouse Coopers documented

such trend in consumer taste in a global study of consumer behavior that included Singapore. The affluence and education of Singaporeans made them more sophisticated consumers who are more demanding in terms of quality and technology (Coopers, 2005). As such, designers need to consider including technological features in phones that are to be offered in Singapore markets.

The predictors of PPA models in the Philippines are distinct from Singapore. Prominent predictors include display size (pixel dimension) and color capability. Although the high intensity of affect experienced for phones with larger displays was expected due to readability issues the low intensity for phones with higher color capability was not. Color capability indicates the brightness of the colors on the display, if this value is high such as 262,000, the color on screen will be bright and clear. This phenomenon is difficult to explain at this point and needs further investigation in future work because subjects were not interviewed after the survey.

Other aspects of form such as number of colors in the body, number of differently shaped buttons, and deviation of body proportion from the golden proportion showed significance in only one PPA model in both countries. Of these form related attributes, number of color in the body and deviation from golden proportion had the most influence in feelings of contentment and cheerfulness, respectively, among Philippine participants. Deviation from golden proportion was also a significant predictor of contentment in Singapore participants but its contribution was not as considerable in the Philippine models. It can be reasonably construed that Philippine participants were more attracted to less colorful phone designs while both sets of participants are captivated by phones with body dimensions closely conforming to the golden proportion. The desire for less colorful designs was also observed among Finnish students (Karjaluoto et al., 2005). The presence of too many colors gives the impression of childishness and did not influence their purchase decision.

It was observed that not one body ratio is exactly equal to 1.618 indicating phone designers' disregard for this widely documented characteristic of natural and man-made beauty based on Fechner's study (Elam, 2001). The rectangle is the most common shape of a cellular phone and designers should start using the golden proportion when they decide on body dimensions.

The Gestalt principle of symmetry was indirectly considered in this study through the inclusion of frontal body shape as independent variable. However, this

variable proved to be an insignificant predictor of PPA implying that body symmetry did not make an emotional impact to the participants.

A product's emotional impact is a good predictor of purchase intention. However, unique sets of affect can predict purchase intention from the two countries. Philippine participants only need to be amazed by the product, while Singaporeans need to experience a combination of affect to drive purchase intention. It seems that Filipinos are driven to purchase by good first impressions of the product that lead them to be amazed while Singaporeans are more discerning in their choice. As mentioned earlier, Singaporeans are more demanding consumers and as a result they look for more attributes that make them feel a number of emotions until they decide to buy. Considering the results, designers can concentrate on product attributes that enhance the relevant emotions that will drive specific sets of users to buy products. In Singapore, for example, designs must cater to advanced technology concept that may be embodied in a thin body, small display area, good resolution, and additional functional features.

It was evident that people coming from different countries are attracted by unique sets of attributes. This may be caused by the prevailing culture that dictates preferences and trends. The cellular phone has evolved from being a voice communication device to an entertainment tool and means of personal expression (Dess et al., 2006). The extent of its use for symbolism, functionality and entertainment, however, may vary in different countries. The results obtained therefore in one country cannot be generalized for another one.

Studies that involve user preferences are subject to many limitations that includes the representativeness of the sample and generalizability of findings. The limited sample size may raise concerns about the validity of the results. However, previous studies conducted in this area by Seva, Duh, and Helander (2006b) confirms the preponderance some cellular phone attributes in the prediction of PPA such as display area and close conformance to golden section proportion of body dimensions. The concurrence of findings confirms the influence of some physical product attributes in attraction and emotion causation that designers should focus on.

The backward elimination regression used in this study, although widely used in human factors research, was criticized by Keith (2006) for lack of theoretical basis in identifying the order of variable inclusion in the model. He cautioned its use in the construction of causal models but found it acceptable in predictive models such as the

one developed in this study. This method showed advantages in narrowing down a large set of predictor variables into a meaningful set that can adequately predict the response.

