THE EFFECTS OF COMPONENT BRANDS ON CONSUMER CHOICE AND EVALUATION OF INFORMATION TECHNOLOGY PRODUCTS

Liqiang Huang, School of Management, Zhejiang University, Hangzhou, P.R.C, China, huangleq@zju.edu.cn
Chuan-Hoo Tan, College of Business, City University of Hong Kong, Hong Kong, P.R.C, China, ch.tan@cityu.edu.hk
Khim Yong Goh, Department of Information Systems, National University of Singapore, Singapore, gohky@comp.nus.edu.sg
Kwok-Kee Wei, College of Business, City University of Hong Kong, Hong Kong, P.R.C, China, isweikk@cityu.edu.hk

Abstract

Brand typically plays a decisive role in influencing consumer purchases. This premise is particularly interesting in the case of an information technology (IT) product, such as a laptop computer, which is often composed of an amalgamation of electronic components (e.g., sound card, memory, and so on). Thus, an IT product is represented not only by the primary brand (also known as the host brand) it carries, but also by the brands of its apparatuses (also known as component brands). Such product nature has afforded opportunity for lesser-known IT product merchants to leverage component brands to compete against established (i.e., better-known) brands. Drawing on theory of salience effect, this study examines the extent to which component brands affect consumer purchasing choices. A set of experiments was subsequently conducted. Results reveal that lesser-known IT product vendors can increase the number of established component brands (quantity) to positively influence consumer product quality assessment and purchase choice. However, incorporation of a feature to highlight good-rated component brands (quality) can positively affect consumer purchase choice, but not overall IT product quality assessment. These findings reveal dissimilar influences of number (quantity) and brand ratings (quality) on consumer response to an IT product.

Keywords: Information Technology Product, Consumer Choice, Salience Effect.
1 INTRODUCTION

It is widely recognized that brand plays a decisive role in influencing consumers’ product judgment and purchase decision (Keller and Lehmann 2006; Swaminathan et al. 2012; Desai and Keller 2002). In these studies, brand has often been taken literally as a single attribute of product choice consideration. For instance, Dodds et al. (1991) consider the case in which a consumer has to make an explicit trade-off between price and brand, whereas Cohen (1972) conceptualizes brand as a surrogate indicator of product quality. However, IT products often comprise an amalgamation of electronic components (e.g., motherboard, sound card in the case of a laptop) (Park et al. 2008). Thus, such an IT product is represented not solely by the primary brand (known as host brand) it carries, but also by the brands of the apparatuses (labeled as component brands) built into that product (Desai and Keller 2002). The existence of component brands could provide less-known IT product merchants with leverage to compete against established IT product merchants. Obvious examples include the laptop markets with merchants leveraging component brands to gain recognition from consumers-at-large.

The current research complements the extant literature through a micro-level examination of IT product brand by considering the influence of component brands on consumer product choice and assessment. Drawing on the theory of saliency effect, we propose that the component brands of an IT product could affect consumer product assessment and choice in two ways, namely, the number of embedded component brands (quantity) and the establishment of such component brands (quality) (Coulter and Coulter 2005; Lalwani and Monroe 2005). A controlled laboratory experiment was conducted.

This research contributes to the current literature in two main facets. First, compared to the markets for simpler products (e.g., shampoo), markets for IT products such as laptops computer post significant challenges to merchants to convince consumers to choose their products, particularly merchants that are less established (Griffin 1997). Examining the issue of component branding could afford practitioners a deeper understanding of how to compete effectively in the competitive IT product market via the component branding strategy. Second, comparing with the previous studies which have macroscopically analyzed the underlying benefits to all the stakeholders using component strategy (Norris 1992) and neglected consumers’ product quality evaluation and choice behavior varying on the number of branded components or the numerical ratings of components (Hasher and Zacks 1984; Alba et al. 1994), the micro-level investigation of our study reveals that the quantity and quality of the branded component influence a consumer’s choice behavior and quality evaluation differently, thus extending the current understanding.

