MEASURING BRAND EQUITY: AN EVALUATION OF A CONSUMER-BASED BRAND EQUITY SCALE

Judith H. Washburn
Bowling Green State University

Richard E. Plank
Western Michigan University

This research reports an independent assessment of a recently developed set of consumer-based brand equity measures. Yoo and Donthu (1997) developed a multidimensional, consumer-based brand equity scale comprised of four theoretically defined constructs and a separate multiple-item overall brand equity measure. The present research employed slightly modified items in a different context in an attempt to examine the robustness of the proposed scale. Subjects (n=272) responded to the brand equity scale for different brands and combinations of brands in a co-branding context. The results suggest that, while the Yoo and Donthu scale represents an adequate first step, further scale development is needed. Nevertheless, this scale development has brought us closer to a universally accepted measure of consumer-based brand equity.

INTRODUCTION

The concept of brand equity has been the subject of much recent research. Brand equity, which refers to the incremental value added to a product by virtue of its brand, has been thoroughly conceptualized (e.g., Aaker 1991 and Keller 1993), but a universally accepted brand equity measure has not been forthcoming. A number of different ad hoc measures have been reported (e.g., Aaker 1991, Park and Srinivasan 1994, and Simon and Sullivan 1993), but Yoo and Donthu (1997) further addressed the measurement question by creating and testing the psychometric properties of a set of scales in an attempt to measure customer-based brand equity.

Keller (1993) explicated the term *customer-based brand equity* and defined it as "the differential effect of brand knowledge on consumer response to the marketing of the brand" (p.2). As such, one way to examine brand equity is from the perspective of the customer and is based in the customer's knowledge, familiarity, and associations with respect to the brand. Another perspective on brand equity emanates from the viewpoint of the marketing organization and focuses on the asset value of the brand in the marketplace. Yoo and Donthu (1997) designed a scale to measure *customer-based* brand equity as opposed to the monetary value of the brand. According to Keller (1993), a thorough understanding of customer-based brand equity is essential for successful brand management since "the content and structure of memory for the brand will influence the effectiveness of future brand strategies" (p.2).

The purpose of this research is to investigate empirically the psychometric properties of Yoo and Donthu's (1997, 2002) customer-based brand equity scale within the context of a co-branding study. Given the importance of brand equity as a useful measure, the manner in which we attempt to measure it must be thoroughly investigated. Theoretical and operational definitions that are both valid and reliable are critical in advancing the knowledge base of academicians and providing guidance for practitioners (Bagozzi 1992). The present

research represents an independent administration of the Yoo and Donthu (1997) scale in an attempt to validate the original authors' efforts. First, we discuss the theoretical structure of customer-based brand equity. We proceed by outlining the development of Yoo and Donthu's (1997) brand equity scale. We then summarize three empirical reports on the scale (Yoo and Donthu 1997, 2002; Yoo, Donthu, and Lee 2000) that provide assessment of scale reliability and validity for a single data collection. We continue by reporting scale performance in the present data collection and comparing the present findings to those previously reported by Yoo and colleagues. Finally, we draw conclusions about the usefulness of Yoo and Donthu's scale.

We used structural equation modeling (SEM) by employing Proc Calis in SAS to conduct this analysis. We detail our experimental and data collection procedures, present our findings and suggest further research. This research highlights the strengths and, concurrently, uncovers certain limitations of Yoo and Donthu's (1997) scale. As such, it contributes to a better understanding of brand equity measurement. The underlying purpose of this analysis is to further evaluate the usefulness of the scale and to make suggestions for its improvement.

MEASURING BRAND EQUITY

Aaker (1991) defined brand equity as "... a set of brand assets and liabilities linked to a brand, its name and symbol, that add to or subtract from the value provided by a product or service to a firm and/or to that firm's customers" (p. 15). Aaker (1991) further explained that a brand's assets and liabilities contribute to its equity, may differ depending on context, and can be grouped into five categories: brand loyalty, name awareness, perceived quality, brand associations, and other proprietary assets. Consistent with Keller (1993), Aaker (1991) suggested that brand equity provides value to the firm (e.g., via effectiveness of marketing programs, brand loyalty, price premiums, favorable environment for brand extensions, etc.) and value to the customer (e.g., via enhanced information processing, purchase decision confidence, and increased use satisfaction). The literature discusses several methods of measuring the financial value to the firm (see Bello and Holbrooke 1995 for a summary), but little attention is devoted to how we measure value to the customer. The importance of understanding brand equity from the customer's perspective is explained by Keller (1993): "Though the eventual goal of any marketing program is to increase sales, it is first necessary to establish knowledge structures for the brand so that consumers respond favorably to marketing activities for the brand" (p. 8). Keller further stated that while positive customer-based brand equity can lead to greater revenue, lower costs and higher profit, it has direct implications for the firm's ability to command higher prices, customers' willingness to seek out new distribution channels, the effectiveness of marketing communications, and the success of brand extensions and licensing opportunities. In other words, the level of customer-based brand equity contributes to the effectiveness of the firm's marketing mix.

Yoo and Donthu (1997) adopted four of the five brand asset categories that, according to Aaker (1991), comprise brand equity. Aaker (1991) described brand loyalty, name (or brand) awareness, perceived quality, and brand associations as representing customer perceptions and reactions to the brand, dimensions that can readily be understood by consumers. Aaker further described the fifth brand asset, other proprietary brand assets, as consisting of patents, trademarks, and channel relationships. This dimension is not relevant to the consumer-oriented, customer-based (or "consumer-based" per Yoo and Donthu 1997) brand equity measure put forth by Yoo and Donthu (1997). Thus, Yoo and Donthu (1997) focused on the four Aaker (1991) dimensions that comprise the construct of consumer-based brand equity: brand loyalty, brand awareness, perceived quality, and brand associations. On this basis, Yoo and Donthu (1997): 1) designed five specific brand loyalty items to capture the attitudinal effect of being loyal to a brand; 2) defined brand awareness as brand recognition (rather than brand recall) (Keller 1993) and used four brand recognition measures from previous research (i.e., Alba and Hutchinson 1987, Nedungadi and Hutchinson 1985, Rossiter and Percy 1987, and Srull 1984); 3) measured perceived brand quality as consumers' subjective judgment of a brand's overall excellence following Zeithaml (1988) by employing seven items from Dodds, Monroe, and Grewal (1991); and 4) articulated brand associations as consisting of six new items based on Keller's (1993) work to measure both the quantity and quality of information processing. Thus, Yoo and Donthu (1997) employed a total of 22 items to capture the four dimensions that comprise consumer-based brand equity.

Yoo and Donthu (1997) ultimately developed two distinct brand equity scales – Overall Brand Equity and Multidimensional Brand Equity. The Overall Brand Equity scale (hereafter referred to as OBE) was reduced using factor analysis to a final set of four items (Table 1) from an initial pool of 18 OBE indicators. This scale was developed primarily to evaluate the convergent validity of the Multidimensional Brand Equity scale (hereafter referred to as MBE) and, according to Yoo and Donthu (1997), accomplished this with consistently high correlations. The focus of Yoo and Donthu's (1997) efforts was developing the MBE scale (Table 1), and consistently, MBE is the focus of this research. In a pilot study, Yoo and Donthu (1997) reduced the initial 22 items to a total of 17 items based on examination of scale reliability via Cronbach's alpha coefficient. For more detail on this procedure, please refer to Yoo and Donthu's (1997) publication.

DEVELOPMENT OF MBE

Yoo and Donthu's (1997) study evaluated six brands of athletic shoes, four brands of camera film, and two brands of color television sets with three student samples – 633 Koreans,

TABLE 1
ITEMS FOR MBE AND OBE SCALES

MULTIDIMENSIONAL BRAND EQUITY (MBE):
Perceived quality
X is of high quality*.
The likely quality of X is extremely high.
The likelihood that X would be functional is very high.
The likelihood that X is reliable is very high*.
X must be of very good quality*.
X appears to be of very poor quality*. (r)

Brand loyalty
I consider myself to be loyal to X.
X would be my first choice.
I will not buy other brands if X is available at the store.