5.4.5 Conclusion

Emotional responses to cellular phone designs and the effect of these responses to purchase intention were explored in this study. Participants from two countries, namely; Singapore and the Philippines were recruited for comparative study. Although there was no clustering of responses in the two countries the models showed that emotional experience is brought about by distinct sets of product attributes. Singapore users are more demanding in terms of form and technology compared to Filipino users. Their purchase intention is also driven by a mixture of emotions such as contentment, cheerfulness, and hopefulness compared to only one emotion in the Philippines, which is amazement.

The approach of breaking down a product into its characteristic subcomponents had been helpful in identifying specific attributes that designers should zero in. The design process can be very tedious and involves numerous decision making about form, aesthetics, and technology. The outcome of the statistical analysis conducted can enable them to concentrate their efforts on a few significant ones depending on the market that they desire to penetrate.

Future studies can be done to confirm the validity of the models obtained in other areas around the globe. It is worth investigating if the same sets of predictors can be obtained in different countries. Studies can also be conducted to identify gender and age differences in PPA models.

Chapter 6: CONCLUSIONS, CONTRIBUTIONS AND FUTURE DIRECTIONS

Affect is a broad concept that encompasses moods, feelings, and emotions. The use of affect as a means of conceptualizing and evaluating designs requires the development of an assessment system that is appropriate for the context where it is used. Users encounter products every day and make decisions that are sometimes emotionally driven. Emotions that users experience when they inspect and evaluate products are called pre-purchase affect. The pre-purchase affect consists of a unique set of emotions and its context was differentiated from post-purchase situation because this situation is characterized by limited time and consumer reliance on instincts and impressions. Consumers evaluate products that they find attractive and it is at this point that PPA is elicited.

The Pre-purchase Emotion Set (PES) that consists of a list of emotions that consumers experience when buying and evaluating a product included eighteen emotions that were predominantly positive compared to other emotion sets found in literature such as those developed by Russell (1980) and Richins (1997). The emotions in the Circumplex Model of Affect were obtained from an evaluation of physical environments while Richin's Consumption Emotion Set (CES) included emotions experienced from an extended use of a product. These models were regarded to be inappropriate for the assessment of emotion during pre-purchase product evaluation because the components were broad and include emotions that are normally experienced after extended use of the product. This will make PPA assessments insensitive and ineffective. The eighteen components of PES may be used in the assessment of emotional intensity in studies involving affective design of "high involvement" products. These products are characterized as expensive and capable of showing the unique personality of the user. The chronological development of emotion assessment is summarized in Figure 16. This figure illustrates how the emotion set proposed in this study fits into the realm of emotion assessment.

Figure 16 Chronological Development of Emotion Assessment

Further analysis of the PES using multidimensional scaling and factor analysis revealed a four-dimensional solution. The unearthing of the dimensions is important as the words in the emotion set are synonymous to each other and can be described using only a few terms. After the statistical analysis, the dimensions were labeled: amazement, positive enthusiasm, optimism, and satisfaction. These dimensions are different from Russell's (1980) three dimensions of pleasure, arousal and dominance (PAD).

The Pre-purchase Affect Model (PAM) proposed in this study related product attributes to PPA and then to purchase intention. PAM proposed that the source of affective responses in the pre-purchase context is the existence of product attributes that consistently cause emotion for a specific range of products. Designers need to be wary of these attributes to aid them in conceptualizing emotion rich products.

Previous studies did not consider using emotional intensity as a dependent variable possibly due to lack of a suitable assessment method. The inclusion of purchase intention in the model was intended to illuminate the business case for considering affect in product design. Although affect was considered as one of the heuristics in consumer decision-making, it is not known which type of emotions and the intensities of these emotions drive decision-making. It is possible to experience several affect at the same time but some of them may be more intense than others. In this case, it is interesting to know how emotion intensities rated on a scale relate to subsequent purchase decisions.