2 THEORETICAL FOUNDATIONS

Brand is one of the most valuable intangible assets a merchant can have (Keller and Lehmann 2006). Through brand building, a merchant can signal the product quality to potential consumers and price its products higher than the competitors. For a merchant with little brand establishment in the market, gaining brand recognition is challenging because the IT market has been considerably saturated, with a sizable market share occupied by few large manufacturers (Doyle 1989). However, the nature of IT products provides less-known merchants with the opportunity to utilize the component branding strategy to induce consumer purchase (Norris 1992; Desai and Keller 2002). From the market well-being perspective, Norris (1992) demonstrates that component branding could benefit all stakeholders, including component suppliers, end-product suppliers, and customers. This finding is reinforced by other studies (e.g., (Desai and Keller 2002)), which indicate that the incorporation of reputable component brands could enhance consumer impression of a less-known host product. Through such incorporation of reputable component brands, merchants could raise their competitiveness and such heightened competition positions could even spill over to other products (Swaminathan et al. 2012).
Beyond advocating the benefits of incorporating component brands, scholars have cautioned that consumer product choice is dynamic and contingent on the level of attractiveness of component brands (Dillon et al. 2001). In other words, a consumer’s IT product choice might be affected by the saliency of components.

### 2.1 Theory of Saliency Effect

The basic tenet of the saliency effect theory is that an individual’s judgment and decision are affected by the extent to which the stimulus presented is noticeable (i.e., salient stimulus) (Taylor and Thompson 1982). Salient stimulus refers to a certain type of information (e.g., brand), which is especially attractive in a specific environment, thus receiving disproportionate weighting and eliciting individuals to emphasize on when they are making a decision (Bordalo et al. 2012). The effect of salient information on consumers is derived from the accessibility in nature. The more salient a stimulus is, the more accessible the information would be, leading to a higher likelihood of such type of information to be acquired and attended. In this study, we conceptualize that the quantity of branded components and the numerical rating of branded components (i.e., quality) as two types of salient information, and examine the effects on consumers’ product choice and quality evaluation (see Figure 1).

![Figure 1. Concept model](image)

### 2.2 Hypotheses

Quantity of component brands denotes the number of established component brands included in an IT product (Alba et al. 1994). Established component brands refer to component brands that are known by consumers-at-large. For instance, Alba and Marmortein (1994) reveal that the number of positive attributes possessed (i.e., established component brands in our case) could positively affect consumer choice. Hasher and Zacks (1984) suggest that quantity is often utilized as a salient, proxy indicator of product quality, which could be interpreted effortlessly by a consumer. Leading from these premises, we conjecture that an increase in the number of established component brands could influence a purchase decision due to the heightened product saliency. Thus, with two products of a same price, one having a reputable branded host, and the other having an unknown host, the latter product has a greater ability to contain more and better branded components because of the savings in advertising and promotion costs. In the choice task of such two products, although the reputable branded host (e.g., Dell) would have a significant impact on consumer choice, such effect would be alleviated or dominated by the great number of branded components, which are salient and easily anchored in an unknown host, especially during the decision-making process (Alba et al. 1994). Therefore, we posit:

**H1:** A consumer is likely to choose an unknown host brand IT product, compared to a reputable host brand IT product, as the number of component brands increases in the unknown host brand IT product.

**H2:** A consumer is likely to assess the product quality high for an unknown host brand IT product, compared to a reputable host brand IT product, as the number of component brands increases in the unknown host brand IT product.

Quality of component brands refers to the worth rating of a focal IT product’s component (Dillon et al. 2001). In contrast to the quantity of established component brands, quality of component brands
reflects the extent to which a component brand is rated to be valuable (i.e., the magnitude). Quality here refers to the component product superiority rather than the brand that the component carries. Studies have demonstrated that consumers accomplish the encoding and retrieval of magnitude representations (i.e., quality of component brands in our case) effortlessly and automatically (Coulter and Coulter 2005). Meanwhile, it is also argued that consumer assessment of an unknown IT product label could largely depend on the components included in that product (Van der Lans et al. 2008). Relating to our context, we posit that consumers would be more likely to choose an unknown host brand IT product when its component brands are rated positively (Swaminathan et al. 2012). With the same theorizing, we also posit that positively rated branded components would also favorably influence consumers’ evaluations on the product quality.