Brand awareness
I know what X looks like*.
I can recognize X among other competing brands.
I am aware of X.

Brand associations
Some characteristics of X come to my mind quickly.
I can quickly recall the symbol or logo of X.
I have difficulty in imagining X in my mind. (r)

OVERALL BRAND EQUITY (OBE)
It makes sense to buy X instead of any other brand, even if they are the same.
Even if another brand has same features as X, I would prefer to buy X.
If there is another brand as good as X, I prefer to buy X.
If another brand is not different from X in any way, it seems smarter to purchase X.

*'d items were deleted from the 15-item to the 10-item model.

320 Korean Americans and 577 Americans. To provide a means to evaluate the scale's discriminant validity, the study also collected data on respondents' attitude toward the brand, purchase intention, product category involvement and experience, and brand purchase experience. The researchers analyzed the data on three levels: an individual analysis (to evaluate commonalities across samples); a multi-group analysis to examine factorial invariance; and a pooled analysis to identify culture-free universal dimensions in the pooled sample. The individual analysis resulted in deleting two items with a total of fifteen items remaining (Table1), which showed excellent reliability. However, an exploratory factor analysis failed to produce the expected four dimensions of brand equity by being incapable of separating brand awareness and brand associations. Further confirmatory factor analysis supported the three-dimension model consisting of brand loyalty, perceived quality, and brand awareness/brand associations. Later in this paper, we engage in a discussion of the distinctions between brand awareness and brand associations.

Next, Yoo and Donthu (1997) compared the three-factor MBE model with the four-item OBE scale. A second order confirmatory factor analysis demonstrated a strong fit between the four-item OBE scale and the three-factor MBE model with a high correlation (.78) between the two. Finally, the authors used discriminant analysis to examine the relationships between OBE and both attitude toward the brand and purchase intention. This analysis established convergent validity among the three constructs with OBE positively correlated with both attitude toward the brand and purchase intention. Further, a pairwise comparison, followed by a Chi square analysis, suggested that OBE was distinct from both constructs.

Yoo and Donthu (1997) further clarified these findings by also reporting on a further reduced, ten-item MBE scale (i.e., three constructs consisting of two items for perceived quality, three items for brand loyalty and five items for brand awareness/associations). Testing this measure across the three culturally distinct samples, the authors argued for an etic measure (i.e., one that is free of cultural bias). Fits were acceptable across all three samples.

Yoo, Donthu and Lee (2000) also reported on the MBE and OBE scales confirming the relationship within a structural equation model that examined the impact of marketing mix elements on brand equity. In addition to hypotheses regarding the effect of various marketing mix components on brand equity, the authors hypothesized and confirmed that the level of consumer-based brand equity was positively related to consumers' perceptions of brand quality, brand loyalty, and brand awareness/associations. Further, the researchers suggested that perceived quality and brand associations might affect brand equity by first affecting brand loyalty. This suggestion was made based on a much stronger relationship between brand loyalty and brand equity than that between perceived quality and brand equity or between brand associations/awareness and brand equity.

CO-BRANDING

This analysis examines consumer-based brand equity in the context of co-branded products. Co-branding is a strategy that attempts to capture the synergism of combining two well-known and well-liked brands into a third, unique branded product (e.g., Rao and Ruekert 1994). Some current examples of co-branding include: Edy's ice cream with Girl Scout thin mint cookies, Lexus with Coach leather interior, and Kellogg's Poptarts with Smucker's fruit filling. A co-branding strategy is often used to quickly gain consumer acceptance of a new product by introducing the new product with not one, but two, familiar brand names. In some cases, a company employs two of its own brands while in other cases the strategy takes the form of a branding alliance between two different marketing organizations (Rao and Ruekert 1994).

While co-branding has become a popular branding strategy in recent years, empirical studies that examine its impact have been few. Park, Jun, and Shocker (1996) examined combining existing brand names (constituent brands) to create a Composite Brand Extension (CBE), or a co-brand. This research focused on a strong lead brand ("header" brand) paired with a secondary or "modifier" brand. Results suggested that

complementarity between the lead and secondary brand contributed more to positive evaluations of the CBE than did a positive attitude toward the secondary brand. Their results also suggested that a strong lead brand was not much influenced by the secondary brand.

Simonin and Ruth (1995) examined the effect of specific product combinations by experimenting with within- or between-brand bundling, an activity analogous to co-branding. These authors concluded that joining two well-liked products via between-brand bundling could contribute to the development of favorable attitudes toward the bundle, and indirectly, toward the new brand. Simonin and Ruth (1998) also examined consumer attitudes toward brand alliances (co-brands). Their further research suggested consumers' attitudes toward a particular brand alliance influenced their subsequent attitudes towards the individual brands that comprised that alliance and, in the reverse, consumer attitudes toward partner brands prior to the alliance significantly affected their attitudes towards the alliance.

These previous studies established important effects of co-branding on the brands involved. Nevertheless, none of these studies addressed the effects of co-branding on brand equity, the overriding purpose of this data collection. The specifics of how co-branding affects brand equity is the subject of another report in which we analyze differences between groups using ANOVA as is appropriate for experimental design. This paper's purpose is only to examine the validity of the brand equity scale in the context of a co-branding study. As such, the focus of this report is on the brand equity scale and its properties, not on the effects of co-branding. We employ confirmatory factor analysis to evaluate the psychometric properties of the brand equity scale in accordance with accepted practice and Yoo and Donthu's techniques.

In the present study, we employed Yoo and Donthu's (1997) brand equity scales to help understand the impact of co-branding. We used both the MBE and OBE scales to group brands into high equity or low equity conditions in a series of pretests. For the actual experiment, we used the same scales to determine the effect on brand equity of pairing different brands together. For example, we combined two high equity brands, two low equity brands and co-brands of mixed brand equity to measure the brand equity level of both the co-branded products and the individual brands that comprise them. The method and rationale is explained in the next section.

THE STUDY

The research reported here comes from a larger study that examined the impact of co-branding strategies on brand equity (Washburn 1999). An experiment using students from three different US universities utilized Yoo and Donthu's (1997) MBE and OBE scales. In addition, subjects provided attitude toward the brand (five items) and purchase intention (two items) using the same scales as Yoo and Donthu (1997). The questions used were identical but were evaluated on a seven-point (Very Strongly Agree/Very Strongly Disagree) rather than the five-point response scale (Strongly Agree/Strongly Disagree as employed by Yoo and Donthu) because we found through pre-testing that the seven-point response scale showed more variability than the five-point scale. We made the decision to trade off greater variability between high and low equity brands (by adding two scale points to create a seven point scale) for direct comparability to Yoo and Donthu's five point scale. While this trade off compromises direct comparisons between the two scale administrations, we believe the value of greater variability justifies this compromise. To minimize the incompatibility, we maintained the seven point scale throughout all aspects of our administration and focus our discussion on comparisons within our data versus between our data and Yoo and Donthu's (1997) data. Thus, we measured seven separate constructs: four MBE constructs, one measure of OBE and two constructs measuring attitude toward the brand and purchase intention. These final two constructs acted to validate the brand equity scales.

To carry out the experiment described here, a list of potential product pairs was generated over the course of several weeks by reviewing advertisements and free-standing inserts and by examining products on the grocery store shelves. Products for the main study were selected based on the results of a series of pretests and the judgment of the researchers. Characteristics instrumental in product selection included the ability to easily try the product in a laboratory (classroom) setting and the need to test fictional, yet realistic, co-brands. In addition, the tested product categories needed to be familiar to student subjects.

Pretest subjects evaluated the compatibility or congruency of constituent product categories and generated a list of top-of-mind brand names for these categories. Product pairs with the highest compatibility scores (potato chips with barbecue sauce flavoring and paper towels with an antibacterial ingredient) were ultimately selected from a list including: microwave popcorn with butter, toaster pastries with fruit filling, pretzels with cheese, cookies with chocolate, coffee cake with peanut butter, and facial tissue with cold cream. Another pretest employed the MBE and OBE scales to measure the brand equity of four brand names in each of the four product categories. The brand names with the highest and lowest brand equity scores in each product category were selected to represent high and low brand equity names.

