The convergent product is an increasingly important phenomenon in the marketplace. The convergent product allows the developer to include more and more diverse functionalities into their products, which can satisfy a broad range of consumer needs. However, failures of convergent products arouse the need to understand its functionalities, and the optimal combination of functionalities and their relationships to attitude and purchase intention. In addition, because convergent product has the potential to offer more diverse functionality, we consider if this will have impacts on instrumental and emotional needs fulfillment and attitude and purchase intention. Additionally, consumer innovativeness was examined to ascertain if there were differences among consumers on their classification of the functionalities, or if it will moderate functional diversity, needs fulfillment, and product attitude. Using the Kano model, this study examined the nature of these relationships by examining the functionalities of a smartphone. Overall, our results show that the convergent products that include functionalities from two of the three categories of the Kano model, must-have and attractive, were rated more positively. Consumer innovativeness differences were found. Consumers with high innovativeness considered must-have and one-dimensional functionalities the most important, and consumers with low innovativeness considered all three important, although one-dimensional functionalities were considered significantly less important. Although increasing functional diversity positively raises product attitude and purchase intention, it tends to raise emotional needs fulfillment only once instrumental needs have been met, especially for respondents showing low innovativeness. The findings should arouse interest about factors that should not be overlooked when developing new convergent products.

Introduction

The plethora of convergent products is a key characteristic of today’s high-technology sector. In the consumer electronics industry, smartphones and other convergent technological devices are significant drivers of industry growth (Consumer Electronics Association, 2011). Major corporations, such as Samsung Electronics and Apple, who have mastered the art of combining computers, communications, and other consumer technologies, have reaped the rewards in terms of share-market value and brand equity. These companies have understood that the development of products that combine disparate functionalities from formerly different products into a common product form, such as smartphones, tablets, and smart TVs, provide enhanced utility to their consumers which has, as a consequence, generated a great deal of market excitement. Other companies are now following suit, but many now understand that providing diverse functionalities in a single product may not necessarily guarantee market success (Kim, Han, and Srivastava, 2002). More knowledge is needed on how consumers perceive the convergent product and its functionalities.

In spite of the growing significance of convergent products, there is relatively little research from which the researcher and practitioner can draw upon to fully understand the nature of consumer attitude toward convergent products. Although the important studies that exist have highlighted what functionalities add value to the base product, particularly as it relates to goal congruence (Gill, 2008; Gill and Lei, 2009); when consumers prefer dedicated products to convergent products (Han, Chung, and Sohn, 2009); and how consumers perceive smart products (Rijsdijk and Hultink, 2009), they, and other academic groups, such as the Marketing Science Institute (Marketing Science Institute, 2011), suggest more research is required. They suggest that more understanding is required on the value of convergent product...
functionalities and the effect of consumer characteristics on the perception, attitude, and purchase intention of convergent products. These are two gaps that this paper will go some way to fill.

This study uses the Kano model (Kano, Nobuhiku, Fumio, and Shinichi, 1984) to understand the types and influence of functionalities on consumer attitude and purchase intention. A widely accepted model by both academics and practitioners, particularly in the quality and operations domains and more recently in service marketing (e.g., Löfgren, Witell, and Gustafsson, 2008), it has received relatively scant attention in the product development management area. The reason for the model’s success is its ability to predict how consumer satisfaction is impacted by different functionalities. The Kano model efficiently explains how functionalities satisfy consumers, depending on their own characteristics, as opposed to other convergent product studies which have mainly focused on the hedonic and utilitarian attributes of functions (e.g., Gill, 2008; Gill and Lei, 2009). In this study, we consider how different combinations of a convergent product’s functionalities affect consumer perceptions. We also identify how perceived product functionalities affect consumer attitude and purchase intention of the product.

Beyond examining the functionalities of convergent products themselves, we also examine the impact of functional diversity. Convergent products have the ability, by their very nature, to have a number of additional incongruent functionalities added to them. Extant literature has however been inconclusive on how this will influence consumer needs fulfillment, attitude, and purchase intention. Gill (2008) for example found that functionality value increases when hedonic functionalities are added to a utilitarian-based product, although not the other way around. In another study on product bundling, Reinders, Frambach, and Schoormans (2010) found negative effects when there is low fit between products in a bundle.

With these inconsistent results, there is a need for additional research in the area.

Finally, this study examines a key consumer characteristic, consumer innovativeness. Consumer innovativeness, especially when it is directed toward a particular product class, domain-specific innovativeness (Hirunyawipada and Paswan, 2006), has been significantly correlated with product adoption, opinion leadership, usage, and usage intention (see Bartels and Reinders, 2011). These are keys to increasing the chance of new product success as they all facilitate the diffusion process. We examine how consumers with high or low levels of innovativeness differ in their assessment of convergent products or moderate the needs fulfilled and the consumer attitude toward convergent products.

In summary, therefore, this paper extends the current literature on convergent products by examining how consumer innovativeness plays on functionality classification and functional diversity on emotional and instrumental needs fulfillment, and convergent product attitude.