**H3:** A consumer is likely to choose an unknown host brand IT product, compared to a reputable host brand IT product, in the presence of positively rated component brands of the unknown host brand IT product.

**H4:** A consumer is likely to assess the product quality high for an unknown host brand IT product, compared to a reputable host brand IT product, in the presence of positively rated component brands of the unknown host brand IT product.

## 3 METHOD

A laboratory experiment was conducted to test the hypotheses. Before conducting the experiment, we identified host and component brands. In this experiment, we utilized two IT products, namely, laptop and personal digital assistant (PDA). The host and component brands for these two IT products were extracted from shopping websites, www.mysimon.com and www.dealtime.com. The authors initially categorized the extracted host and component brands into known and unknown (see Table 1). To confirm that such knowledge also prevails among the subject population (i.e., the university students), we recruited 10 students to categorize the host and component brands as known and unknown as did by the authors. The results showed that all the students successfully categorized them into the predicted categories.

<table>
<thead>
<tr>
<th>Host brand</th>
<th>Laptop</th>
<th>Personal Digital Assistant (PDA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Established</td>
<td>IBM</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>Clevo</td>
</tr>
<tr>
<td>Component brand (Operating system)</td>
<td>Established</td>
<td>Microsoft Windows</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>Open desktop</td>
</tr>
<tr>
<td>Component brand (Microprocessor)</td>
<td>Established</td>
<td>Intel</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>Sonnet</td>
</tr>
<tr>
<td>Component brand (Graphic technology)</td>
<td>Established</td>
<td>ATI Radeon</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>Nil</td>
</tr>
<tr>
<td>Component brand (Wireless technology)</td>
<td>Established</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>Nil</td>
</tr>
</tbody>
</table>

*Table 1. Brand names used in the research*

This research employs a between-subject treatment design to examine the effects of quantity and quality of component brands on consumer choice in the selection of a technology product. Table 2 lists the eight treatments in the experiment. In the first four treatments, we considered the increase in the quantity of component brands, whereas in the last four treatments, we considered the presence of component quality ratings (positive for component brands in unknown host product, i.e., option B vs. neutral for component brands in established host product, i.e., option A). In each treatment, participants were asked to choose between two options, A (a known host brand) and B (an unknown host brand) for two product categories, laptop and PDA.
The operationalization of the independent variables is described as follows:

Quantity (number of component brands): Prior research has shown that consumers are limited cognitively by the amount of information they can process, and having more than six attributes could result in an excessive increase in cognitive effort, thereby influencing consumer choice (Bettman 1979). Thus, in our experiment treatments, the number of component brands varies from one to four.

Quality (numeric brand rating): Past studies have utilized various methods in presenting magnitude information (i.e., numeric rating) to users. Viswanathan and Childers (1996) used calculators with attributes (e.g., battery life, and display width) to present the numeric information for each attribute. Other studies such as that of Lalwani et al. (2005) used shampoo price to analyze the magnitude effect caused by the numerical information. Given that our study deals primarily with the role of numerical information presented through component branding, brand rating is also used to convey information to subjects in numeric form. Each component brand is given a rating that reflects the quality of the attribute. The focus of this study on numerical rating effect is that the branded host includes an unknown component with neutrally rated, and the unknown own-labeled host includes positive component(s) which are positively rated.

### Table 3. An illustration of quantity manipulation

<table>
<thead>
<tr>
<th>Task</th>
<th>Option A</th>
<th>Option B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Host</td>
<td>Number of Components</td>
</tr>
<tr>
<td>a</td>
<td>Known</td>
<td>1 Unknown</td>
</tr>
<tr>
<td>b</td>
<td>Known</td>
<td>1 Unknown</td>
</tr>
</tbody>
</table>

Table 2. Treatments of the Experiment

The operationalization of the independent variables is described as follows:

Quantity (number of component brands): Prior research has shown that consumers are limited cognitively by the amount of information they can process, and having more than six attributes could result in an excessive increase in cognitive effort, thereby influencing consumer choice (Bettman 1979). Thus, in our experiment treatments, the number of component brands varies from one to four.