A total of 272 subjects were randomly assigned to eight treatment conditions consisting of the following brand equity combinations for each of the two product category pairings: high/high, high/low, low/high, and low/low. Subjects were handed questionnaires and told to carefully follow the instructions. The procedures and instructions were standardized across the eight different administrations. Subjects were exposed to a full color package prototype of the co-brand in the respective treatment conditions and then asked

to respond to the brand equity questions for that co-brand and for each of the constituent brands. The initial questions were answered after exposure to the package but before product trial. Subjects then engaged in a series of mind clearing tasks, tried the product and, following product trial, again answered the brand equity questions for the co-brand and for each of the constituent brands. As a result, each subject provided brand equity evaluations by responding to 26 questions (i.e., 15 MBE items, four OBE items, five attitude toward the brand items, and two purchase intention items) for the co-brand and each of the two constituent brands both before and after product trial. In effect, each subject provided six brand equity evaluations. While contributed during the same session, the evaluations were separated by the product trial and by the mind-clearing tasks requiring subjects to consider and provide information on unrelated issues. On average, each subject took about 25 minutes to complete the task. There was no indication of respondent fatigue, boredom or other conditions that would lead to poor scale responses. In addition, the study employed control groups that completed brand equity evaluations for one of eight brands (i.e., two brands each of potato chips, barbecue sauce, paper towels, or disinfectants). These subjects were randomly assigned to a control group and completed only a brand equity evaluation. They did not try the product nor did they participate in any other activities.

Three possible concerns could arise with the method employed: the use of student subjects, the use of a laboratory setting, and the use of a within-subjects or repeated measures design. To address the first two concerns, Calder, Phillips, and Tybout (1981) provided justification for the use of student subjects and laboratory settings. These authors differentiated between research conducted for effects versus theory application. In effects application research, "the specific effects obtained are expected to mirror findings that would be observed if data were collected for other populations and settings in the real world" (p.197). The concern over generalizability relates to the theory, not the specific effects obtained. Research design should be mandated by the researcher's priorities regarding whether "to apply the specific effects observed or to apply a more generalized theoretical understanding" (p. 197). The present research is designed to be a theory application study. As such, Calder, Phillips, and Tybout (1981) recommended that research procedures should include subjects who are homogeneous on non-theoretical variables (e.g., students) and a research setting that can be isolated from extraneous variables (e.g., a laboratory). These procedures allow the strongest tests of causality and minimize threats to internal validity (Cook and Campbell 1975). Nevertheless, student subjects constitute a convenience sample, limiting our ability to generalize these findings to any other population. The final concern regarding repeated measures design is justified by Martin (1996). A within-subject design is appropriate to address the issues herein because the differences between individual subjects are minimized, further assuring a homogeneous sample. In order to minimize the risk of subject contamination through learning, memory-clearing tasks were employed. These remedies do not alleviate the concerns discussed, which are valid limitations to this study and should be kept in mind when evaluating the results.

ANALYSIS

The treatment groups were divided in multiple ways for the purpose of this analysis. Recall that each individual subject (n=272) completed the same questions for different brands or combinations of brands a total of six times. Thus, the effective sample size is 1632 (272 x 6). Sample #1 (n=139x6 or 834) consists of the potato chip/barbecue sauce co-brand evaluations (a combination closely resembling a product currently in the marketplace) in all treatment conditions. Sample #2 (n=133x6 or 798) consists of the paper towel/disinfectant co-brand evaluations (a fictitious product) in all treatment conditions. Sample #3 (n=67x6 or 402) consists of only the high brand equity conditions in both product classes. Low brand equity conditions were evaluated in Sample #4 (n=67x6 or 402). Sample #5 (n=137x6 or 828) consists of mixed brand equity situations where one high equity brand is combined with one low equity brand. Finally, Sample #6 examined all brand combinations in total (n=272x6 or 1632). Table 2 shows a sample key. The differing sample sizes are simply an artifact of the randomized treatment groups. Further, recall that the study was an experiment that sought to determine the impact of different treatment conditions on brand equity. For purposes of this paper, dividing samples as above provides insight into the possible effects of the treatment conditions on the response patterns and, thus, the reliability and validity of the measures.

TABLE 2
SAMPLE KEY

Sample #1	All potato chip/barbecue sauce co-brands (n=834)
Sample #2	All paper towel/disinfectant co-brands (n=798)
Sample #3	High equity co-brands in both product classes (n=402)
Sample #4	Low equity co-brands in both product classes (n=402)
Sample #5	Mixed equity co-brands in both product classes (n=828)
Sample #6	Combination of all co-brands (n=1632)

The purpose of the following analysis is to provide further evidence as to the factor structure and the validity of the brand equity scales as discussed. Recall that Yoo and Donthu (1997) originally developed a four-factor MBE scale that was subsequently reduced to a three-factor scale. This analysis is structured to test both the four-factor and three-factor models, in addition to the four-item OBE scale, on the present data set.

We examined each of the six samples in several ways. Based on theoretically developed measures, we constructed confirmatory factor models (CFA) examining both the OBE and MBE measures. We generally followed Yoo and colleagues' methodology (1997, 2002) to provide evidence of construct reliability and validity. Specifically, we first

TABLE 3
CONFIRMATORY FACTOR ANALYSIS OVERALL BRAND EQUITY (OBE) SCALE

Sample Number	1	2	3	4	5	6
Sample Size	834	798	402	402	828	1632
AGFI	.966	.938	.784	.986	.985	.971
CFI	.996	.992	.973	1.00	.999	.996
NNFI	.989	.975	.918	.999	.996	.989
Prob> chi **2	.003	.000	.000	.325	.068	.000
CHI SQ/D.F.	5.74	9.64	18.45	1.12	2.68	9.89
Composite Reliability	.924	.800	.927	.912	.912	.918
Variance Extracted	.754	.710	.760	.722	.722	.736
Convergent Validity	YES	YES	YES	YES	YES	YES
Std. Residuals >2.58	4	4	4	0	0	4
<5% of total residuals (.6)	NO	NO	NO	YES	YES	NO

TABLE 4
CONFIRMATORY FACTOR ANALYSIS 15-ITEM, FOUR-FACTOR MULTIDIMENSIONAL BRAND EQUITY (MBE) SCALE

Sample Number	1	2	3	4	5	6
Sample Size	834	798	402	402	828	1632
AGFI	.910	.910	.883	.836	.926	.924
CFI	.971	.965	.962	.932	.976	.971
NNFI	.963	.956	.952	.915	.970	.964
Prob > chi **2	.000	.000	.000	.000	.000	.000
CHI SQ/D.F.	4.94	4.65	3.15	4.23	4.00	7.96
Composite Reliability (1)	.893	.834	.875	.866	.867	.871
(2)	.899	.878	.891	.864	.889	.894
(3)	.940	.936	.944	.910	.944	.943
(4)	.875	.818	.820	.801	.877	.854
Variance Extracted (1)	.735	.627	.702	.688	.686	.693
(2)	.749	.722	.732	.679	.727	.738
(3)	.725	.719	.739	.628	.737	.740
(4)	.700	.601	.607	.588	.714	.660
Convergent Validity	YES	YES	YES	YES	YES	YES
Std. Residuals > 2.58	29	31	27	26	31	42
<5% of total residuals (10)	NO	NO	NO	NO	NO	NO

(1) Latent factor is Brand Loyalty - items 5,6,7; (2) Latent factor is Brand Awareness - items 8,9,10;
(3) Latent factor is Perceived Quality - items 11,12,13,14,15,16; (4) Latent factor is Brand Associations - items 17,18,19

TABLE 5
CONFIRMATORY FACTOR ANALYSIS 15-ITEM, THREE-FACTOR MULTIDIMENSIONAL BRAND EQUITY (MBE) SCALE

Sample Number	1	2	3	4	5	6
Sample Size	834	798	402	402	828	1632
AGFI	.907	.909	.869	.835	.919	.907
CFI	.969	.962	.954	.926	.972	.968
NNFI	.962	.954	.944	.912	.967	.962
Prob > chi **2	.000	.000	.000	.000	.000	.000
CHI SQ/D.F.	4.99	4.83	3.53	4.33	4.32	5.00
Composite Reliability (1)	.892	.856	.876	.874	.867	.892
(2)	.934	.915	.911	.905	.929	.936
(3)	.952	.939	.943	.910	.944	.941
Variance Extracted (1)	.735	.695	.703	.709	.686	.735
(2)	.703	.645	.630	.615	.686	.704
(3)	.728	.720	.735	.628	.736	.728
Convergent Validity	YES	YES	YES	YES	YES	YES
Std. Residuals > 2.58	27	33	26	29	32	26
<5% of total residuals (10)	NO	NO	NO	NO	NO	NO

