

## DEVELOPMENT AND VALIDATION OF THE BRAND DEMAND SCALE: A CASE STUDY OF TAIWANESE AND GLOBAL BRANDS

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**ABSTRACT.** *Consumer satisfaction with products derives from consumer emotion and the product features; the attractiveness of the brand can bring about psychological benefits far more than the product alone can. Therefore, emotional design has become a major issue lately with brand and product design as two of its key elements. This study proposes a method to evaluate brand demand using a questionnaire specialized for Taiwanese and global brands. The questionnaire was developed considering factors of product function, design and emotion as they affect user preference. Then, a case study with hundreds of participants was conducted via the Internet to verify and screen out questionnaire items in terms of reliability and validity. Finally, a total of 12 questionnaire items were selected for evaluating elements of brand demand. This study aims to provide designers, companies, and organizations with a design strategy tailored to the current market. A second objective of this work was to investigate Taiwanese brands and global brands through the “brand demand scale” after the detection of differences. The results of this study could contribute to future follow-up studies on product design-related factors that affect brands.*

**Keywords:** Brand demand, Product design, Emotional design, Brand

**1. Introduction.** Consumers link product information with brands, and brand image represents product appearance to consumers. Moreover, products symbolize brands, and the brand summarizes consumers’ feelings toward products. Product design is critical for building a brand image; the product should be consistent with the brand image [1-3].

The designer, Sam Hecht of MUJI once proposed that a good design does not necessarily guarantee commercial success, but successful brands must have good design support. Consumer satisfaction with the products derives from the product features and emotion; the attractiveness of the brand can bring about psychological benefits far more than the product alone can. Therefore, with the core value of products recognized as market position, strengthening brand image would help identify product advantages [4-7]. Ralph Weigmann as the CEO of iF (iF International Forum Design GmbH) defined design as the philosophy and soul of brand and product from the perspective of industrial design [8].

When consumers face an unfamiliar product, they usually use brand awareness to help them make purchasing decisions [3]. Based on these observations, the motivation of this theme is to understand how a brand through products knows its place in the minds of consumers as well as its place in the market. This research has the following objectives: 1) preparation of a “brand demand scale”, and an affirmation of its reliability and validity through confirmatory factor analysis (CFA); 2) exploration of the differences between

Taiwanese brands and global brands after the “brand demand levels of scale” testing. Thus, the purpose of this study was to develop an evaluation scale for Taiwanese and global brands, which can be used as a reference for future design instruction, product and brands evaluation, and relevant future studies.

**2. Conceptual Background.** As CEO of one of the world’s top ten brand marketing companies, [9] pointed out that the 21st century is dominated by the emotion of the period, and as such, brands should create an appropriate emotional atmosphere for consumers. Emotion functions as the link between a brand and its products, as well as the bridge between enterprises and consumers. Consumers are no longer content with satisfying their ordinary daily needs: they want to feel “longing” and “desire”, which are generated by the admiration of a brand or a product. Market competition has made it apparent that product functionality and design are no longer the product’s only advantages. Invisible factors including product aesthetics and symbolic attributes have become the key factors that influence consumers’ decisions to purchase certain brands’ products. Product design is critical for developing a brand image; the product should be consistent with the brand image [2,3,10].

Consumers, designers, and producers view the required developmental process of products and brands as a process from use to the user, from function to emotion, and from hi-tech (original equipment manufacturer, OEM) to hi-touch (original brand manufacturer, OBM) [11]. In this process, the products of brands also progress from popular to unique. Through an analysis of the factors underlying the function, design, and emotion of a brand and its products, it is possible to explore how these factors affect a variety of brands. The purpose of this research is to provide designers, companies, and organizations with the design strategy to align brands and products with current market demands.

**2.1. Users’ perception.** Product design is integral to a brand and is a major driver of brand equity. Product design can drive consumer preferences and create a sustainable competitive advantage for a brand [12]. The course from product quality to brand is the course from “use” to “user” on which a company might focus.

Physical objects have the potential to surprise, emotionally touch, and bring joy to people. Therefore, the final performance of the products is evaluated by the consumers according to their emotional reactions. A product’s qualia are determined by its quality, including the attractiveness, beauty, and creativity rendered in the product’s external features. Therefore, a successful product design meets or exceeds the emotional needs of users beyond utility and quality [13,14].