Quality (numeric brand rating): Past studies have utilized various methods in presenting magnitude information (i.e., numeric rating) to users. Viswanathan and Childers (1996) used calculators with attributes (e.g., battery life, and display width) to present the numeric information for each attribute. Other studies such as that of Lalwani et al. (2005) used shampoo price to analyze the magnitude effect caused by the numerical information. Given that our study deals primarily with the role of numerical information presented through component branding, brand rating is also used to convey information to subjects in numeric form. Each component brand is given a rating that reflects the quality of the attribute. The focus of this study on numerical rating effect is that the branded host includes an unknown component with neutrally rated, and the unknown own-labeled host includes positive component(s) which are positively rated.

### 3.1 Manipulations and Dependent Variables

Table 3 illustrates the manner in which a number of component brands were manipulated. Each choice task had two product options. The number of component brands in product choice A was kept constant at quantity level (1 brand), whereas the other (Product Choice B) reflected the increase in the number of component brands. To differentiate it from quantity manipulation without the provision of ratings on the components, quality manipulation includes the rating of each component, as illustrated in Table 4. To minimize the influence of the number of components, the number of brands in Option A was kept constant under the circumstance of manipulating the quality of component (involving only one component brand). The number of brands in Option B was also kept similar to the previous manipulation (i.e., from one to four components). All positively rated brands had the same rating (+2 for all positive component brands). Table 4 illustrates the manipulation of numerical ratings.

<table>
<thead>
<tr>
<th>Task</th>
<th>Option A</th>
<th>Option B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Host</td>
<td>Number of Components</td>
</tr>
<tr>
<td>a</td>
<td>Known</td>
<td>1 Unknown</td>
</tr>
<tr>
<td>b</td>
<td>Known</td>
<td>1 Unknown</td>
</tr>
</tbody>
</table>

Table 3. An illustration of quantity manipulation
Table 4. An illustration of quality manipulation

**Dependent variables:** We used both subjective and objective measures. For the actual choice regarding the product that consumers chose, the result was either Option A or Option B. With respect to consumers’ perceived product quality to the focal product they chose, we adapted the measurement items from previous studies to ensure validity (Dodds et al. 1991).

### 3.2 Procedure

A total of 256 students were recruited for the experiment. They were randomly and evenly assigned to eight treatments (i.e., 32 subjects for each treatment). The subjects were recruited through mass electronic mails. Participation was voluntary, and each subject received a token of appreciation amounting to US$6. Upon arrival, an experiment handout which contains information about the task, the contact information of the researcher and supervisor, and simple requests for instructions regarding the experiment, was distributed. A pre-prepared standard briefing was conducted in which the subjects were informed of their participation in a choice task.

To discourage careless selections or rushed choices, the subjects were also informed that they would be able to leave when all the subjects had completed their choice task. Before embarking on the choice task, the participants were shown a mock-up choice task illustrating the significance of any symbol or graphics that were used in the experiment. The subjects then commenced the choice task, including the choice of a notebook computer and a PDA. After finishing the choice task, the subjects were subsequently asked to evaluate the quality of the focal product and report their personal information. The subjects were debriefed at the end of the experiments, and cash payments were made.

### 3.3 Data Analysis

A logit choice model is a reasonable approach to estimate a model of choice behavior with explicit consideration of the demographic characteristics and knowledge-related variables of the subjects. When a consumer makes a judgment about the product or a purchase decision, his/her familiarity with brands significantly influences information processing behavior (Cowley and Mitchell 2003). The consideration of this variable in our study is important because consumer familiarity with a focal brand, especially for a complex technology product that contains a number of component brands, would greatly influence consumer choice of such a product (Cowley and Mitchell 2003). We measure the construct adapted the items from Kent and Allen (1994). Other than the significance of brand familiarity to this model, considering the involvement of consumer processing information is also imperative. In different levels of involvement, consumers would use different strategies to process information, which would affect their perceptions and judgments of the information (Chaiken 1980). Therefore, our model also takes this variable into account. We measure the construct with the items from Suh and Yi (2006).