(1) Latent factor is Brand Loyalty - items 5,6,7; (2) Latent factor is Brand Awareness/Brand associations - items 8,9,10,17,18,19; (3) Latent factor is Perceived Quality - items 11,12,13,14,15,16

TABLE 6
CONFIRMATORY FACTOR ANALYSIS TEN-ITEM, THREE-FACTOR MULTIDIMENSIONAL BRAND EQUITY (MBE) SCALE

Sample Number	1	2	3	4	5	6
Sample Size	834	798	402	402	828	1632
AGFI	.953	.939	.908	.924	.946	.957
CFI	.985	.973	.967	.973	.980	.983
NNFI	.979	.962	.953	.963	.972	.975
Prob > chi **2	.000	.000	.000	.000	.000	.000
CHI SQ/D.F.	3.83	4.67	3.46	2.84	4.36	6.78
Composite Reliability (1)	.893	.834	.878	.863	.867	.871
(2)	.918	.898	.888	.886	.911	.910
(3)	.847	.795	.847	.780	.864	.847
Variance Extracted (1)	.735	.627	.703	.677	.686	.693
(2)	.693	.626	.614	.610	.671	.668
(3)	.735	.740	.735	.639	.760	.735
Convergent Validity	YES	YES	YES	YES	YES	YES
Std. Residuals > 2.58	10	13	15	8	14	16
<5% of total residuals (4.5)	NO	NO	NO	NO	NO	NO

1 Latent factor is Brand Loyalty - items 5,6,7; (2)Latent factor is Brand Awareness/Brand Associations – items 9,10,17,18,19; (3) Latent factor is Perceived Quality - items 12,13

TABLE 7
CONFIRMATORY FACTOR ANALYSIS TWO-FACTOR ATTITUDE/PURCHASE INTENTION SCALE

Sample Number	1	2	3	4	5	6
Sample Size	834	798	402	402	828	1632
AGFI	.939	.955	.947	.919	.940	.955
CFI	.983	.984	.987	.971	.980	.984
NNFI	.972	.974	.978	.953	.968	.974
Prob > chi **2	.000	.000	.000	.000	.000	.000
CHI SQ/D.F.	6.84	4.82	2.95	4.35	7.08	8.35
Composite Reliability (1)	.912	.865	.881	.888	.899	.895
(2)	.820	.872	.876	.780	.857	.839
Variance Extracted (1)	.698	.773	.763	.639	.751	.724
(2)	.681	.569	.607	.617	.646	.635
Convergent Validity	YES	YES	YES	YES	YES	YES
Std. Residuals > 2.58	7	6	1	4	5	9
<5% of total residuals (2.1)	NO	NO	YES	NO	NO	NO

(1)Latent factor is Attitude Toward Brand - items 22,23,24,25,26;
(2)Latent factor is Purchase Intention - items 20,21

TABLE 8
CORRELATION OF BRAND EQUITY MODELS WITH ATTITUDE TOWARD BRAND AND PURCHASE INTENTION (ALL CORRELATIONS SIGNIFICANT AT P<.001)

Sample Number	1	2	3	4	5	6
A. Overall Brand Equity (OBE)						
Attitude to Brand	.645	.480	.560	.521	.582	.571
Purchase Intention	.717	.634	.692	.607	.715	.686
B.15-item, Four-Factor MBE						
Attitude to Brand	.756	.690	.737	.670	.752	.734
Purchase Intention	.707	.587	.607	.641	.685	.653
C.Brand Loyalty Latent Factor 15-item, Four-Factor MBE						
Attitude to Brand	.665	.471	.579	.551	.588	.589
Purchase Intention	.729	.681	.745	.674	.709	.712
D. Brand Awareness Latent Factor 15-item, Four-Factor MBE						
Attitude to Brand	.543	.394	.466	.403	.506	.489
Purchase Intention	.483	.264	.258	.345	.438	.389
E. Perceived Quality Latent Factor 15-item, Four-Factor MBE						
Attitude to Brand	.781	.768	.770	.728	.789	.776
Purchase Intention	.700	.599	.577	.660	.676	.652
F.Brand Associations Latent Factor 15-item, Four-Factor MBE						
Attitude to Brand	.578	.455	.455	.446	.574	.538
Purchase Intention	.514	.325	.287	.402	.466	.424
G.Ten-Item, Three-Factor MBE						
Attitude to Brand	.722	.624	.695	.601	.712	.690
Purchase Intention	.693	.569	.618	.595	.668	.636
H.Brand Loyalty Latent Factor Ten-Item, Three-Factor MBE						
Attitude to Brand	.665	.471	.579	.552	.588	.589
Purchase Intention	.729	.681	.745	.674	.709	.712
I. Perceived Quality Latent Factor Ten-Item, Three-Factor MBE						
Attitude to Brand	.736	.701	.725	.630	.750	.724
Purchase Intention	.672	.555	.556	.582	.645	.616
J.Brand Awareness/Brand Associations Latent Factor Ten-Item, Three-Factor MBE						
Attitude to Brand	.584	.450	.480	.452	.570	.541
Purchase Intention	.520	.318	.299	.396	.474	.428

TABLE 9
BEST FIT MODELS

A. Best Fit Four-Factor MBE

Sample	1	2	3	4	5	6
Sample Size	834	798	402	402	828	1632
AGFI	.979	.955	.945	.947	.973	.962
CFI	.996	.987	.988	.986	.994	.991
NNFI	.994	.981	.982	.978	.991	.984
Prob > chi**2	.013	.000	.000	.001	.000	.000
CHI SQ/D.F.	1.80	3.05	2.00	2.00	2.06	3.21
Composite Reliability (1)	.853	.796	.834	.862	.837	.839
(2)	.852	.886	.891	.819	.819	.832
(3)	.836	.921	.914	.827	.913	.895
(4)	.829	.800	.830	.732	.838	.817
Variance Extracted (1)	.746	.668	.742	.675	.720	.725
(2)	.742	.722	.732	.694	.695	.713
(3)	.630	.746	.728	.618	.727	.742
(4)	.708	.668	.709	.582	.721	.690
Convergent Validity	YES	YES	YES	YES	YES	YES
Std. Residuals > 2.58	2	4	4	2	1	5
<5% of total residuals	YES	NO	NO	YES	YES	NO

(1) Latent factor is Brand Loyalty - items 5,6,7; (2) Latent factor is Brand Awareness - items 8,9,10;
3. Latent factor is Perceived Quality - items 11,12,13,14,15,16; (4) Latent factor is Brand Associations - items 17,18,19

B. Indicators Loading into Four-Factor Best Fit MBE

Sample	1	2	3	4	5	6
Brand Loyalty	6,7	5,7	5,7	5,6,7	5,6	5,7
Brand Awareness	8,10	8,9,10	8,9,10	8,10	8,10	9,10
Perceived Quality	13,15,16	11,12,14,16	11,12,13,16	12,14,16	11,12,13,16	11,12,16
Brand Associations	17,18	18,19	18,19	17,19	18,19	17,19

C. Best Fit Ten-Item, Three-Factor MBE

Sample	1	2	3	4	5	6
Sample Size	834	798	402	402	828	1632
AGFI	.968	.980	.964	.960	.972	.983
CFI	.992	.995	.994	.990	.993	.995
NNFI	.988	.991	.988	.981	.987	.991
Prob > chi**2	.000	.020	.051	.026	.001	.000
CHI SQ/D.F.	2.98	2.02	.1.80	1.97	2.94	3.45
Composite Reliability (1)	.839	.791	.836	.802	.836	.821
(2)	.893	.842	.843	.791	.869	.853
(3)	.847	.850	.847	.780	.864	.848
Variance Extracted (1)	.725	.667	.721	.671	.724	.699
(2)	.677	.640	.635	.563	.690	.659
(3)	.735	.740	.735	.639	.761	.736
Convergent Validity	YES	YES	YES	YES	YES	YES
Std. Residuals > 2.58	1	0	1	3	2	3
<5% of total residuals	YES	YES	YES	NO	NO	NO