PAM's proposal that product attributes are related to PPA included the moderating effect of users' criteria. The inclusion of criteria in the model concurs with the "hierarchical structure principle" proposed in Activity Theory (AT). This principle proposes that actions are guided by goals, and thus emotional responses are goal dependent. Consequently, the emotional impact of perceptual inputs varies according to this goal. A car buyer, for example, would be delighted by certain designs that conform to the intended purpose of the car. Consumers with a large family will be delighted by size while singles may be attracted by form and speed. In the PAM, users' criteria may be construed as the users' goals in the shopping activity. These goals influence the emotion elicitation in product evaluation. Considering this argument, it seems that Aboulafia & Bannon's (2004) claim is true; that designing affect into a product is a daunting task because affect is not brought about by the characteristics of the product but by the situation surrounding the activity. However, in this study the context was already fixed. All the subjects were given a definite shopping situation to consider where they need to identify products that satisfy their inner desire or annoy them. The results obtained, therefore, can be used as a common ground for understanding customer requirements and expectations.

One issue in affective design is its domain of application. It was earlier argued that this method is more applicable to high involvement products. The concept of high involvement, however, needs to be operationally defined. There are numerous products in the market but only a handful can be appropriate subjects of affective design. These are products that are expensive and expressive. Users use these products to express themselves and make a statement. They enable users to show uniqueness in their style or personality setting them apart from the rest. The prospect of owning such a product generates a variety of emotions that are not applicable when confronted with highly standardized products. In essence, deep seated desires of users for individuality, pleasure, and aesthetics cause emotion in product evaluation. If affective design is used in highly standardized products, it is possible there will be no variations observed in data because emotion intensities will all be the same and in the low scale.

Different sets of data were gathered to validate the PAM. In an attempt to find a general trend in the data, experiments were conducted in the field and laboratory at two sites, namely; Philippines and Singapore. It was expected that in the field many variables would confound the results so the salient ones were controlled in a laboratory experiment. In this case the effect of brand, store layout, salesperson, and

environment can be discounted from the results. This kind of control, however, limited the evaluation to a subset of products in the market and the absence of a real intention to buy on the part of the subjects. As such, field studies were also conducted in order to investigate the subjects in the real environment where there are relatively many phones to choose from compared to the laboratory study. In the stores where the studies were conducted, the subjects can choose from a variety of phone types and brands available to be inspected. As such, their choice of the most attractive and least attractive is more valid and reliable.

The results obtained reveal that product attributes related to dimensions such as weight, body thickness, and display area predicts PPA intensity. The models obtained are statistically significant at 5%. Comparatively, these attributes give the phone a uniqueness that customers highly value. Thin and small phones are associated with novelty as the trend now is towards miniaturization. Attributes that are related to ergonomics and aesthetics also contribute to emotion elicitation such as size of navigation button and ratio of body length to width. As these are affect-inducing attributes, designers should identify how the trends of this attribute influence affect intensities.

As the results suggest, designers of mobile phone must pay attention to dimensional attributes as they evoke affect. How then does a set of attributes elicit more affect than the others? The answer to this question may be explained by Fulton Suri & IDEO (2005) who explained that the best way to understand the consumer is by studying the behavior. These behaviors then dictate the attributes of the product.

The mobile phone has become an essential gadget for everyone. People bring this everywhere they go and use it for a variety of purpose. They can be found inside purses, bags, pouches, hanging on necks, and inside the pocket where it can be easily pulled out when needed. It serves as a communication tool, entertainment gadget, flashlight, camera, and alarm clock. As such, maintaining it at a reasonable size is necessary. Reasonable size, however, must also consider user comfort or the “ergonomics” of design. This means maintaining a suitable button size for navigation such that errors are minimized and the thumb does not get sore from repeated keying.

