The marketing implications of affective product design

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Abstract

Emotions are compelling human experiences and product designers can take advantage of this by conceptualizing emotion-engendering products that sell well in the market. This study hypothesized that product attributes influence users' emotions and that the relationship is moderated by the adherence of these product attributes to purchase criteria. It was further hypothesized that the emotional experience of the user influences purchase intention. A laboratory study was conducted to validate the hypotheses using mobile phones as test products. Sixty-two participants were asked to assess eight phones from a display of 10 phones and indicate their emotional experiences after assessment. Results suggest that some product attributes can cause intense emotional experience. The attributes relate to the phone's dimensions and the relationship between these dimensions. The study validated the notion of integrating affect in designing products that convey users' personalities.

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1. Introduction

Product designers have always been in 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 (2004) highlighted “design experience” as a key influence in conceptualizing good designs. This entails knowing users’ activities, thoughts, feelings, aspirations, goals, rituals, 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 senses of achievement, inspiration, and joy (Givechi and Velasquez, 2004). IDEO, a design company, has constantly employed observation techniques to help them understand people’s interaction with products and develop designs around this interaction (Fulton Suri and IDEO, 2005).

Observing people’s interaction with products educates the designer on critical user behaviour that can serve as input to design. An alternative to this is “immersion in context”, which involves living with the users (Crossley, 2004). Behavioural 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 design concept that encompasses users’ conscious and unconscious aspirations about the product. This design concept, however, can still be improved by using quantitative techniques to compare alternatives. It can also be tested for its potential to engender emotion.

Recently, product designers have considered the emotional needs of consumers in product conceptualization. The Kansei Engineering framework was developed apparently to incorporate customers’ feelings into the design of the product by translating these feelings into design elements (Matsubara and Nagamachi, 1997; Nagamachi, 1995, 2002). Many companies in the automotive, construction, and cosmetics industries have noted that “affect”, a more encompassing term for emotion, is essential to product design.

Not all products are capable of eliciting emotions from consumers. Products that “involve” people in the purchasing process are more likely to elicit reactions and increased
arousal (Mano and Oliver, 1993). High involvement products are usually expensive and express the purchaser’s personality, such as fashion clothing, cars, and mobile phones.

Bloch (1995) discussed the role of the product’s form in evoking aesthetic and positive responses upon perception. Consumers become emotionally engaged in products that capture their attention, especially art products. Nevertheless, Holbrook (1980 cited in Bloch, 1995) asserted that products with resonant designs can cause strong emotional responses. Some researchers have tried to identify product characteristics that are relevant in predicting consumer satisfaction. Using audio/visual products, Han and Hong (2003) identified eight satisfaction dimensions. Attractiveness and overall satisfaction were included in the satisfaction dimensions that were actually feelings of arousal, pleasantness, and contentment. Yun et al. (2003) similarly studied mobile phones. Design features were correlated to the perceived satisfaction of users expressed in 10 dimensions, namely luxuriousness, simplicity, attractiveness, colourfulness, texture, granularity, harmoniousness, salience, ruggedness, and overall satisfaction. Khalid and 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 consider affective states of the customer. As such, it is not known whether physical product attributes are capable of engendering strong emotional responses from consumers and whether these emotional responses influence the decision to purchase.

1.1. Pre-purchase Affect Model (PAM)

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). Fig. 1 shows the hypothesized relationship of the variables. The model may be divided into two segments, which were marked in the diagram as an aid for understanding succeeding references in the paper.

Pre-purchase affect is a term that was used to describe a consumer’s feelings before s/he purchased a product. This type of affect is different from post-purchase affect because the set of emotion is predominantly positive (Seva et al., 2005). The Consumption Emotion Set, proposed by Richins (1997), also includes negative affect, which results from product use.

In our model, pre-purchase affect is triggered by the consumer’s perception of product attributes that are classified as distinctive, integrative, and interactive (Han and Hong, 2003). Distinctive features include colour, size, and shape of a product, which are evaluated independent of other features. Colour, for example, can elicit tension, calmness, and arousal (Bellizzi and 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, and include colour combinations or layouts. 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.

1.2. Hypotheses

The study posits three hypotheses derived from the model:

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 this with purchase intention.