The remainder of this paper reports on a study consisting of two stages.

Stage one’s objective is to understand how consumer perceptions of functionalities and different combinations of functionalities in a convergent product affects consumer product attitude. Before considering the combined types of functionalities, we classified each functionality into one of the three principal quality categories of the Kano model; the must-have, one-dimensional, and attractive.

Stage two focuses on understanding how perceived diversity of product functionalities affects consumer emotional and instrumental needs fulfillment, consumer product attitude, and purchase intention. Given that some consumers might regard the functionalities of convergent products as diverse, we expect that perceived diversity of a convergent product’s functionalities positively affects consumer product attitude and purchase intention. We also seek to identify how perceived instrumental and emotional needs fulfillment might mediate the relationship between perceived functional diversity and product attitude. Figure 1 shows the explored relationships for stage two of the study.

Throughout the analysis, we identify if differences in consumer innovativeness can be observed in the classification of the functionalities or if consumer innovativeness moderates the perceived fulfillment of emotional needs, instrumental needs, and the overall attitude to the convergent product given the perceived functional diversity.

---

**BIOGRAPHICAL SKETCHES**

Mr. Sungkyu Lee is a graduate student at Korea University Business School (KUBS) in Seoul, Korea. His research interests focus on understanding new products’ influence on consumer attitude.

Dr. Jong-Ho Lee is an associate professor of marketing at KUBS in Seoul, Korea. His research interests focus on understanding performance of innovation, especially in high-tech companies.

Dr. Tony C. Garrett is an assistant professor in marketing at KUBS in Seoul, Korea. His research interests focus on new product development management, adoption of new technologies, and cross-national management behavior.
Theoretical Background and Hypotheses

Convergent Products

Convergent products are recently getting more and more attention (Gill, 2008; Gill and Lei, 2009; Han et al., 2009), although the concept itself resides within the older concepts of product bundling (e.g., Reinders et al., 2010; Stremersch and Tellis, 2002) and multiattribute products (e.g., Mittal, Katrichis, Forkin, and Konkel, 1994). In other words, the convergent product is a platform product bundle that integrates two or more platform technologies into a common product form which represents a renewed product offering. This has been mainly explored for digital products e.g., mobile phones (Han et al., 2009; Huh, 2003; Kim and Ko, 2008), in which there is unification of functionalities from previously distinct products that employ digital technologies (Yoffie, 1997). The nature of and why convergent products occur have been examined in detail in other studies (e.g., Rijsdijk and Hultink, 2009; Yoffie, 1997).

Recent studies on convergent products have focused on goal congruence between the nature of the base product, hedonic or utilitarian functionality, and the nature of the added ones (Gill, 2008; Gill and Lei, 2009). These studies have focused on a restricted number of added functionalities; therefore, they give only limited guidance for designing convergent products that involve really diverse functionalities. When developing convergent products with diverse functionalities, we may need to consider how the combined types of diverse functionalities are perceived by consumers and how they arouse positive product attitude and purchase intention.

Kano Model

This study uses the Kano model of customer satisfaction. The Kano model is a useful framework on which to categorize product attributes based on how they are perceived by the customers and their effects on customer satisfaction (Kano et al., 1984). Since its introduction in the 1980s, the Kano model has been a popular quality model among practitioners and researchers across a wide range of industries. In new product development research, for example, the Kano model has been used in studies on how to improve perceived quality and customer satisfaction (e.g., Matzler and Hinterhuber, 1998; Rust and Oliver, 2000; Tu, 2010).

The basis of the Kano model is to classify product attributes into one of three distinct primary quality categories; must-have, one-dimensional, and attractive; and two secondary categories, indifference quality and reverse. Each classification has a different influence on customer satisfaction. According to this model, satisfaction is formed through a cognitive comparison of perceived performance with prepurchase expectations. The must-have and attractive functionalities’ performance–satisfaction relationship is nonlinear and nonsymmetric, but the one-dimensional functionalities’ relationship is linear and symmetric. Must-have functionalities are the minimum requirements for customer satisfaction but do not necessarily lead to customer satisfaction if fulfilled or exceeded. Therefore, must-have functionalities are basic expectations and are taken for granted. One-dimensional functionalities lead to satisfaction if performance is high and to dissatisfaction if performance is low; therefore, they are stated, specified, measured, and tend to be technical. Attractive functionalities increase customer satisfaction if delivered but do not cause dissatisfaction if
they are not delivered. Therefore, attractive factors are unexpected and generate surprise to the customer. Attractive functionalities have received most of the recent attention in the literature (e.g., Rejeb, Boly, and Morel-Guimaraes, 2011). There are also two secondary functionality categories, indifference and reverse. Indifference performance does not impact customer satisfaction; however, customers are more dissatisfied with the increase of reverse performance. Because we do not expect these two secondary functionality categories, indifference and reverse, to have effects on consumer evaluations, our study did not consider them.