D. Indicators Loading into Ten-Item, Three-Factor Best Fit MBE

Sample	1	2	3	4	5	6
Brand Loyalty	5,7	6,7	5,6	5,7	6,7	5,6
Brand Aware-ness/Associations	10,17,18,19	10,18,19	10,18,19	9,10, 19	9,10, 18	10,18,19
Perceived Quality	12,13	12,13	12,13	12,13	12,13	12,13

Table 9 (con't)

E. Overall Best Fit 15-Item, Three-factor MBE

Sample	1	2	3	4	5	6
Sample Size	834	798	402	402	828	1632
AGFI	.986	.988	.958	.957	.983	.989
CFI	.999	.999	.992	.988	.997	.998
NNFI	.998	.998	.988	.980	.995	.996
Prob > chi**2	.187	.221	.016	.010	.053	.010
CHI SQ/D.F.	1.29	1.23	1.82	1.94	1.77	2.27
Composite Reliability (1)	.866	.775	.883	.862	.837	.841
(2)	.891	.838	.852	.804	.842	.842
(3)	.861	.821	.886	.784	.836	.895
Variance Extracted (1)	.798	.663	.717	.677	.720	.727
(2)	.731	.634	.660	.583	.617	.725
(3)	.675	.805	.705	.645	.721	.741
Convergent Validity	YES	YES	YES	YES	YES	YES
Std. Residuals > 2.58	0	0	0	0	0	0
<5% of total residuals	YES	YES	YES	YES	YES	YES

F. Indicators Loading into Overall Best Fit 15-Item, Three-Factor MBE

Sample	1	2	3	4	5	6
Brand Loyalty	6,7	5,6	5,6	5,6,7	5,6	5,6
Brand Aware-ness/Associations	9,17, 18	9,10, 19	9,10,19	8,10, 19	8,10, 18	8,10
Perceived Quality	11,13,16	11,12	11,12,13	11,16	11,13	11,12,16

TABLE 10
CORRELATION OF BEST FIT MBE MODELS WITH ATTITUDE TOWARD BRAND AND PURCHASE INTENTION (ALL CORRELATIONS SIGNIFICANT AT P<.001)

Sample Number	1	2	3	4	5	6
A. Four-Factor Brand Loyalty						
Attitude to Brand	.631	.415	.518	.552	.621	.536
Purchase Intention	.706	.601	.682	.674	.735	.655
B. Four-Factor Brand Awareness						
Attitude to Brand	.518	.394	.446	.388	.475	.487
Purchase Intention	.452	.264	.258	.323	.404	.386
C. Four-Factor Perceived Quality						
Attitude to Brand	.764	.762	.757	.707	.784	.765
Purchase Intention	.681	.581	.563	.633	.665	.634
D. Four-Factor Brand Associations						
Attitude to Brand	.574	.415	.398	.409	.546	.523
Purchase Intention	.521	.267	.212	.360	.420	.410
E. Three-Factor Ten-Item Brand Loyalty						
Attitude to Brand	.621	.441	.587	.497	.548	.616
Purchase Intention	.683	.674	.734	.625	.677	.723
F. Three-Factor Ten-Item Brand Awareness/Brand Associations						
Attitude to Brand	.579	.427	.432	.412	.539	.515
Purchase Intention	.511	.273	.243	.351	.450	.389
G. Three-Factor Ten-Item Perceived Quality						
Attitude to Brand	.736	.701	.725	.630	.750	.724
Purchase Intention	.672	.555	.556	.582	.645	.616
H. Three-Factor 15-Item Brand Loyalty						
Attitude to Brand	.631	.501	.587	.552	.621	.616
Purchase Intention	.706	.689	.734	.674	.735	.723
I. Three-Factor 15-Item Brand Awareness/Brand Associations						
Attitude to Brand	.582	.427	.465	.400	.521	.464
Purchase Intention	.530	.269	.258	.340	.432	.362
J. Three-Factor 15-Item Perceived Quality						
Attitude to Brand	.761	.735	.742	.695	.736	.765
Purchase Intention	.672	.578	.572	.615	.637	.634

TABLE 11
CRITERIA FOR EVALUATING MODEL FIT

Criteria	*Acceptable Fit*
Adjusted Goodness of Fit (AGFI)	> .9
Comparative Fit Index (CFI)	> .95
Nonnormed Fit Index (NNFI)	> .9
Probability for Chi-square	≤ .05
Normed Chi-square	1.0-2.0
Composite Reliability	> .700
Variance extracted	> .500
t-test Convergent Validity	t ≥ 3.29
Standardized Residuals>2.58	<5% of total residuals

examined the four-item OBE measure using CFA. Table 3 shows the results for all six samples. We then used CFA to examine the original 15-item, four-construct MBE measure as developed by Yoo and Donthu (1997, 2002). This analysis provided a baseline for the four-factor model using all of the items. Table 4 reports the results for all six samples. Table 5 reports an alternative 15-item, three-construct MBE model, as suggested by Yoo and Donthu (1997, 2002), for all six samples. This analysis provided the baseline for the three-factor model, again using all items. Table 6 reports Yoo and Donthu's (1997, 2002) ten-item MBE measure for all six samples, replicating Yoo and Donthu's final three-factor model. We also ran a two-factor model for attitude toward the brand and purchase intention to evaluate the predictive validity of the brand equity scales. Table 7 summarizes these results for all six samples. These analyses were performed using the CALIS procedure in SAS, Version 6.12. Following generally accepted protocol, we used covariances as input to the analysis. We ran a series of simple Pearson correlations on the three models tested as well as their latent factors. We correlated simple summed scales against attitude toward the brand and purchase intention factors. Table 8 reports the correlations and their significance.

The analysis then proceeds to define the "best fit" CFA models for the six samples. Beginning with the full 15-item models for both the four-factor and three-factor theoretical MBE models, we maximized the fit for the models using residual outlier analysis and modification indices. We completed the same analysis for the three-factor, ten-item MBE model developed by Yoo and Donthu (1997). Table 9 provides the results for each best-fit model in addition to the listing of the indicators for each model.

Finally, Table 10 provides an analysis examining predictive validity via simple Pearson correlations of the various MBE models with attitude toward the brand and purchase intention. After reporting these results, we discuss the usefulness of the various brand equity scales.

RESULTS

To assess a maximum likelihood factor analysis with an oblique rotation we used several conventional rules of thumb. The factor loading was required to be .40 or greater and at least .10 or greater than its loading on a different factor for an item to load. In cases where these conditions were not met, the item was deleted from consideration.

The analysis extracted five or six factors in each of the six samples. Recall that the original 26 items (Yoo and Donthu 1997) separated into seven distinct factors (i.e., brand loyalty, perceived quality, brand awareness, brand associations, OBE, attitude toward the brand and purchase intention). In general, the exploratory factor analyses did not conform to our preconceived notions. Between two and four indicators did not load on any construct in every case. In no case did a seven-factor model emerge as expected. While some indicators did load as anticipated, the majority did not. The results of the analyses were discouraging, but not completely unexpected.

Each of Tables 3-7 and Table 9 report the same set of ten statistics for all six samples applying different CFA models: Table 3 reports the CFA for the OBE scale; Table 4, the 15-item, four-factor MBE scale; Table 5, the 15-item, three-factor MBE model; Table 6, the ten-item, three-factor MBE scale as finalized by Yoo and Donthu (2002); Table 7, the two-factor attitude toward the brand/purchase intention scale; and Table 9, the best fit for the three- and four-factor MBE models. The ten statistics we report are: AGFI, CGI, NNFI, CHI SQ, CHI SQ/D.F., composite reliability for each latent factor, variance extracted for each latent factor, convergent validity, number of standardized residuals greater than 2.58, and whether the number of standardized residuals is less than five percent of the total. For each of these ten statistics, we next explain what the statistic measures and the standards we used to determine fit. Table 11 summarizes the fit criteria used throughout this analysis. Tables 8 and 10 report the correlations between the brand equity models and attitude toward the brand and purchase intention.