2. Methods

2.1. Participants

Sixty-two participants from the Philippines aged 18–28 participated in the study, with an average age of 22 years. Forty-three per cent of the sample was male and half of them were University students. They were paid S$10.00 for participating in the study. The age range of 18–28 was considered for two reasons: volume of spending, and buying behaviour. Consumers in this age range constitute a significant percentage of the buying population and a large purchase volume. A survey in the UK estimated the spending of 18–24-year-olds as about £10 billion annually, which is very significant. Wood (2004) indicated that this group share many common characteristics such as their aptitude for new technology and impulsive habits of purchasing new things. Young adults (18–34 years of age) were most concerned about how products could enhance their image according to a US study (Fetto et al., 2001).

2.2. Measurements

A questionnaire was designed to gather data on pre-purchase affect and purchase intention. The first part of the questionnaire inquired about the pre-purchase affect that people felt while examining a product. The affect terms in the questionnaire were expressed in English since all participants could read and understand the language very well. Several affect responses were validated in a previous study and included in the questionnaire (Seva et al., 2006c). There were 18 emotions, which were rated using a five-point rating scale to indicate the intensity of emotional experience. In this paper, however, not all 18 emotions are used to validate the model since a previous study that classified these emotions using factor analysis yielded the results that pre-purchase affect can be expressed using four dimensions, which can be adequately represented by the following emotions: amazed, hopeful, content, and encouraged (Seva et al., 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 in Seva et al.’s (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.

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

2.3. Dependent and independent variables

The model can be divided into two segments, namely attribute-affect part (Segment 1) and affect-purchase intention part (Segment 2). For the first segment of the model, the dependent variables were the pre-purchase affect ratings of amazed, content, hopeful, and encouraged. The independent variables were the characteristics of the mobile phone shown in Table 1 and the adherence of each phone to purchase criteria. The measurements of these phone attributes were obtained from the company’s website or were taken by the authors.

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

<table>
<thead>
<tr>
<th>Mobile phone design attributes (independent variables)</th>
<th>Weight of phone (g)</th>
<th>Ratio of body height to width</th>
<th>Number of colours in the body</th>
<th>Size of navigation button (cm²)</th>
<th>Ratio of display width to height</th>
<th>Area of display (cm²)</th>
<th>Display size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Shape of navigation button</td>
<td>Number of differently shaped buttons</td>
<td>Number of colours in display</td>
<td>Ratio of body weight to height</td>
<td>Horizontal length of the body (cm)</td>
<td>Vertical length of body (cm)</td>
<td>Thickness of body (cm)</td>
</tr>
</tbody>
</table>
2.4. Experimental products

Ten Nokia mobile phones were chosen to be evaluated in this study. Mobile phones were chosen because they can be classified as “high involvement” products. They are not inexpensive and exhibit users’ personalities. To prevent the brand from influencing the emotion of the consumer, the phones were all 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 10 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 five had coloured displays.

2.5. Data collection procedure

Although a field setting such as a shopping centre or telephone store was considered, the study was conducted in a laboratory because this controls the effects of possible nuisance variables such as the store environment and the salesperson. Since the study aims to identify the effect of specific variables, the control afforded by a laboratory setting was deemed appropriate.

In the laboratory, the phones were displayed on top of a table and were numbered for identification. To simulate the real scenario in retail shops the phones were not operational. The participants could hold and study the phone but could not use them.

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 screening questions about their mood, to identify if the participant had an extreme or unusual mood that could influence the evaluation process. Those with extreme moods were dismissed from the experiment.

Participants were asked to assess eight mobile phones that attracted their attention. They were supposed to assess the phones in the order that they were attracted to them. They were then instructed to fill in individual questionnaires for each of the phones evaluated.

3. Results

3.1. Outline of statistical analysis

To validate the three hypotheses, a multilevel 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 centred using grand-mean centring. This was done to improve interpretability of the 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 participants. 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 2. Since all ICCs computed were greater than 20%, multilevel modelling was justified to be used in the analysis.

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 to zero at first (Hox, 2002). As there were many variables included in the analysis, a preliminary screening was deemed necessary. This was to avoid the model becoming over-parameterized, which would mean that convergence could then not be achieved. To determine the statistical significance of the parameter estimate and the variance component, each of the variables 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.