Using the Kano model to classify functionalities allows developers to identify the product criteria that have the greatest influence on the customer’s satisfaction and attitude by focusing their priorities for product development. Therefore, the Kano model has been found to be optimally combined with quality function deployment (Chen and Chuang, 2008; Griffin and Hauser, 1993; Matzler and Hinterhuber, 1998). Because functionalities classified by the Kano model influence consumer satisfaction differently, developers can anticipate that convergent products with varying combinations of the Kano classification of functionalities result in different levels of consumer product attitude. Therefore, we expect the following:

**H1a:** The consumer evaluation of the convergent product itself will differ by the number of Kano functionality categories it represents.

Because functionalities from each category play different roles and lead to different consumer attitude, they have different implications. First, must-have functionalities should be included to establish a market-entry “threshold.” One-dimensional and attractive functionalities increase levels of customer product attitude. In particular, attractive functionalities are very important determinants of satisfaction (e.g., Matzler, Sauerwein, and Heischmidt, 2003). We therefore expect the following:

**H1b:** The three Kano categories, “must-have,” “one-dimensional,” and “attractive,” are each important to the consumer evaluation of the convergent product.

**Functionality Influence on Consumer Perceptions**

**Perception of functional diversity.** A convergent product provides the developer the opportunity to add more and more disparate functionalities (Covell, 2000). There are however inconsistent results on consumer attitude and response to greater functional diversity (e.g., Gill, 2008; Gill and Lei, 2009).

In our study, we have used the assortment variety literature to define perceived functional diversity as the diversity of functionalities the consumers have as options in the product (Kahn and Ratner, 2005). Consumers actively seek variety whether to satisfy a need for stimulation, utility, pleasure, or for other reasons, and the larger the assortment helps consumers satisfy these needs (e.g., Brown and Carpenter, 2000; Kahn and Ratner, 2005; Sela, Berger, and Liu, 2009). Much of the existing literature on variety suggests that more options lead to positive product mood and evaluation (e.g., Ratner and Kahn, 2002). It is assumed that the richer the variety of products and services provided to consumers, the greater the likelihood that each customer will find an offering aligning with their preferences and tastes. However, some researchers have also highlighted the negatives of too many features. Complicated products with several functionalities can arouse negative consumer evaluation of products because those functionalities lead to higher consumer cognitive load (Cacioppo, Petty, and Morris, 1983). Negative emotional reactions, such as stress and anxiety, may also be observed, resulting in “feature fatigue” (Brown and Carpenter, 2000; Thompson, Hamilton, and Rust, 2005). Furthermore, as a consequence of abundant offerings, consumers are unable to make optimal choice decisions (Gourville and Soman, 2005).

Negative consumer evaluations of products with several functionalities may be reduced by making trade-offs between the different types of functional attributes (Gill, 2008; Gill and Lei, 2009; Reinders et al., 2010). A complex product may be evaluated by the product’s capability and usefulness. In cases when there is low usefulness, consumers may evaluate products positively due to the products’ high capability. This is especially the case as researchers have found that consumers give more weight to a product’s capability before consumption than after; therefore, consumers tend to indicate stronger preferences for products with relatively higher number of features and greater capabilities before purchase and use (Thompson et al., 2005) or those that do not require too much cross-referencing or trade-offs (Herrmann, Heitmann, Henneberg, and Ladwehr, 2009). Thus, we expect convergent products are evaluated positively because functional diversity may satisfy expectations for increased capability.

**H2a:** Perceived functional diversity of convergent products will raise consumer product attitude.

**Perceived fulfillment of instrumental and emotional needs.** Consumers evaluate a product and its functionalities using both instrumental (utilitarian and cognitive)
and emotional (affective and hedonic) criteria. Both utilitarian and hedonic functionalities offer benefits to the consumer; the former are primarily associated with instrumental goals and practical functionality and the latter with emotional goals for pleasure and excitement (e.g., Dhar and Wertenbroch, 2000; Mazaheri, Richard, and Laroche, 2010; Okada, 2005). Previous research (e.g., Ratner and Kahn, 2002) demonstrates that perceived diversity increases expected consumption utility both emotionally and instrumentally. Because perceived variety increases positive feelings or stimulates more elaborate network encoding in memory, consumers anticipate higher levels of consumption utility for assortments with higher perceived variety. Convergent products with diverse functionalities are expected to influence consumer instrumental and emotional needs fulfillment. Therefore, we expect the following:

**H2b:** Perceived functional diversity of convergent products will influence perceived fulfillment of emotional needs.

**H2c:** Perceived functional diversity of convergent products will influence perceived fulfillment of instrumental needs.