It can be logically concluded that trends in design is driven by the changing culture and behavior of people. The desire for today’s miniature products was driven by the need to stay entertained and connected anywhere in the world. Advertisements, science fiction films and technological trends that may be unrelated to one product

may influence this. These information can alter consumer's attitude about existing products and make them desire for more advanced features. One of Nokia's advertisements, for example, set the trend for mobile entertainment by dropping clowns from the sky to amuse a bored traveler waiting for a bus. The advertisement drove the idea that games must be portable to serve the needs of the user anytime and anywhere. Designers should therefore be wary of emerging behavioral changes in consumers and improve the product's physical attributes based on these trends.

The PAM may be used as a framework for identifying product attributes that are responsible for eliciting PPA. However, the use of this model must be preceded by a clear distinction of a context. So far, the findings revealed that product attributes that shows a contemporary trend and heightens pleasure are capable of eliciting PPA from customers. Designers should therefore channel their attention in objectifying these in their designs.

The study suffers from some weaknesses. One weakness of the PAM is the inclusion of only one negative affect in the emotion set out of the eighteen after the streamlining method utilized. Although it had been argued that the shopping experience is replete with positive affect, a different streamlining method could have resulted in some differences in the emotion set. The identification of the words in the emotion set is also highly dependent on the language ability of the participants. Although some controls were taken to ensure the competence of the subjects, there can still be variations in their language ability.

Product attributes cannot be generalized for a bigger population aside from the ones considered in this study. The findings suggest that although emotional experiences were the same for different countries, the perceptual inputs that cause the heightened intensities were different. In view of this, designers must not assume that design attributes that are successful in one place will also be successful in another. Distinctions should be further studied to establish a theory that explains the distinctions.

Since uniqueness, aesthetics, and pleasure were identified to be customer desires that affective design cater to, future researches in this area must focus on developing methods that ensure customers get what they want. Product customization, a method that has been in existence for quite a while might be able to achieve this.

Future work can focus on replicating the study in other parts of the world to identify hedonistic reactions in specific populations. Although it is assumed that there would be variations, it is hypothesized that dimensional characteristics will continue to be the attributes that would generate the most reactions because of the desire for the modern look. The model can also be validated using other high involvement products such as automobile and mp2 players.

The seeming contradiction of customer preferences for mobile phone design such as small width but larger display size may also be investigated using designed experiments. This thesis failed to consider these tradeoffs in the experimental design and succeeding analyses.

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Appendix 1: Product Attraction/Avoidance Survey

Clothing

1. Assume that you are going to a department store to buy some clothes. You don't have very much time to spend in the store so you have to be efficient about buying. In deciding what specific item to buy, you may want to formulate some criteria so that you can make a quick decision.

What criteria do you use to make a decision to buy an item of clothing? First list as many criteria as you can. When you are done listing the criteria rank order them so that the most important is 1 and the second most important is 2, and so forth.

Criteria	Rank

2. What makes you ignore or avoid some clothes? Check all applicable.

- ☐ It is known to be expensive
- ☐ I did not plan to buy it in the first place
- ☐ It does not attract me
- ☐ I have no interest in this kind of clothing
- ☐ Others, pls specify _____

Watch

Assume that you went to the store to buy a watch this time.

1. What criteria do you use to make a decision to buy a watch? First list as many criteria as you can. When you are done listing the criteria rank order them so that the most important is 1 and the second most important is 2, and so forth.

Criteria	Rank

2. If you go to a watch store, what makes you ignore or avoid a certain watch on display? Check all applicable.

- ☐ Item is known to be expensive
- ☐ I did not plan to buy it in the first place
- ☐ It does not attract me
- ☐ Others, pls. Specify _____

Hand phone

Assume that you went to the store to buy a hand phone.

1. What criteria do you use to make a decision to buy a hand phone? First list as many criteria as you can. When you are done listing the criteria rank order them so that the most important is 1 and the second most important is 2, and so forth.