In order to test the moderating effect of purchase criteria to 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 modelling was used because it conformed to the structure of the data.

3.2. Models fitted

The full model tested in the first segment was as follows:

\[ Y_{ij} = \beta_{0j} + \beta_{1j}X_{1ij} + \ldots + \beta_{15j}X_{15ij} + \beta_{16}T_{1j} + \ldots + \beta_{18}T_{3j} + \beta_{19j}X_{1j}T_{ij} + \ldots + \epsilon_{ij}, \]
\[ \beta_{ij} = \gamma_{00} + u_{0j} \]
\[ \beta_{1j} = \gamma_{10} + u_{1j} \]

Level 2: Slopes of product attributes,
\[ \beta_{18j} = \gamma_{180} + u_{18j} \]

where \( Y_{ij} \) is the pre-purchase affect rating of person \( i \) for mobile phone \( j \), \( X_{ij} \) the measurement of product attribute \( i \) for mobile phone \( j \), \( T_{ij} \) the rating of adherence to criteria \( i \) of mobile phone \( j \), and \( X_{ij}T_{ij} \) the interaction terms of product attribute and purchase criteria.

The model considered the interaction of the product attribute and the purchase criteria to test for moderating effect.

For the second segment of the model, the following multilevel model was fitted to the data:

Level 1: \[ P_{ij} = \beta_0 + \beta_1 Y_{1ij} + \beta_2 Y_{2ij} + \beta_3 Y_{3ij} + \beta_4 Y_{4ij} + e_{ij}, \] (3)

Level 2: Slopes of the pre-purchase affect,
\[ \beta_{0j} = \gamma_{00} + u_{0j} \]
\[ \beta_{1j} = \gamma_{10} + u_{1j} \]
\[ \beta_{4j} = \gamma_{40} + u_{4j} \]

where \( P_{ij} \) is the purchase intention of person \( i \) for mobile phone \( j \).

3.3. Segment 1 results

After screening the product attributes and purchase criteria for their significant individual effect and their covariance parameters, the following results were obtained for the four dependent variables (see Table 3).

As can be seen in the table, the dimensions of the phone and its screen display had the most significant effects on 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 means that the participants 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 analysing which ones contribute significantly to the model equation. The variables that have 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 4.

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 attributes was paired with all the purchase criteria, one at a time, until all the attributes were considered. However, the exercise did not yield any

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Amazed</th>
<th>Content</th>
<th>Encouraged</th>
<th>Hopeful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Colour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shape of navigation button</td>
<td>***</td>
<td></td>
<td></td>
<td>***</td>
</tr>
<tr>
<td>Number of differently shaped buttons</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of colours in display</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ratio of body weight to height</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>*</td>
</tr>
<tr>
<td>Horizontal length of the body (cm)</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Vertical length of body (cm)</td>
<td>***</td>
<td>**</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Thickness of body (cm)</td>
<td></td>
<td></td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>Weight of body (g)</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Ratio of body height to width</td>
<td>*</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Number of colours in the body</td>
<td></td>
<td>***</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Size of navigation button (cm²)</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Ratio of display width to height</td>
<td>***</td>
<td>**</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Area of display (cm²)</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Display size</td>
<td>***</td>
<td>*</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Personality</td>
<td>***</td>
<td>**</td>
<td>***</td>
<td>*</td>
</tr>
<tr>
<td>Design</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Quality</td>
<td>***</td>
<td>***</td>
<td>***</td>
<td>***</td>
</tr>
</tbody>
</table>

*** \( p < 0.001 \); ** \( p < 0.01 \); * \( p < 0.05 \).
significant results and so were not included in Table 4. 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, especially personality.