Previous studies in consumer research suggest that once needs have been fulfilled, this will lead to higher levels of product attitude (e.g., Chitturi, Raghunathan, and Mahajan, 2007; Mano and Oliver, 1993). Specifically, products that meet or exceed customers’ instrumental needs enhance customer satisfaction, whereas products that meet or exceed customers’ emotional needs enhance customer delight, improving customer loyalty (Chitturi, Raghunathan, and Mahajan, 2008). Therefore, we expect the following:

**H3a:** Perceived emotional needs fulfillment from convergent products will influence product attitude.

**H3b:** Perceived instrumental needs fulfillment from convergent products will influence product attitude.

When consumers evaluate products, trade-offs are made between instrumental and emotional needs fulfillment. These can evoke a variety of both negative and positive emotions (e.g., Chitturi et al., 2007; Dhar and Wertenbroch, 2000). Also, previous research shows consumers attach more importance to fulfilling instrumental needs than emotional needs, although there is considerable debate about this (e.g., Chitturi et al., 2007). Convergent products can fulfill both instrumental and emotional needs, which are expected to interplay with each other; therefore, we expect the following:

**H3c:** Perceived instrumental needs fulfillment from convergent products will influence perceived emotional needs fulfillment from convergent products.

Numerous studies have found a positive relationship between the consumer’s attitude toward a product or service and purchase intention under a number of diverse contexts (e.g., Hirunyawipada and Paswan, 2006; Zeithaml, Berry, and Parasuraman, 1996). In summary, increasing consumer product attitude leads to greater purchase intention. Therefore, we expect the following:

**H4:** Consumer product attitude will influence the purchase intention of convergent products.

**Consumer Innovativeness**

There is an understanding that not all consumers are going to be equal when it comes to their behaviors and perceptions of new products. Consumer innovativeness has been a phenomenon examined extensively in the consumer research literature to explain the propensity of consumers to adopt new products (e.g., Hauser, Tellis, and Griffin, 2006; Hirschman, 1980). It is of particular importance to developers to identify and understand the behaviors of innovative consumers as consumer innovativeness has been significantly correlated to product adoption, opinion leadership, market mavenism, frequency of use, and product involvement (Bartels and Reinders, 2011; Hoffmann and Soyez, 2010). Although an enduring overall concept, its operationalization and measurement have been questioned when it comes to how innovativeness affects product adoption (Bartels and Reinders, 2011; Hauser et al., 2006). Consumer innovativeness for example has been operationalized as being either innate, domain specific, or behavioral (Bartels and Reinders, 2011; Hirschman, 1980; Hirunyawipada and Paswan, 2006), with domain-specific innovativeness being more consistently associated with product adoption (see Bartels and Reinders, 2011).

What is of interest to developers, is if consumers, when segmented by their level of innovativeness, will have needs for different types of functionalities within a convergent product, as classified by the Kano model, or whether innovativeness will moderate the relationship between functional diversity, needs fulfillment, and attitude. There is relatively little guidance within the literature.

As consumer innovativeness is related to one’s propensity to seek information about and adopt new ideas or products relatively earlier than other members of a social system, especially in the case of new technology products
(e.g., Hirschman, 1980; Hirunyawipada and Paswan, 2006), it is important for developers to understand the distinction between consumers with different levels of innovativeness. Consumers with high levels of innovativeness for example have been found to be less affected by the perceived cost of a new product relative to the perceived benefit of it (Luthje, 2004). Consumers with high levels of innovativeness, therefore, may be less prone to a cognitive approach for the selection of new products relative to those who are not. They may be just interested in the product because it is new. This is especially the case for consumers who seek information about new and novel products (e.g., Hirschman, 1980; Hirunyawipada and Paswan, 2006). Because consumers have different levels of innovativeness, they are expected to show different characteristics regarding their perception of convergent products. Therefore, we expect the following:

**H5a:** Innovativeness will affect the consumer evaluation of the convergent product by the number of Kano functionality categories it represents.

**H5b:** Consumers with low levels of innovativeness will consider all three of the Kano categories as important as they are more cognitive in their decision making.

**H5c:** Consumer innovativeness will moderate the relationship between perceived functional diversity and product attitude, instrumental needs fulfillment, and emotional needs fulfillment.

### Methodology

#### Sample and Data Collection

A survey methodology was used to gather data for the research. Subjects were drawn from graduate- and undergraduate-level students (n = 240) at a large Korean university. Using a Korean sample is appropriate for this study as increasingly Korean and non-Korean multinational companies are using Korea as a new product test market before worldwide product launch (New York Times, 2010).

The representative convergent product used was a smartphone due to its growing multifunctional use and its use in other convergent product studies (e.g., Han et al., 2009). Although the use of a student sample could also be seen as a limitation of this study, they are often seen as a key market for smartphones and other high-tech devices and are appropriate for this study (e.g., Han et al., 2009). The research was conducted in the latter part of 2009 at the time of the introduction of the smartphone into the Korean market. There were high levels of awareness of this product’s introduction and its potential functionalities.

The total number of responses was spread across three variants of the questionnaire (each n = 80). The questionnaires are composed of two parts: section A differs across the three variants with the manipulation of four different convergent product functionality stimuli while section B remained constant. After accounting for unanswered, improper responses, and those who had recently purchased the product, 192 questionnaires were used for analysis: 66 for questionnaire one, 65 for questionnaire two, and 61 for questionnaire three.