Perceived product quality is a continuous variable, which is different from a binary variable like choice; thus, we develop a linear regression model for this variable. We posit that the relationship between the quantity and quality rating of components, and the perceived product quality of consumers is linear. In this model, we also take the brand familiarity and consumer involvement into consideration. We build our models as follows. Table 5 lists the interpretation of each variable.
Logistic regression model for choice

\[ P_b(\text{choice}) = \frac{\exp(u)}{1 + \exp(u)} \]

\[ u = \beta_1 \text{Qunty} + \beta_2 \text{Qulty} + \beta_3 \text{Qunty} \ast \text{Qulty} + \beta_4 \text{Invo} + \beta_5 \text{Gen} + \sum_{i=1}^{14} \beta_i \text{Brand}_i \text{Fam}_i + \varepsilon \]

Linear regression model for perceived product quality

\[ P_b(\text{per.qut}) = v \]

\[ v = \beta_1 \text{Qunty} + \beta_2 \text{Qulty} + \beta_3 \text{Qunty} \ast \text{Qulty} + \beta_4 \text{Invo} + \beta_5 \text{Gen} + \sum_{i=1}^{14} \beta_i \text{Brand}_i \text{Fam}_i + \varepsilon \]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qunty</td>
<td>Quantity: the total number of the component brands</td>
</tr>
<tr>
<td>Qulty</td>
<td>Quality: the ratings of the component brands</td>
</tr>
<tr>
<td>Qunty* Qulty</td>
<td>The interaction item between the quantity and quality</td>
</tr>
<tr>
<td>Invo</td>
<td>Involvement</td>
</tr>
<tr>
<td>Gen</td>
<td>Gender</td>
</tr>
<tr>
<td>BrandiFam</td>
<td>The extent of consumers’ familiarity to brand i</td>
</tr>
<tr>
<td>Per.qut</td>
<td>Perceived product quality</td>
</tr>
<tr>
<td>( \varepsilon )</td>
<td>Constant term</td>
</tr>
<tr>
<td>( \beta_i )</td>
<td>The coefficient of each variable</td>
</tr>
</tbody>
</table>

Table 5. The meaning of each variable in models

Control Variables Check: The results are presented in Table 6. The findings suggest that gender does not significantly influence the choice behavior of consumers and their perceptions of product quality. Although involvement significantly influences the product choice of consumers, it does not affect their perceptions on product quality evaluations. With regard to the influence of brand familiarity on consumer choice and product quality evaluation, our results reveal that most reputable brands do not significantly influence the choice of consumers and their product quality evaluations, whereas non-established brands affect choice and product quality evaluations.

Hypothesis Testing: In this study, we used the data collected from two products (i.e., notebook computer and PDA) to generalize our findings. To reinforce our research findings, we randomly extracted one product (notebook computer) to conduct a robustness test. We firstly performed a logistic regression. A chi-square statistic was computed, which compared the observed frequencies with those expected under the linear model. The results indicated that the value of chi-square was equal to 3.88, \( p > 0.5 \), suggesting that the data fits the model. The regression result revealed that both the quantity of components (beta=1.001; \( p < 0.001 \)) and quality rating of components (beta=2.106; \( p < 0.001 \)) positively influenced the choice behavior of consumers. Thus, Hypotheses 1 and 3 were fully supported. In addition, as predicted, the linear regression result suggested that the quantity of components (beta=0.117; \( p < 0.001 \)) positively influenced product quality evaluation. On the contrary, the quality rating of components negatively influenced product quality evaluation (beta=-.311; \( p < 0.01 \)). Therefore, Hypothesis 2 was supported, but Hypothesis 4 was not.

Post Hoc Analysis: We further explore how the increase in branded components influences the choice behavior and product quality evaluation under either the absence or presence of component quality ratings. We plot the dependent variables varying on the number of branded components and a split of quality rating into “presence” and “absence” groups (see Figure 2). As the figure illustrates, consumers are more likely to choose the unknown host IT product under the presence of quality ratings, compared to the absence of quality ratings. Surprisingly, consumers perceive product quality as lower under the presence of quality ratings compared to the absence of such ratings.
Robustness Test: Our robustness test, which randomly extracted one product (i.e., notebook computer), suggested the same results. Examining the choice of an unknown host product indicated that the increase of the number of branded components positively influenced consumer choice behavior (beta=1.159;p<0.001), thus supporting Hypothesis 1. The quality rating also positively influenced consumer choice behavior (beta=2.476;p<0.001), thus supporting Hypothesis 3. These results also indicated that “quantity” positively (beta=0.114;p<0.001) and “quality” negatively (beta=-0.405;p<0.01) influenced consumer quality evaluations, which confirmed the hypothesis testing for 2 and 4. Overall, our robustness test reinforced the findings.