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, 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 did not show significant results, regression models that only included product attributes were identified to eliminate the influence of the purchase criteria into the equation. The parameter estimates of the

**Table 4**

Parameter estimates of fitted model

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Amazed</th>
<th>Content</th>
<th>Encouraged</th>
<th>Hopeful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed intercept</td>
<td>2.47</td>
<td>2.71</td>
<td>2.64</td>
<td>2.13</td>
</tr>
<tr>
<td>Ratio of body weight to height</td>
<td>3.52</td>
<td>0.06</td>
<td>-1.02</td>
<td>-0.60</td>
</tr>
<tr>
<td>Horizontal length of the body (cm)</td>
<td>6.35</td>
<td>-2.54</td>
<td>-2.34</td>
<td>0.56</td>
</tr>
<tr>
<td>Vertical length of body (cm)</td>
<td>-0.05</td>
<td>0.02</td>
<td>-1.91</td>
<td>0.19</td>
</tr>
<tr>
<td>Thickness of body (cm)</td>
<td>0.18</td>
<td>0.32</td>
<td>0.39</td>
<td>0.18</td>
</tr>
<tr>
<td>Weight of body (g)</td>
<td>-0.32</td>
<td>0.10</td>
<td>0.07</td>
<td>0.07</td>
</tr>
<tr>
<td>Ratio of body height to weight</td>
<td>11.91</td>
<td>0.26</td>
<td>0.54</td>
<td>0.54</td>
</tr>
<tr>
<td>Area of display (cm²)</td>
<td>0.18</td>
<td>0.32</td>
<td>0.39</td>
<td>0.13</td>
</tr>
<tr>
<td>Personality</td>
<td>0.03</td>
<td>0.10</td>
<td>0.15</td>
<td>0.13</td>
</tr>
<tr>
<td>Quality</td>
<td>0.12</td>
<td>0.04</td>
<td>0.10</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>Significant covariance parameters</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random intercept</td>
<td>0.60</td>
<td>0.43</td>
<td>0.29</td>
<td>0.71</td>
</tr>
<tr>
<td>Personality variance</td>
<td>0.08</td>
<td>0.06</td>
<td>0.15</td>
<td>0.13</td>
</tr>
<tr>
<td>Personality + intercept covariance</td>
<td>0.09</td>
<td>0.06</td>
<td>0.65</td>
<td>0.30</td>
</tr>
<tr>
<td>Residual</td>
<td>0.51</td>
<td>0.59</td>
<td>0.65</td>
<td>0.38</td>
</tr>
</tbody>
</table>

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

**Table 5**

Parameter estimates for attribute models

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Amazed</th>
<th>Content</th>
<th>Encouraged</th>
<th>Hopeful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed intercept</td>
<td>2.52</td>
<td>2.72</td>
<td>2.63</td>
<td>2.16</td>
</tr>
<tr>
<td>Shape of navigation button</td>
<td>0.42</td>
<td>0.40</td>
<td>0.40</td>
<td>0.40</td>
</tr>
<tr>
<td>Ratio of body weight to height</td>
<td>1.33</td>
<td>-1.52</td>
<td>-4.2</td>
<td>-0.99</td>
</tr>
<tr>
<td>Horizontal length of the body (cm)</td>
<td>-0.10</td>
<td>0.15</td>
<td>0.02</td>
<td>-0.11</td>
</tr>
<tr>
<td>Weight of body (g)</td>
<td>2.38</td>
<td>0.46</td>
<td>0.40</td>
<td>0.40</td>
</tr>
<tr>
<td>No. of colours in body</td>
<td>0.70</td>
<td>0.46</td>
<td>0.40</td>
<td>0.40</td>
</tr>
<tr>
<td>Display size</td>
<td>5.8E-5</td>
<td>7.4E-5</td>
<td>5.8E-5</td>
<td>-4.1E-5</td>
</tr>
<tr>
<td>Random intercept</td>
<td>0.74</td>
<td>0.80</td>
<td>0.99</td>
<td>0.57</td>
</tr>
<tr>
<td>Residual</td>
<td>0.78</td>
<td>0.58</td>
<td>0.45</td>
<td>0.86</td>
</tr>
</tbody>
</table>

***p<0.001; **p<0.01; *p<0.05.
“attribute-only” models for each of the dependent variables are shown in Table 5. The width, weight, ratio of body weight to height, number of colours in the body, and display size were significant parameters in at least two of the pre-purchase emotions analysed. The other attributes were either significant for only one type of affect or individually insignificant.

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

3.4. Segment 2 results

The second part of the model, which related pre-purchase affect and purchase intention, was validated by fitting the data in the multilevel model discussed in Section 2. 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 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 6. It can be seen that the most influential emotions in purchase intention were content and encouraged. Although the parameter estimate of each individual pre-purchase affect produced significant results, the integrated model showed that two were not significant. This may be attributed to multicollinearity of the variables. Correlation analysis was done on the data and all correlations were significant at 1%.