#### Functionality Selection and Pretest

The first stage of the research required the selection of representative smartphone functionalities, which were then, through the pretest, classified into the three Kano quality categories. Among the diverse functionalities of smartphone, we collected a number of representative functionalities; these representative functionalities were identified by investigating product specifications stated in several smartphone brochures produced by Apple, Motorola, and Samsung and about to be or had recently become available in the Korean market.

The pretest of 30 university student respondents classified the functionalities into the Kano categories following the method of previous studies (e.g., see Kano et al., 1984; Matzler and Hinterhuber, 1998). Using pretest, respondents ensured that there are no a priori allocations by the researchers of the functionalities into the Kano classifications. At the end of this process, 20 representative functionalities were identified (Table 1).

#### Construct Measures of Stage One

Section A of the questionnaire consisted of four stimuli to represent the convergent product functionalities and their Kano classifications. Each stimulus was restricted to eight functionalities in view that respondents can only process on average seven (plus or minus two) attributes simultaneously (e.g., Miller, 1956; Shiffrin and Nosofsky, 1994). Questionnaire one uses functionalities that had one and combinations of two or three Kano functionality categories; questionnaire two combines two of the Kano categories; and questionnaire three combines all three Kano categories. In order to test H1b, four stimuli combinations were used in each questionnaire. These combinations included different functionalities representing each of the Kano categories. We intended therefore to
manipulate 12 different stimuli representing the different Kano functionality category across the three questionnaire variants.

Seven-point Likert scales were used to measure the respondent’s perceived importance of each stimuli’s Kano functionalities, and their attitude and purchase intention to each stimulus. We also measured level of innovativeness in both stage one and two of the research. Innovativeness in this study uses an adaption of the Acquisition of Novel Information associated with New Products (AQNIP) scale developed by Hirunyawipada and Paswan (2006). With the smartphone only just being released in the Korean market and having limited availability meant we could not measure actual adoption. The AQNIP scale is however significantly correlated with domain-specific innovativeness and product adoption (Hirunyawipada and Paswan, 2006), suggesting that it can be used as a surrogate for innovativeness. Our respondents were categorized into high (\(M = 4.67, n = 83, \sigma = .99\)) and low (\(M = 2.20, n = 109, \sigma = .435\)) innovativeness groups by the median split (median = 3) on this scale.

Construct Measures of Stage Two

In section B of the questionnaire, we asked the respondents to choose their favorite smartphone option among the four given stimuli options in section A. Once chosen, we measured the respondent’s perception of this option in terms of its perceived functional diversity and its fulfillment of instrumental and emotional needs, on 7-point Likert scales. All constructs were measured using multi-item scales, except purchase intention, and were adapted from or developed based on prior research: e.g., product attitude (Mittal and Kamakura, 2001); purchase intention (Zeithaml et al., 1996); perceived function diversity (Sela et al., 2009); fulfillment of emotional needs (Okada, 2005; Voss, Spangenberg, and Grohmann, 2003); fulfillment of instrumental needs (Okada, 2005; Voss et al., 2003); and consumer innovativeness (Hirschman, 1980; Hirunyawipada and Paswan, 2006). Only those items that loaded significantly above the minimum threshold value (.50) were included for analysis (Bagozzi and Yi, 1988). This is further confirmed by high internal consistency scores, i.e., exceeding the threshold value of .7 recommended by Nunnally (1978) (Table 2).

**Analysis and Results**

**Stage One**

To determine the importance of each of the Kano categories when combined with the others, we conducted an analysis of variance test, using the SPSS 17.0 statistics package (SPSS Inc., Chicago, IL, USA), depending on the number of Kano category combinations. We have used data from all three questionnaires depending on the number of Kano categories covered by the stimuli.

Results show that consumer attitude levels are not significantly different between stimuli-combining functionalities from two Kano categories and stimuli-

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cronbach's Alpha</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perceived functional diversity</td>
<td>.757</td>
<td>2.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Emotional needs fulfillment</td>
<td>.795</td>
<td>.71</td>
<td>1.93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Instrumental needs fulfillment</td>
<td>.735</td>
<td>.28</td>
<td>.18</td>
<td>1.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Product attitude</td>
<td>.901</td>
<td>.20</td>
<td>.24</td>
<td>.32</td>
<td>.58</td>
<td></td>
</tr>
<tr>
<td>5. Purchase intention</td>
<td>N/A</td>
<td>.33</td>
<td>.38</td>
<td>.25</td>
<td>.58</td>
<td>1.25</td>
</tr>
</tbody>
</table>

Mean

4.73  3.69  5.49  5.73  5.37

Standard deviation

1.41  1.39  1.07  .76  1.12

N/A, not applicable.
combining functionalities from three Kano categories \( (M_3 \text{ Kano categories} = 4.51, M_2 \text{ Kano categories} = 4.40, \ p = .787) \). Compared with these two stimuli types, the stimulus involving only the must-have functionalities shows a significantly higher positive attitude level \( (M_{\text{must-have category only}} = 5.17, M_3 \text{ Kano categories} = 4.51, p = .000; M_{\text{must-have category only}} = 5.17, M_2 \text{ Kano categories} = 4.40, p = .000) \). Therefore, H1a, the consumer evaluation of the convergent product itself will differ by the number of Kano functionality categories, it represents is supported. Results did not show any significant between-group difference on consumer innovativeness, rejecting H5a.