The adjusted goodness of fit index (AGFI) is a standard measure reported in most studies, although Bentler's (1990) comparative fit index (CFI) and Bentler and Bonnett's (1980) non-normed fit index (NNFI) are argued to be more accurate regardless of sample size (Hatcher 1996). We report all three measures. For each, a statistic of .900 or better is regarded as a good fit. However, Hu and Bentler (1999) have suggested .950 as a more appropriate acceptance of model fit for CFI.

The probability for chi-square goodness of fit (CHI SQ) is also reported. This measure requires a statistic of .05 or higher (1.0 is best) for the model to be considered a good fit. Given the weakness of chi-square as a goodness of fit measure (Joreskog and Sorbom 1989), we also report chi-square divided by the degrees of freedom, or normed chi-square (CHI SQ/D.F.), as suggested by Hair et al. (1998). A result between 1.00 and 2.00 indicates a fit regardless of the probability statistic.

Composite reliability (Fornell and Larcker 1981) was computed for each latent factor. Thus, for Table 3 only one

latent factor is reported and, therefore, only one composite reliability computation. However, for the 15-item, four-factor MBE model (Table 4), the 15-item, three-factor MBE model (Table 5), the ten-item, three-factor MBE model (Table 6), and the two-factor model (Table 7) we report four, three, three and two latent factors, respectively. As such, composite reliability statistics are computed for each latent factor in each model. Composite reliability is analogous to coefficient alpha but considered a superior measure. Like coefficient alpha, composite reliability should be .700 or higher (Hair et al. 1998).

The variance extracted estimate assesses the amount of variance captured by the latent factor in relation to the variance because of measurement error (Fornell and Larcker 1981) and is considered a very conservative test. A statistic of .500 or better is desirable. In this context, convergent validity is defined in terms of the individual indicators and whether or not they are measuring the same latent variable (Anderson and Gerbing 1988). It is assessed by reviewing the t-tests for factor loadings. At the statistical level of .001, all t-tests must generate a statistic greater than 3.29. The argument is that each indicator is measuring the latent construct when the t-test is significant. Finally, we report the number of normalized residuals over 2.58. Per Hair et al. (1998), an acceptable number of standardized residuals is a maximum of five percent of the total residuals. We also report whether or not that standard is achieved.

Recall that Yoo and Donthu (1997) began with a total of 22 items in the OBE scale, but, in the end, retained only four items. We used those four items, the minimum number that can be subjected to a single factor confirmatory factor analysis. Therefore, we are unable to make adjustments to the OBE scale. In contrast, the other scales being assessed (Tables 4-7 and 9) are multiple latent variable scales with multiple factors. These scales can be improved by deleting one or more indicator(s) and still be re-specified to confirm a more accurate fit of the data.

Table 3 reports the CFA results for the four-item OBE scale. These results provide generally stable findings. Five of the six samples show very solid fit, although Sample #3 shows only a marginal fit with a poor AGFI. In Sample #3, all the evaluations were for high brand equity products. In all but Sample #4, the chi-square data is weak.

Critical to the analysis is the number of standardized residuals exceeding 2.58. Samples #4 and #5 have no residuals. Samples #1, #2, #3, and #6 each show four residuals, which suggests a "noisy" scale. In summary, five of the six samples indicate good fit statistically with only Sample #3 being marginal. However, in three of the five "good fit" samples (Samples #1, #2 and #6) standardized residual problems appear. A detailed examination of the specific indicators underlying the residuals suggests that a single indicator is not the cause. Therefore, deleting any one indicator will not solve the problem of large residuals. Thus, the four-item OBE scale provides an adequate brand equity measure but continues to pose questions because of the large number of residuals or noise.

The 15-item, four-factor MBE scale also provides mixed results. Recall that this scale was Yoo and Donthu's (1997) original theoretical brand equity model. The model fits very well for all samples except Sample #4 based on CFI and NNFI. AGFI is mixed and chi-square is weak. The composite reliabilities are strong as is the variance extracted, however, the number of residuals is very high for each sample. Examining the residuals and the modification indices shows that significant improvement in model fit is possible by deleting offending indicators.

Table 5 shows that the 15-item, three-factor MBE model demonstrates a fairly good fit to the data, similar to the four-factor model. Nevertheless, the number of standardized residuals is very high for each sample indicating, once again, a very noisy scale. The residuals and modification indices suggest substantial room for improvement.

As shown in Table 6, the ten-item, three-factor MBE model (Yoo and Donthu's final model) demonstrates generally solid results. In all six samples, the overall fit of the model to the data is acceptable. Composite reliability and variance extracted are also acceptable, despite poor chi-square results. In general, this model fits slightly better than the 15-item, four-factor or the 15-item, three-factor MBE models, but again is subject to residual problems. It should be noted that the Yoo and Donthu (1997) analysis was subject to similar residuals problems, although the magnitude is not known. An examination of the residuals and modification indices also indicates some improvement in model fit can be obtained.

The purpose of Table 7 is to examine the construct validity of both attitude toward the brand and purchase intention. The two-factor CFA reported in Table 7 is included so that these scales can be used to determine the predictive validity of the brand equity scales reported in Tables 3-6 and 9. Since purchase intention was only a two-item scale and, therefore, unable to be reduced, the two separate constructs (attitude toward the brand and purchase intention) were combined into one model for validity estimation purposes. We would expect that higher brand equity would be highly correlated with more positive attitudes toward the brand and greater purchase intention.

All six samples generally fit well with high AGFI, CFI and NNFI statistics and strong composite reliability and variance extracted. However, the model produced excessive standardized residuals. Examination of the residuals and modification indices provided no consistent pattern for model improvement across the samples.

Table 8 (A-J) provides the bi-variate Pearson correlation statistics comparing OBE and the three MBE scales and their latent components with both attitude toward the brand and

purchase intention. Recall from the previous tables that construct validity problems surfaced in some of the samples. For both the OBE scale and the individual underlying latent factors in the three- and four-factor MBE scales, we simply summed the scales to compute the Pearson correlations. Again, the purpose of this analysis is to assess the predictive validity of the four brand equity scales. As noted in the tables, all Pearson correlations are statistically significant at $p < .001$. Brand awareness and brand associations consistently show the lowest correlations although the magnitude of correlation varies across the six samples. The only other consistent pattern appearing is that correlations are generally higher for the potato chip/barbeque sauce co-brands than for the paper towel/disinfectant co-brands. This result is not surprising since subjects were more likely to be familiar with the potato chip/barbecue sauce product inasmuch as the paper towel/disinfectant product was fictitious.

Table 9 reports the best model fit for the four-factor MBE model; the three-factor, ten-item MBE model; and the three-factor, 15-item MBE model. To arrive at these results, we examined the t-statistics for individual indicators, problematic standardized residuals, and various modification indices. Fit is indicated by strong fit statistics and by ensuring that all indicators are significant contributors to the model. In addition, no latent factor should have fewer than two indicators. The best fit models are those with one or more offending indicators removed from the model while still retaining a four- or three-factor solution.

All of the best-fit models (Table 10 A through J) have adequate fits with all Pearson correlations statistically significant at $p < .001$. The best fitting model is that developed using three factors and all 15 items. This is the only model with no standardized residuals across all six samples. It also has slightly higher fit statistics than the competing models. We also correlated the best fit models with the four-item OBE model for which Yoo and Donthu (1997) reported a .78 correlation. Across the six samples, the OBE model and the four-factor MBE model averaged a .661 correlation; the OBE and the three-factor MBE model averaged a .675 correlation; and the OBE and the full 15-item best fit three-factor MBE model averaged a .684 correlation. All are substantially lower than the strong correlation achieved by Yoo and Donthu (1997), but very consistent with one another.