Hopeful had a negative effect on purchase intention as indicated by the slope of its parameter estimate. The result confirms the third hypothesis of the study that the intensity of pre-purchase affect influences the consumer’s purchase intention.

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

4. Discussion

4.1. Product attribute and pre-purchase affect

Designing products to appeal to consumers’ emotions is a new paradigm in the area of product design research. However, it is not clear which aspects of a product drive consumers’ emotions. The results of this study demonstrated a strong relationship between design attribute of mobile phones and pre-purchase affect. The width of the phone’s body, for example, significantly affected feelings of contentment and encouragement. The slimmer the phone the more these two emotions were 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 and encouragement because it enhances the image of the information displayed on the phone. Although the participants were not given the opportunity to turn on the phone during the experiment, they were well familiar with Nokia phones and the display characteristics of each phone. They had either used some of these phones before or had seen friends use them. It can be noticed, however, that greater display size relates negatively to feelings of hopefulness. “Hopeful” is not construed as a positive emotion as far as the shopping context is considered. Shoppers feel hopeful if they are uncertain that a product feature will work as anticipated. Hence “hopeful” carries negative implications. Larger display size, therefore, reduces helpfulness because it is a good feature of the phone, and there is less to worry about.

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

The results of this study confirm some of the findings of Seva et al. (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 seems likely that the size of the navigation control button is a reliable predictor of pre-purchase affect experience. A related study done on Nokia mobile phones in Finland by Karjaluoto et al. (2005) also showed that size and appearance influence mobile phone choice among people aged 18–34 years.

4.2. Purchase criteria and product attribute

There were no significant interactions obtained between adherence to purchase criteria and product attributes. It may also be noticed that adherence to purchase criteria has more significant influence on pre-purchase affect than attributes, especially for personality, because products are also used as social representations (Taylor and 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 any 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.

4.3. Pre-purchase affect and purchase intention

The validation of the second segment revealed that contentment and encouragement were meaningful predictors of purchase intention. The more intense these two feelings, the greater was the intention of the consumer to purchase the product. Although “amazed” was not a significant prediction variable in the model, it positively contributed to purchase intention. The reverse trend was observed for “hopeful” because, as mentioned earlier, “hopeful” is not a positive emotion in the shopping context.

The predictability of purchase intention from affect intensity affirms 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 judgements 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 would be implied in the decision models based on operations research models. Rather a “simplistic” reliance on emotions forms the basis for purchase decisions.

Similarly, Schiffman et al. (2001) identified emotion as the basis of consumer decision-making. In this model, consumer decisions are 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 (Bittner, 1992; Milliman, 1982), the salesperson (Bell, 1999), advertising (Batra and Stayman, 1990), or the product itself (Richins, 1997) as illustrated in this study.

The main limitation of this study is the small number of products (10) that were used for data collection. The participants did not have much choice. Other variables that were considered in the analysis, such as colour and shape, were not properly evaluated because the selection was too limited.

The statistical analysis performed to identify product attributes that elicit affect may be used to study alternative designs after a product concept had been formed using non-quantitative techniques such as user observation (Fulton Suri, 2004) and immersion in context (Crossley, 2004). Immersion in context is a design process where the design team engage themselves into the activities of the users to gain better understanding. These two techniques are appropriate in drawing out personal and life experiences of the users, and although not quantifiable do give designers a more comprehensive understanding of the context of use (Fulton Suri, 2004).

5. Conclusion

Some product attributes 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 frequently interact with is also a significant variable prediction of emotion. The multilevel analysis revealed that the contribution of each of the significant product attributes is the same for each person and the variation is brought only by the intercept. This simply indicates that some people experience more affect than others.

The hypothesis that, if phone characteristics adhere to some purchase criteria then 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. Such studies must be based both on theory and on empirical data.

Affect strongly influences purchase intention. However, of the four affective states that were studied, “content” and “encouraged” have greater influence than “amazed” and “hopeful”.

The results of this study generally confirm the necessity of considering affect in designing “high involvement” products.
References


Han, S.H., Hong, S.W., 2003. A systematic approach for coupling user satisfaction with product design. Ergonomics 46 (13/14), 1441–1461.