The results (Table 3) show that the perceived importance of each Kano category varies with the number of Kano categories represented in the stimuli. When the stimuli-combining functionalities from all three quality categories were compared with the stimuli-combining two-quality categories' functionalities, perceived importance of must-have functionalities and attractive functionalities were significantly higher. One-dimensional functionalities did not show any significant differences between the two types of stimuli. H1b is not supported: only two of the Kano categories, must-have and attractive, are rated important for consumer evaluation of the convergent product.

When consumer innovativeness levels are considered, the relationships are found to be moderated. The results shown in Table 3B indicate that the high and low consumer innovativeness groups vary in their perception of the importance of the addition of Kano functionalities beyond the must-have category. High innovativeness consumers rate each Kano functionality category addition more highly, although significantly for one-dimensional functionalities but not significantly for attractive functionalities. Low innovativeness consumers meanwhile do not rate the one-dimensional functionality addition significantly higher, rather significantly lower. The addition of attractive functionalities is perceived significantly higher. H5b is partially supported; consumers consider all of the Kano categories as important for the consumer evaluation of the convergent product, although not in the direction anticipated.

The results suggest that developers need to consider the innovativeness levels of the consumers they are targeting. The overall results highlight that only Kano’s must-have and attractive functionalities are perceived as being important, partially supporting H5b. Once consumer innovativeness is considered, the emphasis should be on the Kano must-have and one-dimensional functionalities for consumers with high innovativeness tendency, whereas for those with low innovativeness tendency, the emphasis should be on Kano’s must-have and attractive functionalities. The fact that the results show consumers with low levels of innovativeness have significantly lower levels of importance for additional one-dimensional functionalities is surprising and should be a subject for future investigation.

Table 3. Perceived Importance of Functionalities of Three Kano Categories

<table>
<thead>
<tr>
<th>A. Total ( (n = 126) )</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kano Functionality Category</td>
<td>Number of Kano Categories</td>
<td>Mean</td>
<td>( n )</td>
</tr>
<tr>
<td>Must-have</td>
<td>2</td>
<td>5.14</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6.02</td>
<td>61</td>
</tr>
<tr>
<td>One-dimensional</td>
<td>2</td>
<td>3.06</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>3.17</td>
<td>61</td>
</tr>
<tr>
<td>Attractive</td>
<td>2</td>
<td>3.64</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4.21</td>
<td>61</td>
</tr>
</tbody>
</table>

\* Number of Kano categories represented in the stimuli.

B. High Innovative Group \( (n = 61) \) and Low Innovative Group \( (n = 65) \)

<table>
<thead>
<tr>
<th>Kano Functionality Category</th>
<th>Number of Kano Categories</th>
<th>High Innovative Group</th>
<th>Low Innovative Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>( n )</td>
</tr>
<tr>
<td>Must-have</td>
<td>2</td>
<td>5.15</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6.08</td>
<td>30</td>
</tr>
<tr>
<td>One-dimensional</td>
<td>2</td>
<td>2.95</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>3.75</td>
<td>30</td>
</tr>
<tr>
<td>Attractive</td>
<td>2</td>
<td>3.63</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4.06</td>
<td>30</td>
</tr>
</tbody>
</table>
Stage Two

Using the final survey data ($n = 192$), the hypothesized model, Figure 1, was tested via a path analysis using LISREL 8.30 (Scientific Software International Inc., Chicago, IL, USA). Prior to testing the hypotheses, a covariance matrix of the composite scale for constructs was produced and examined to assess the assumptions of linearity, model specification, multicollinearity, and homoscedasticity (Berry and Feldman, 2000). Table 2 provides the summary statistics of the covariance matrix, means, and standard deviations.

To establish the required convergent validity, and discriminant validity, the measurement model was assessed using confirmatory factor analysis which showed that it possessed good model fit indices ($\chi^2 = 38.20$; d.f. = 17; $p = .00$; goodness-of-fit index = .96; normed fit index = .94; comparative fit index = .97; incremental fit index = .97; root mean square error of approximation = .081). The baseline comparison indices exceed the .90 cutoff, indicating good fit of the model (Bagozzi and Yi, 1988). The results for the significance of the path coefficients (standardized coefficient) to test the hypotheses are shown in Table 4.