[15] proposed that qualia products satisfy users’ need for products to have a practical function, appealing aesthetics, and the ability to evoke an emotional connection from users. Brand image represents the product’s appearance in the minds of consumers. In the memories of consumers, product information and the brand are linked together. Therefore, effective product design can promote the brand image [1,15,16]. Based on the above discussion, we can see that is a path of from quality to qualia to the brand of users’ perception.

**2.2. Designers’ perception.** Product design is a user-centered process which must not only meet the functional demands of products but also take account of the consumer’s experience. Products tended to emphasize technical and practical capability in the past, but today’s products focus more on design and emotion. Through creativity and a design emphasis on the uniqueness of the product, products have become more emotionally evocative. Therefore, product design is a process from the functional to the emotional [17]. [18] proposed that products have “psychology” and “physiology” and involve rational conditions for consumer use but do not lack emotional appeal.

[19] published a classic article that identifies how visceral design relates to appearances. Behavioral design relates to pleasure and the effectiveness of use. Reflective design involves the rationalization and intellectualization of a product. In the past, “production thinking” provided product function through technology that emphasized products’ “universality” and facilitated comfort. Currently, “design thinking” seeks to convey product feelings through creativity and designs that emphasize products’ uniqueness and enhance happiness. Based on the above discussion, we can see that is a path of from function to design to the emotion of designers’ perception.

**2.3. Makers’ perception.** The process from the original equipment manufacturer (OEM) to the original design manufacturer (ODM) to the original brand manufacturer (OBM) can reflect the development of product design. Branding is an important factor for creating high value-added brands for industrial upgrading and competitiveness. In light of this, product design in Taiwan has entered the OBM era, which involves the evolution of Taiwanese design development. Taiwan is eager to transform its economic development to “branding Taiwan” [20].

The pioneers of design thinking postulated that innovations should start with a focus on desirability, but should ultimately satisfy three perspectives: human desirability, technical feasibility, and economic viability [21]. “Feasibility” indicates a product’s functionality; “viability” indicates what can be achieved with a product within a company’s sustainable business model; “desirability” represents what people want or will eventually want, which is a product’s customer appeal.

Based on the previously mentioned research, this section discusses the product as a result of a manufactured process of the maker’s perception of technical feasibility, economic viability (product innovation), and desirability to users. This manufacturing process is the intersection of the processes of industrial OEM to ODM to OBM. It is a change from the hi-tech to the hi-touch of brands and their products from the maker’s perception. Based on the above discussion, we can see that is a path of from OEM to ODM to OBM of makers’ perception.

### 3. Research Method.

**3.1. Conceptual framework.** The conceptual framework presented in this paper was used to study the trends in Taiwanese and global design and development from “use” to “user”, “function” to “emotion”, and “hi-tech” to “hi-touch”. Additionally, Taiwanese design development was explored, and the OEM, ODM, and OBM stages were identified to illustrate how Taiwan’s local culture might transform into a global market through adaptive design development. Three perspectives (user, designer, and maker) were also included in the conceptual framework, which included feelings toward functional design and representatives of the desired course of the user, representatives of the user-centered course of the designer, and representatives of the OEM to OBM course of the maker, as shown in Figure 1. This paper proposes a design approach for branding Taiwan by using Taiwanese designs, which can be adopted by Taiwan in the future. Hence, this study aims to provide designers, companies, and organizations with a design strategy tailored to the current market.

Based on the literature review, products were measured by brand performance in this study. The “use” to “user” was generated from product “qualia factors” that included practical function, aesthetics, and emotional connection [17]. The “function” to “emotion” was generated from “visceral level of emotional design” that included visceral, behavioral, and reflective factors [19]. The “hi-tech” to “hi-touch” was generated from “design thinking” that included feasibility, viability, and desirability [21].



FIGURE 1. Study framework

**3.2. Research methods.** Based on the purposes of this research, the authors used the following research methods. (1) Exploratory factor analysis (EFA) was conducted to analyze three latent variables (function, design, and emotion) of the “brand demand scale”. (2) CFA was conducted to confirm whether measurement test models and theoretical models had suitability with the “brand demand scale”. (3) Reliability analysis was conducted to measure the theory of “brand demand scale” with composite reliability (CR) and the average variance extracted (AVE). (4) Convergent analysis of the “brand demand scale” was conducted to determine the convergent validity of the observed variation of latent variables. (5) Distinctive information analysis between the latent variables of the “brand demand scale” was conducted to determine discriminant validity. (6) Multiple group measurement invariance analysis of the “brand demand scale” with an analysis of covariance (ANCOVA) was conducted. (7) The level of differences in the brand demand of Taiwanese and global brands was determined, and Taiwanese brands and products were examined in the future direction of international efforts. These methods about structural equation modeling are quoted from [21-23].