DISCUSSION

The results of the present research, in some ways, support and build upon the work of Yoo and colleagues (1997, 2000, 2002), and in other ways, depart from it. The results of the ten-item, three-factor MBE model (Table 6) are most consistent with Yoo and Donthu's (1997) findings. We tested Yoo and Donthu's (2002) final model on our six samples and found an acceptable fit and acceptable composite reliability and variance extracted. Nevertheless, this model was subject to serious residual problems prompting us to attempt to refine it in order to eliminate as many residuals as possible.

We were able to improve the model by using Yoo and Donthu's (1997) same three-factor structure but by examining all 15 items rather than the ten items ultimately used by Yoo and Donthu (1997) (Table 9). These findings suggest that, as proposed by Yoo and Donthu (1997), a three-factor MBE model that groups together brand awareness and brand association items provides the most parsimonious model in both Yoo and Donthu's (1997) data and ours. However, future researchers would be wise to carefully select the particular items that fit best within their own analyses. Yoo and Donthu's (1997, 2002) analysis differed from ours in the nature and number of the specific items selected for evaluation.

Our analysis also found acceptable fits, with acceptable composite reliability and variance extracted, for a four-factor MBE model, again starting with 15 items. While the four-factor structure is not as strong a fit as the three-factor model, it could certainly be applied in a situation where the need to separate brand awareness from brand association is deemed critical. That is, in our data, the 15-item, four-factor MBE model works, but not as well as the 15-item, three-factor version. We base this assertion on lower numbers of standardized residuals and slightly higher AGFI, CFI and NNFI statistics for the three-factor model with slightly higher average composite reliability and variance extracted for the four-factor model.

The question of whether or not brand awareness and brand associations should be collapsed is critical. Both Aaker (1991) and Keller (1993) distinguish between the two constructs. Aaker (1991) defined brand awareness as " ... the ability of a potential buyer to recognize or recall that a brand is a member of a certain product category" (p. 61). He further explained that brand awareness can be viewed as a continuum ranging from brand recognition at the lowest level, to brand recall at the mid-level, to top-of-mind recall (i.e., the first-named brand in unaided recall) and, finally, the dominant brand, which is the only brand recalled by the consumer. Aaker (1991) defined brand associations as " ... anything linked in memory to a brand" (p. 109). Clearly, the two constructs will be highly correlated since, according to Aaker's conceptualization, brand awareness must precede brand associations. That is, a consumer must first be aware of the brand in order to develop a set of associations. Nonetheless, the two dimensions are not synonymous since one can be aware of a brand without having a strong set of brand associations linked in memory.

According to Keller (1993), brand awareness and brand associations are the dimensions that underlie brand knowledge with brand awareness being described as "...related to the strength of the brand node or trace in memory ..." (p. 3). Keller also stated that, "... brand awareness affects consumer decision making by influencing the formation and strength of brand associations in the brand image" (p. 3). Keller conceptualized brand associations as falling into three categories of increasing scope: attributes, benefits, and attitudes, with attributes being descriptive features that

characterize a product. This discussion sheds light on Yoo and Donthu's (1997) inability to separate the two constructs. The literature seems well developed enough to support the theory of brand awareness and brand associations being two closely related yet distinct concepts. Nevertheless, the particular items selected by Yoo and Donthu (1997) do not appear to clearly discriminate between the two constructs. The items selected measure only the lowest level of both brand awareness (i.e, recognition as per Aaker 1991) and the lowest level of brand associations (i.e, describing only attributes versus benefits or attitudes as per Keller 1993).

The confounding results of the brand awareness/brand associations question can be better understood by examining the series of correlations between our best fit brand equity models and attitude toward the brand and purchase intention (Table 10 A through J). The latent factors of brand loyalty and perceived quality correlate highly with both attitude toward the brand and purchase intention regardless of the model being scrutinized. The lower correlations appear consistently in the brand awareness and brand association latent factors, particularly with respect to purchase intention. These results are not surprising. The data indicate that, even though a consumer may have a high awareness level of one brand, or may have a rich set of associations in conjunction with one or more brand names, it is not given that the consumer perceives the brand(s) as offering high quality or feels a high degree of loyalty to that brand(s). It seems that both brand awareness and brand associations are necessary, but not sufficient, conditions for high customer-based brand equity.

Table 12 examines the correlations conducted on our data between OBE, the four-factor MBE, the three-factor MBE and the two separate constructs of attitude toward the brand and purchase intention. It shows that Yoo and Donthu's (1997) proposed OBE model demonstrates a very high correlation (and higher than either the four- or three-factor MBE models) with purchase intention but relatively weak results with attitude toward the brand. It could be argued that the more critical measure is purchase intention. However, these mixed results are likely a result of noise (the number of residuals) in the OBE scale that is impossible to reduce because of the few number of items (four) that comprise the scale. As reported, deleting any one item does not improve the scale and deleting more than one item would destroy it. Thus, we recommend that future researchers use the OBE scale with caution by remaining very cognizant of problematic residuals.

TABLE 12
AVERAGE CORRELATIONS BETWEEN BRAND EQUITY MODELS AND ATTITUDE TOWARD THE BRAND AND PURCHASE INTENTION

	OBE Average	15-Item Four-Factor MBE Average	Ten-Item Three-Factor MBE Average
Attitude toward the brand	.560	.723	.674
Purchase Intention	.675	.646	.630

The fundamental question in this analysis is whether or not we should be satisfied with a three-factor brand equity model as proposed by Yoo and Donthu (1997) and confirmed by our analysis. If, theoretically, a research question can be adequately addressed within the constraints of the three-factor model, our analysis suggests that it provides the strongest and cleanest fit. However, we encourage researchers to further refine the particular items (ten or 15) that provide the best fit.

In situations where a four-factor analysis is imperative, we recommend that researchers use the four-factor structure, but with caution. While the fit of this model was seen as acceptable (although not the best) in our research, Yoo and Donthu (1997) originally discounted such a model as having weak fit. Again, this model should be used with even closer attention paid to fit and residuals.

As in all empirical studies, this study has limitations. The primary limitation is that this research was not specifically designed to ascertain differences in scale reliability and validity across different conditions. Rather, it was designed to test co-branding strategies. As such, the analysis suffers from our inability to control for some factors and manipulate others. For instance, the present study used a seven-point response scale versus the five-point scale used by Yoo and Donthu (1997) and, in the context of co-branding, this research elicited multiple responses from a single subject. It is impossible to determine which variables, if any, might account for the differences between this study and the work of Yoo and colleagues (1997, 2000, 2002).

CONCLUSION

The results of this research provide some support for Yoo and Donthu's (1997) OBE model and three-factor MBE models. Nonetheless, the support is inadequate to offer an unconditional endorsement of Yoo and Donthu's (1997) brand equity measures. On the contrary, our results encourage future researchers to proceed to further refine the factor structure of these models. We conclude that Yoo and Donthu's scale is not psychometrically sound for theory testing research and needs to be improved. Our best fit model was similar to Yoo and Donthu's (1997) but required additional items that Yoo and Donthu deleted in their analysis. We concur with Yoo and Donthu that such a measurement scale is needed and that scale development to date has been successful. We also agree with Yoo and Donthu's conclusion that, while this scale represents a forward step in scale development, further refinement is required.

Future research should focus on the brand awareness/brand associations issue. Theory highlights a clear distinction between brand awareness and brand associations, which makes it important to further refine the scales. We argue that, consistent with Yoo and Donthu (1997), a three-factor scale works best given the constraints of the items selected to measure brand awareness and brand associations. However, our analysis suggests that different items may act to improve

the statistical fits of the model/data interface. Therefore, we strongly encourage future researchers to reevaluate the use of the particular items selected for the scale and look upon the literature to suggest more discriminating indicators.

Much brand equity research will need to rely on a short, overall perceptual brand equity evaluation. The four-item OBE scale developed by Yoo and Donthu (1997) is a good start, but seems to suffer from residual problems. In our discussion, we have referred to residual problems as noise. A major effort should be undertaken to further refine this scale into a four- or five-item scale that exhibits more consistent response patterns. The question of whether a five- or seven-point response scale is appropriate also should be further considered.