Criteria	Rank

2. If you go to a store for hand phones, what makes you ignore a certain model?
Check all applicable.

- ☐ Item is known to be expensive
- ☐ I did not plan to buy it in the first place
- ☐ It does not attract me
- ☐ Others, pls. Specify _____

Personal Information

AGE	How often do you shop?
GENDER ☐ male ☐ female	☐ once a week ☐ once a month ☐ others, specify _____

Appendix 2: Criteria for Electronic Products and Clothes

List of Criteria for Electronic Products

1. function	2. after sales service	3. battery life
4. price	5. reliability	6. user interface
7. aesthetics	8. appearance	9. need
10. personality	11. style	12. warranty
13. usability	14. feature	15. trendy
16. durability	17. resale value	18. popularity
19. nice design	20. screen size	21. life
22. uniqueness	23. buttons	24. model
25. color	26. ergonomics	27. suitability
28. size	29. weight	30. quality
31. brand	32. reputation	□

List of Criteria for Clothes

1. need	2. design	3. compatibility
4. aesthetics	5. size	6. fabric
7. personality	8. brand	9. quality
10. price	11. style	12. culture
13. social norms	14. appearance	15. texture
16. money available	17. trendy	18. attractiveness
19. uniqueness	20. comfort	21. easy to maintain
22. fitting	23. function	24. durability
25. color	26. budget	27. suitability

Appendix 3: Dendrograms of Cluster Analysis

Dendrogram for electronic products

Dendrogram for clothes

***** H I E R A R C H I C A L C L U S T E R A N A L Y S I S *****

Dendrogram using Average Linkage (Between Groups)

Appendix 4: Exploratory Survey of Pre-purchase Affect

Good day!!! I am a student from the Nanyang Technological University (NTU) and I am conducting a survey on what shoppers feel while they are looking for products to buy. Two different scenarios will be enumerated in the following section and you will be asked to answer the questions honestly and to the best of your ability.

MOOD EVALUATION

Please check which of the following feelings you experienced before you went shopping, and rate them accordingly.

	1 not at all	2 a little	3 moderately	4 quite a bit	5 very much
Active					
Afraid					
Alert					
Ashamed					
Attentive					
Determined					
Distressed					
Enthusiastic					
Excited					
Guilty					
Hostile					
Inspired					
Interested					
Irritable					
Jittery					
Nervous					
Proud					
Scared					
Strong					
Upset					

SCENARIO 1: *Item of clothing*

Recall the item of clothing (dress, shoes, etc.) you purchased **TODAY**.

1. What is this item of clothing? _____
2. Why did you buy this product over the other products that you have seen?

3. What is your primary consideration when choosing the design of these products?

☐ my personality ☐ function ☐ my culture ☐ social standard

☐ others, _____

4. Which one of the following is true in your case? Please check.

☐ I intended to buy this product when I went to the store.

☐ I did not have initial intentions of buying this product.

5. Please indicate emotions/feelings you experienced **when you saw** the product you eventually bought. Some examples of feelings are: happy, interested, disgusted, etc. Please list as many adjectives as you can. **Why did you feel these emotions?**

SCENARIO 2: Electronic product.

Recall the electronic product you purchased **TODAY**.

1. What is this item of electronic product? _____

2. Why did you buy this product?

3. What is your primary consideration when choosing the design of these products?

☐ my personality ☐ function ☐ my culture ☐ social standard

☐ others, _____

4. Which one of the following is true in your case? Please check.

☐ I intended to buy this product when I went to the store.

☐ I did not have initial intentions of buying this product.

5. Please indicate emotions/feelings you experienced **when you saw** the product you eventually bought. Some examples of emotions/feelings are: happy, interested, disgusted, etc. Please list as many adjectives as you can. **Why did you feel these emotions?**

SCENARIO 3: Please recall your shopping experience TODAY when you examined/held a product that you did not buy.