**3.3. Preliminary verification of measurement scales and official survey.** This study consisted of two phases. The first phase was the preparation of the “brand demand scale”, pre-testing, and determination of a formal scale problem. The second phase was the EFA and CFA of the official survey.

**3.3.1. Questionnaire development.** This research, through the use of brand and product related theories (“use” to “user”, “function” to “emotion”, and “hi-tech” to “hi-touch”), resulted in the development of the “brand demand scale”. Measurement scales were devised for product function, design, and emotional factors. In this study, the survey questions on the product function (need), design (want), and emotion (desire) factors were based on the literature review. A 7-point Likert scale was used in the experiment and each variable had six questions.

**3.3.2. Phase 1: preliminary verification.**

(1) Selection of brands as experimental subjects: This phase consisted of the selection and filtering of the brands tested. Two steps were involved in this phase: 1) as this study aimed to understand the product function, design, and emotional factors (the emotional atmospheres created by the products) in the current market, 100 large companies in Taiwan and well-known international brands were referenced, and 50 brands with manufacturing capabilities were selected; 2) expert groups were invited to perform investigations

of brand familiarity, and the top 13 brands were selected, which were ACER, ALESSI, APPLE, ASUS, BENQ, HTC, IKEA, MUJI, PHILIPS, SONY, TATUNG, FRANZ and GIANT.

(2) Samples of the preliminary verification of measurement scales: In this study, we invited 70 participants with university degrees to participate in our preliminary survey questionnaire. Once the survey questionnaire results were returned, we performed a detailed review of the survey. The results of some of the participants who gave blank answers or omitted a large number of questions were discarded. There were a total of 63 valid results from the pool of participants.

(3) Analysis of the questions used in the preliminary verification of measurement scales: We analyzed all of the data gathered from the preliminary verification by using statistical analysis software suite SPSS22.0. The questionnaire analysis contained two parts: determination of the scale reliability and validity, and analysis of the correlation coefficient.

3.3.3. *Phase 2: EFA and CFA of the official samples.* During this stage, there were 208 participants with university degrees between the ages of 21 and 30. As 5 participants gave blank answers or omitted a large number of questions, their responses were discarded. In the end, there were 203 valid responses from 102 design background participants and 101 non-design background participants. We conducted the CFA by using statistical analysis software suite SPSS22.0 and Amos 22.0.

(1) Exploratory factor analysis (EFA) and model modification: We used EFA to examine the preliminary questionnaire of brands' and products' function, design, and emotion, and used modification indices to remove inappropriate questions from the questionnaire.

(2) Confirmatory factor analysis (CFA): We conducted CFA with the following test standards: 1) overall model fit; 2) CR and AVE; 3) discriminant validity and convergent validity; 4) measurement invariance.

## 4. Discussion and Results.

### 4.1. Phase 1: preliminary verification.

(1) The questionnaire reliability and validity: In terms of the reliability analysis, Cronbach's  $\alpha$ , the internal consistency reliability, showed that the values of the measurement scales for function, design, and emotion were 0.93, 0.91, with 0.87 as the value of the total measurement scale. The factor loadings for the measurement scales were all greater than 0.85. [22] stated that a value smaller than 0.4 means that the factor loadings are very low, while a value greater than 0.6 indicates a high standard. This showed that overall, the measurement scales demonstrated good reliability and validity.

(2) Correlation coefficient analysis: The Pearson product-moment correlation coefficients were computed to assess the relationship between each of the dimensions and the total scale ( $N = 63$ ). The results showed that each dimension had a significant correlation with the total scale, as shown in Table 1.

TABLE 1. Internal relationship between the dimensions and the scale ( $N = 63$ )

Dimensions	Function	Design	Emotion
Scale	0.972**	0.993**	0.970**

\*\*Level of significance is 0.01; two-tailed.