Yoo and Donthu (1997) have made an excellent start towards the development of valid and reliable perceptual measures of brand equity. Future research should begin with this base and refine the scales with the goal of achieving psychometrically valid and reliable scales. In an ideal world, a valid and reliable scale is one that provides similar and consistent factor structures regardless of the context in which it is used. The current scale has shown to be reasonably consistent over two very different research design contexts, but further refinement is called for.

MANAGERIAL IMPLICATIONS

Marketing managers have several models from which to choose when measuring brand equity with respect to the financial value of a brand. An equally important question to managers is how to effectively measure *customer-based* brand equity. However, much less attention has been devoted to the design of such an instrument. The real value of attempting to refine Yoo and Donthu's customer-based brand equity measure is in moving a step closer to a universally accepted customer-based brand equity scale. Yoo and Donthu made great strides in accomplishing this task. Nevertheless, managers must be confident that the instrument recommended is, indeed, measuring what they intend to measure. By evaluating the Yoo and Donthu scale in a different context, we have moved this research forward. Our research supports Yoo and Donthu's concept of an OBE scale, but suggests the Yoo and Donthu scale would benefit from reevaluation of the specific items. Further, our research uncovers a limitation to Yoo and Donthu's three-factor MBE scale that contradicts accepted theory about the underlying brand equity constructs of brand awareness and brand associations. While we hesitate to take a stand on which scale is better given the limitations associated with the differences in methods of the two studies, we do not hesitate to recommend that further refinement of the scale is called for. We believe this scale should be tested in different contexts, on different types of products, and with different types of subjects in order to achieve generalizability. When the scale(s) are refined to the point of general acceptance, marketing managers will find them useful in tracking customers' perceptions of brand equity, comparing one product's customer-based brand equity with another's for deletion and resource allocation decisions, and contributing one additional piece of information to estimate the monetary value of a company and its products.

REFERENCES

Aaker, D.A. (1991), *Managing Brand Equity*, New York: The Free Press.

Alba, J.W. and J. W. Hutchinson, (1987), "Dimensions of Consumer Expertise," *Journal of Consumer Research*, 13 (1), 411-453.

Anderson, J.C. and D. W. Gerbing (1988), "Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach," *Psychological Bulletin*, 103, 411-423.

Bagozzi, R. (1992), "Acrimony in the Ivory Tower: Stagnation or Evolution?" *Journal of the Academy of Marketing Science*, 20 (4), 355-359.

Bello, D. C. and M. B. Holbrooke (1995), "Does An Absence Of Brand Equity Generalize Across Product Classes?" *Journal of Business Research* 34: 125-131.

Bentler, P.M. (1990), "Comparative Fit Indexes in Structural Models," *Psychological Bulletin*, 107: 238-246.

_____ and D. G. Bonnett (1980), "Significance Tests and Goodness of Fit in the Analysis of Covariance Structures," *Psychological Bulletin*, 88: 599-606.

Calder, B. J., L. W. Phillips, and A. M. Tybout (1981), "Designing Research For Application," *Journal of Consumer Research* 8 (2): 197-207.

Cook, T. and D. Campbell (1975), "The Design And Conduct Of Experiments And Quasi-Experiments In Field Settings." Edited by Martin Dunnette. *Handbook of Industrial and Organizational Research.* Chicago: Rand McNally and Co.

Dodds, W.B., K.B. Monroe, and D. Grewal (1991), "Effects of Price, Brand and Store Information on Buyers' Product Evaluation," *Journal of Marketing Research*," 28 (3), 307-319.

Fornell, C. and D.F. Larcker (1981), "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research*, 18 (February): 39-50.

Hair, J. F., R.E. Anderson, R.L. Tatham and W.C. Black (1998), *Multivariate Data Analysis*, Fifth Edition, Upper Saddle River, NJ: Prentice Hall.

Hatcher, L. (1996), "Using SAS PROC CALIS or Path Analysis: An Introduction," *Structural Equation Modeling*, 3 (2): 176-192.

Hu, L. and P.M. Bentler,. (1999), "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives," *Structural Equation Modeling*, 6 (1), 1-55.

Joreskog, K. G. and D. Sorbom (1989), LISREL 7, Chicago: SPSS, Inc.

Keller, K.L., (1993), "Conceptualizing, Measuring, and Managing Customer-Based Brand Equity," *Journal of Marketing*, 57 (1), 1-22.

Martin, D. W. (1996), *Doing Psychology Experiments, 4th Edition,* Brooks/Cole Publishing Company, Pacific Grove, CA.

Nedungadi, P. and J. W. Hutchinson (1985), The Prototypicality of Brands: Relationships with Brand Awareness, Preference, and Usage," in *Advances in Consumer Research,* Vol. 12, Elizabeth Hirshman and Morris Holbrook, eds. Provo, UT: Association for Consumer Research, 498-503.

Park, C.W., S.Y. Jun, and A. D. Shocker, (1996), "Composite Branding Alliances: An Investigation Of Extension And Feedback Effects," *Journal of Marketing Research* 33 (4): 453-466.

Park, C.S., and V. Srinivasan, (1994), "A Survey- Based Method for Measuring and Understanding Brand Equity and its Extendibility," *Journal of Marketing Research*, 31 (2), 271-288.

Rao, A. R., and R. W. Ruekert (1994), "Brand Alliances as signals of Product Quality," *Sloan Management Review*, Fall, 87-97.

Rossiter, J.R., and L. Percy (1987), *Advertising and Promotion Management*, New York: McGraw Hill.

Simon, C.J., and M.W. Sullivan (1993), "The Measurement and Determinants of Brand Equity: A Financial Approach," *Marketing Science*, 12 (4), 28-52.

Siminon, B. L., and J. A. Ruth (1998), "Is A Company Known By The Company It Keeps? Assessing The Spillover Effects Of Brand Alliances On Consumer Brand Attitudes," Journal of Marketing Research 35 (1): 30-42.

_____and _____ (1995), "Bundling As A Strategy For New Product Introduction: Effects On Consumers' Reservation Prices For The Bundle, The New Product, And Its Tie-In," *Journal of Business Research* 33: 219-230.

Srull, T.K. (1984), "Methodological Techniques for the Study of Person Memory and Social Cognition," in R.S. Wyer and T.K. Srull (eds.), *Handbook of Social Cognition*, vol. 2, Hillsdale, NJ: Lawrence Erlbaum Associates, 1-72.

Washburn, J.H. (1999), *An Evaluation of Co-branding: Its Effects on Brand Equity, SEC Attribute Performance, and the Moderating Role of Product Trial*, Unpublished Doctoral Dissertation, UMI Number: 9942832, UMI 300 North Zeeb Road, Ann Arbor, MI.

Yoo, B., and N. Donthu (1997), Developing and Validating a Consumer-based Overall Brand Equity Scale for Americans and Koreans: An Extension of Aaker's and Keller's Conceptualizations," Paper presented at 1997 AMA Summer Educators Conference, Chicago:

_____, and _____(2002), "Developing and Validating a Multidimensional Consumer-based Brand Equity Scale," *Journal of Business Research*, Forthcoming.

_____, _____, and S. Lee (2000), "An Examination of Selected Marketing Mix Elements and Brand Equity," *Journal of the Academy of Marketing Science*, 28 (2), 195-211.

Zeithaml, V.A. (1988), "Consumer Perceptions of Price, Quality, and Value: A Means-End Model and Synthesis of Evidence," *Journal of Marketing*, 52 (3), 2-22.

AUTHOR BIOGRAPHY

Judith H. Washburn (Ph. D.Saint Louis University) is assistant professor of marketing at Bowling Green State University in Bowling Green, OH. Dr. Washburn has published previously in such journals as *Journal of Consumer Marketing, Journal of Services Marketing* and *Journal of Nonprofit and Public Sector Marketing*. Her research interests relate to organizational alliances in the form of brand alliances and cause related marketing.

AUTHOR BIOGRAPHY

Richard E. Plank, (Ph. D., City University of New York) is professor of marketing at Western Michigan University in Kalamazoo, MI. Dr. Plank has published previously in over 15 journals including the *Journal of Marketing Theory and Practice*. His research interests relate to integration of buying and selling in business markets. He has developed a model of brand equity for business markets.