- ☐ What is this item? _____
- ☐ Why didn't you buy this item? _____

1. Please indicate emotions/feelings you experienced **examined/held** this product.
Why did you feel these emotions?

AGE	OCCUPATION ☐ student ☐ professional
GENDER ☐ male ☐ female	

LIST OF ADJECTIVES

	Pls chk	Why did you feel this? (only for negative feelings)		Pls chk	Why did you feel this? (only for negative feelings)
Afraid			Hopeful		
Aggravated			Hopeless		
Alarmed			Humiliated		
Amazed			Irritated		
Angry			Jealous		
Annoyed			Joyful		
Ashamed			Lonely		
Astonished			Loving		
Bad			Mad		
Calm			Miserable		
Caring			Nervous		
Cheerful			Optimistic		
Compassionate			Panicky		
Concerned			Passionate		
Contented			Peaceful		
Defeated			Pleased		
Delighted			Romantic		
Depressed			Sad		
Discontented			Scared		
Embarrassed			Sentimental		
Encouraged			Sexy		
Enthusiastic			Surprised		
Envious			Tender		
Excited			Tense		
Frightened			Threatened		
Frustrated			Thrilled		
Fulfilled			Uneasy		
Furious			Unfulfilled		
Glad			Upset		
Good			Warm hearted		
Happy			Worried		
Homesick					

Appendix 5: Initial List of Pre-purchase Affect

1. Happy	2. Satisfied	3. Uneasy	4. Comfortable
5. Excited	6. Afraid	7. Unfulfilled	8. Convinced
9. Pleased	10. Warm hearted	11. Amused	12. Discontented
13. Delighted	14. Curious	15. Bad	16. Displeased
17. Cheerful	18. Funny	19. Beautiful	20. Exhilarated
21. Fulfilled	22. Romantic	23. Caring	24. Hopeful
25. Glad	26. Astonished	27. Compassionate	28. Hopeless
29. Good	30. Irritated	31. Confused	32. Impatient
33. Amazed	34. Alarmed	35. Depressed	36. Impressed
37. Enthusiastic	38. Sexy	39. Disappointed	40. Lucky
41. Contented	42. Annoyed	43. Distasteful	44. Motivated
45. Hopeful	46. Embarrassed	47. Eager	48. Neutral
49. Joyful	50. Sentimental	51. Enticed	52. Not nice
53. Interested	54. Turn off	55. Lonely	56. Overwhelmed
57. Encouraged	58. Wonder	59. Need	60. Panicky
61. Concerned	62. Ashamed	63. Nervous	64. Refreshed
65. Surprised	66. Discouraged	67. Nice	68. Relaxed
69. Thrilled	70. Envious	71. Not interested	72. Suitable
73. Desire	74. Frustrated	75. Pitiful	76. Tense

77. Optimistic	78. Jealous	79. Upset	80. Unbelieving
81. Worried	82. Loving	83. Anticipating	84. Uncomfortable
85. Calm	86. Passionate	87. Attracted	88. Unpleasant
89. Disgusted	90. Sad	91. Bored	
92. Peaceful	93. Scared	94. Cheap	

Appendix 6: Pre-Purchase Affect and Purchase Intention Questionnaire

Please rate the emotion you experienced and its intensity when you have finished evaluating the product. Put a check mark on the appropriate box.

Affect	Not at all	A little	Moderately	Quite a bit	Very much
Happy					
Excited					
Pleased					
Glad					
Good					
Interested					
Concerned					
Surprised					
Optimistic					
Worried					
Satisfied					
Funny					
Sad					
Bad					
Beautiful					
Disappointed					
Need					
Bored					
Cheap					
Comfortable					
Lucky					
Relaxed					
Suitable					

Please rate your intention to purchase this product based on the following rating scale. Put a tick mark on the appropriate box.

definitely will not buy	probably will not buy	may or may not buy	probably will buy	definitely will buy

Please indicate how the following purchase criteria were met by the product evaluated.

Purchase Criteria	Not at all	A little	Moderately	Quite a bit	Very much
1. Personality					
2. Need					
3. Design					
4. Brand					
5. Popularity					
6. Expected Life					
7. Features					
8. Quality					
9. Reliability/Durability					