As we expected, perceived functional diversity affects convergent product attitude (H2a). However, perceived functional diversity does not affect emotional needs fulfillment (H2b) but affects instrumental needs fulfillment (H2c). Therefore, perceived functional diversity affects emotional needs fulfillment when the instrumental needs are also satisfied. The fulfillment of emotional needs affects consumer attitude of the convergent product (H3a), but fulfillment of instrumental needs does not affect consumer attitude (H3b). Therefore, the fulfillment of instrumental needs affects consumer attitude of the convergent product only when the instrumental needs and emotional needs are satisfied together. The expectation that instrumental needs fulfillment affects emotional needs fulfillment (H3c) is supported. The hypothesized effect of consumer attitude on purchase intention is also supported (H4).

From the results of hypotheses above, we can identify that the mediating effect of instrumental needs fulfillment between perceived functional diversity and product attitude is only met when the instrumental needs are fulfilled. Also, the mediating effect of instrumental needs fulfillment between perceived functional diversity and product attitude is only met once emotional needs are fulfilled. Therefore, to develop convergent products with high functional diversity that will result in a positive consumer attitude requires the developer to consider those functionalities that can fulfill both emotional and instrumental needs together.

To assess whether or not consumer innovativeness influences the strength of the effect of perceived functional diversity on product attitude, emotional needs fulfillment, and instrumental needs fulfillment, we conducted multigroup analyses using LISREL 8.30. Separate variance-covariance matrices for these two groups (high and low innovativeness groups) were used as inputs for the structural equation model. Next, we compared the chi-square differences of the two main models when all parameters were allowed to be estimated unconstrained and three constrained models: one in which the path from perceived functional diversity to product attitude is constrained; one in which the path from perceived functional diversity to emotional needs fulfillment is constrained; and one in which the path from perceived functional diversity to instrumental needs fulfillment is constrained.

Table 4. Results of Stage Two Hypotheses Test*

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Standardized Coefficient</th>
<th>t-Value</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>H2a</td>
<td>Perceived functional diversity $\rightarrow$ product attitude</td>
<td>.36</td>
<td>5.14**</td>
</tr>
<tr>
<td>H2b</td>
<td>Perceived functional diversity $\rightarrow$ emotional needs fulfillment</td>
<td>.06</td>
<td>.81</td>
</tr>
<tr>
<td>H2c</td>
<td>Perceived functional diversity $\rightarrow$ instrumental needs fulfillment</td>
<td>.19</td>
<td>2.59**</td>
</tr>
<tr>
<td>H3a</td>
<td>Emotional needs fulfillment $\rightarrow$ product attitude</td>
<td>.16</td>
<td>2.25**</td>
</tr>
<tr>
<td>H3b</td>
<td>Instrumental needs fulfillment $\rightarrow$ product attitude</td>
<td>.06</td>
<td>.88</td>
</tr>
<tr>
<td>H3c</td>
<td>Instrumental needs fulfillment $\rightarrow$ emotional needs fulfillment</td>
<td>.35</td>
<td>5.09**</td>
</tr>
<tr>
<td>H4</td>
<td>Product attitude $\rightarrow$ purchase intention</td>
<td>.67</td>
<td>12.57**</td>
</tr>
</tbody>
</table>

** Significant at .05 level.
* The overall fit indices for the structural model indicate good model fit ($\chi^2 = 6.11$; d.f. = 3; $p = .111$; goodness-of-fit index = .99; normed fit index = .99; comparative fit index = .98; incremental fit index = .98; root mean square error of approximation = .072).
The results revealed a significant chi-square difference between two of the models, supporting the anticipated moderating role of consumer innovativeness on perceived functional diversity and emotional needs fulfillment ($\Delta \chi^2 = 5.57$). However, the moderating effects of consumer innovativeness on perceived functional diversity and each variable—product attitude ($\Delta \chi^2 = .11$) and instrumental needs fulfillment ($\Delta \chi^2 = .59$)—were not revealed by a significant chi-square difference (Table 5).

From these results, there is partial fulfillment of H5c; consumer innovativeness will moderate the relationship between perceived functional diversity and emotional needs fulfillment.

**Discussion and Recommendations**

The convergent product is an increasingly important phenomenon in the marketplace. Convergent products offer many opportunities and challenges to the developer. The convergent product allows the developer to include more and more diverse functionalities into their products that can satisfy a broad range of consumer needs. The challenges for the developer center on the types and combinations of functionalities considered to be attractive for the consumer. Also, the addition of new functionalities to a product could increase the perceived functional diversity of the product which might result in a number of negative or confused consumer perceptions and thereon have an impact on their behavior. In addition, developers need to consider the characteristics of those consumers of who will facilitate the diffusion process; consumers’ levels of innovativeness. This study therefore first seeks to understand the types of functionalities classified according to the Kano model that should be included in a convergent product as well as gaining an understanding of their combinations, their importance, and their impact on product attitude. Second, we determine if the perceived diversity levels of the functionalities have an impact on instrumental and emotional needs fulfillment, product attitude, and purchase intention. Finally, we assess if differences in the innovative characteristics of consumers will have an influential effect.