### DISCUSSION

The finding suggests that the presence of positive ratings of branded components in the unknown host does not improve consumers’ quality perception of the focal product. One possible explanation is that consumers’ evaluation of product quality is not only determined by the components, but also...
influenced by comparable alternatives. Past studies in advertising have consistently demonstrated that when two pieces of product advertisements are presented concurrently, consumer evaluation of the product described in one advertisement is significantly affected by the other (Grewal et al. 1998). This argument is also reinforced by other consumer behavior studies, which suggest that consumer assessment of one product would typically be influenced by surrounding available products (Mantel and Kardes 1999). Based on this finding, we conjecture that consumers evaluate an unknown host IT product as of lower quality under the provision of the positively rated components compared to the absence of ratings because of the influence of the reputable host with neutrally rated components. That is, a reputable host IT product including an unknown host would not be conceived as high quality, which is consistent with the studies examining the fit of host and components of IT products (Swaminathan et al. 2012; Higgins 2000).

4.1 Limitations

Before we highlight the contributions of this research, presenting its limitations is imperative to afford opportunities for future research. First, we include one circumstance of the manipulation of the quality rating effect. Although a considerable number of interesting findings are identified, we surmise that more interesting results would be explored if we consider additional means of manipulating this variable. Second, we use one type of component in the experiment to represent the unknown component, which may limit the generalizability of our findings. Further studies could consider using other components to explore interesting phenomena. Third, our study only includes two product options for consumers to choose; however, in reality, we believe that more choices should be provided when a consumer is faced with a similar price. In this situation, the choice behavior becomes more complex for study, and more in-depth findings would be generated. We hope this research could initiate this field of exploration.

4.2 Implications

Our study provides several implications. First, component branding could afford an effective marketing strategy for unknown product companies to promote their products. Researchers have macroscopically analyzed the underlying benefits to all the stakeholders (Norris 1992), while neglecting consumers’ product quality evaluation and choice behavior varying on the number of branded components or the numerical ratings of components. This study, from a new perspective and through the micro-level investigation, not only guides researchers in paying more attention to this interesting area, but also helps practitioners to better understand consumer information processing behavior and decision-making.

Second, the inconsistent findings in relation to consumers’ product evaluation and choice behavior not only extend the current understanding of consumer behavior (Zeithaml et al. 1996; Sweeney et al. 1999), but also provide guidelines to practitioners on how to design appropriate marketing strategies. Previous studies have suggested that a manufacturer should distinctly design its product strategy based on its own focus, either myopic profit or forward-looking development (Swinney 2011). The finding of our study implies that, if a manufacturer producing the own-labeled host IT product is myopic, it can emphasize consumer choice influenced by branded components. However, if the unknown host producer is forward-looking, whose focus is not to obtain short-term interests, but to build its own brands, he should additionally pay significant attention to consumer attitude toward the product.

Third, the post hoc result reveals that, when a reputable product includes unknown components, the increase in the number of branded components included in an unknown host will not significantly improve the consumers’ choice of the focal product. This finding may imply that adding more branded components is unessential for own-labeled host manufacturers when competing with a reputable host IT product. On the other hand, in this situation, consumers do perceive the product quality as constantly increasing when more branded component are added. Such finding again implies the need
for practitioners to design a suitable strategy according to their overall strategy. Specifically, if the company is myopic, a better strategy for the company is to include less number of branded components when competing with a reputable host IT product, because consumer choice is not sensitive to the increase in the number of branded components. Conversely, if the company is forward-looking, then the best strategy is to add more branded components. Because, although the increase of the branded components would not easily improve consumer choice, the increased perceived quality typically could bring repeated purchase or consumer loyalty, thereby benefitting the company in the long run.

References