In order to meet the objectives of the first stage of the study, we categorize the functionalities of convergent products using the Kano model. Although the Kano model has been used extensively in the quality and operations literature, it has not been used extensively in the product development literature recently. The strength of the Kano model resides in its ability to deconstruct the functionalities of a product into several quality categories, which have resulting customer satisfaction influences. The key question remaining though for the developer is if the chosen functionality characteristic matters. Given the choice of functionalities, therefore, what are the most important and key combination of functionalities, according to the Kano model, that will influence consumer perception and attitude of the convergent product?

The results from our study suggest that developers do need to consider each function’s characteristics and functionality combinations when they develop new convergent products. Once developers have taken these considerations into account, we can expect a better attitude toward the convergent product. Specifically, we found that must-have functionalities have to be included for high consumer attitude no matter the levels of consumer innovativeness. This is in accordance with the literature which states that “must-have” criteria are either required or self-evident (e.g., Matzler and Hinterhuber, 1998).
The results however become less clear when we consider which of the additional Kano functionalities should be included in the product and its influence on the consumer’s perceived importance of each of the Kano model’s functionalities. For the overall sample, our results suggest that the addition of one-dimensional functionalities was not considered to be important. However, when we considered the consumer’s level of innovativeness, the importance of the additional respective categories and their direction of importance differed. Consumers with high levels of innovativeness considered that the must-have and the addition of one-dimensional functionalities were the most important. These consumers may consider the product just because it is new rather than requiring the developer going to the extra effort of emphasizing the addition of its attractive characteristics. Consumers with low levels of innovativeness considered each Kano category to be important, although they considered one-dimensional functionalities significantly less important. This was contrary to expectations. In the early stages of product launch, therefore, when developers are seeking to attract consumers with high levels of innovativeness, given that they are important for the diffusion process, developers should focus on the must-have and one-dimensional functionalities. Later in the launch cycle, developers should focus on the attractive functionalities to appeal to consumers with lower levels of innovativeness.

It is hypothesized in this study that the perceived functional diversity of convergent products will lead to a positive product attitude (H2a) and thereon purchase intention (H4). These hypotheses were supported. The results however are mixed when consideration is given to the types of needs the perceived functional diversity of a convergent product fulfills. It is hypothesized that more diverse functionalities would fulfill the consumer’s emotional (H2b) and instrumental (H2c) needs. Instrumental needs fulfillment was supported, but emotional needs fulfillment was not. When the moderating effect of innovativeness was analyzed, we found that the consumers displaying high levels of innovativeness had their emotional needs met by diverse functionalities, whereas those with low innovativeness did not. This was the only difference between the two groups. Individuals who display high levels of innovativeness may not have to have their instrumental needs fulfilled before emotional needs in order to adopt new complex products. This is borne out by the literature that suggests that consumers displaying higher levels of innovativeness will have additional or different need requirements than those who do not (e.g., Hirunyawipada and Paswan, 2006; Steenkamp, ter Hofstede, and Wedel, 1999). Luthje (2004) says in addition that consumers with low levels of innovativeness need to have more evidence about a product before considering adoption. Our research suggests that instrumental needs would be this additional requirement.

Our theoretical review also suggested that there would be direct positive impacts on product attitude through either the fulfillment of emotional needs (H3a) or instrumental needs (H3b) (e.g., Chitturi et al., 2007; Oliver, 1997). The results suggest however that although diverse functionalities have an impact on instrumental needs fulfillment, there is no direct link between this and product attitude. Emotional needs have to be met as well in order to garner positive product attitude. Emotional needs act as a mediator between instrumental needs and product attitude. Both needs sets therefore should be considered when seeking to enhance consumers’ evaluation, while reverse quality functionalities influence individual consumers negatively. Further studies should be used to explore how these indifferent and reverse quality functionalities influence consumer attitude and purchase intention of convergent products. The second was that there was no consideration given on which and how many functionalities from each of the Kano categorizations are optimal for convergent products. Further research could address this issue. The third limitation is using the smartphone as the representative convergent product. The smartphone’s characteristics may not share the same representative functionalities as other convergent devices. This study therefore may not be generalized beyond this product category. The prepurchase context of this study may also be a limitation. We would expect that in post purchase context, when the product has been used, the results would differ (Thompson et al., 2005). A longitudinal study may be appropriate as the Kano category literature states that there is movement of functionalities from one category to another over time (e.g., Matzler and Hinterhuber, 1998). Finally, we have some sampling limitations. The first is the use of the student sample. Although students may be
a key market for phones and other high-tech devices (e.g., Han et al., 2009), they are clearly not representative of the entire population. Further research could use a larger, more representative sample. The second is the use of a sample from one national setting, Korea. Although the popular press suggests that Korea is a good market for product testing, further cross-cultural research should be conducted to support this assumption. Literature for example suggests that consumers’ attitudes, needs, and perceptions will differ from culture to culture (e.g., Bolton, Keh, and Alba, 2010; Lee, Garrett, Self, and Musgrove, 2011). Studies from other national environments could determine the validity of these results.

References


This document is a scanned copy of a printed document. No warranty is given about the accuracy of the copy. Users should refer to the original published version of the material.