### 4.2. Phase 2: EFA and CFA of the official samples.

4.2.1. *Exploratory factor analysis (EFA).* Figure 2 is based on the function, design, and emotional dimensions of brands established by the results of the exploration of the structural equation modeling analysis.

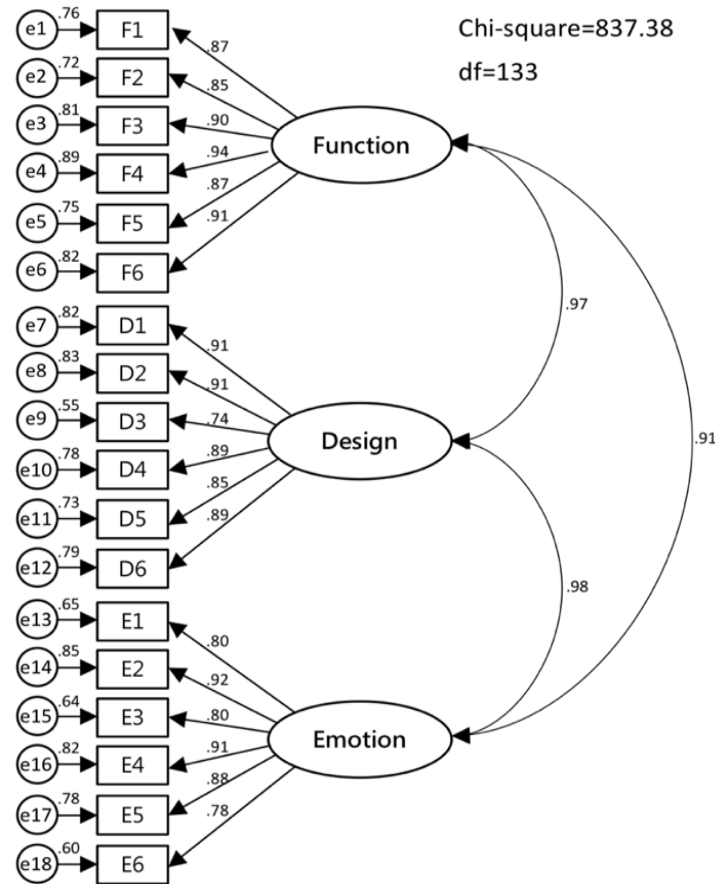


FIGURE 2. The exploration of the SEM analysis

4.2.2. *Modification indices.* Although Figure 2 shows that the internal load was greater than .50, the fitness test through patterns demonstrated that the overall model fit was not good. Values of the modification indices were  $> 3.84$ , indicating that the parameter suggested amendment, so through modification indices to the correction of the too high value of the same dimension deleted.

The third and fifth questions of the design dimension and the first and third questions of the emotion dimension were therefore removed. Values of the modification indices of the function dimension were not too high, but for the sake of consistency for each subsequent to the analysis of also extracting semantic and other questions of scale related to the second and third questions of scale were also deleted. Thus, for each dimension, two questions were removed, four questions were retained, and subsequent authentication was conducted.

4.2.3. *Confirmatory factor analysis (CFA).* This stage involved conducting the official questionnaire from which we had a total of 203 survey results. During this stage, we analyzed the measurement model CFA to address the covariant relationships between the observation variables and the latent variables.

(1) Proposed measurement model: Through the adjustment of various dimensions of the model by the deletion of some questions, this study established 12 measurement variables for the three dimensions. The final model and model verification are shown in Figure 3. According to the structure of the tests used by [23,24], the model fit test results for this study showed that the indicators of this model were almost always at or close to an acceptable level. This indicated that the overall structure of this research as well as its theoretical structure had a good fit with the empirical data. The overall model fit verification results showed that the ratio between the chi-square value and the degrees

of freedom was between 1 and 5 ( $X^2/df = 3.67$ ) which was within the acceptable range. Other index values showed that they all complied with the testing standards (RMR =  $0.01 < 0.08$ ; PGFI =  $0.57 > 0.5$ ; NFI =  $0.94 > 0.9$ ; RFI =  $0.92 > 0.9$ ; IFI =  $0.96 > 0.9$ ; NNFI(TLI) =  $0.94 > 0.9$ ; CFI =  $0.96 > 0.9$ ; PNFI =  $0.73 > 0.5$ ; PCFI =  $0.74 > 0.5$ ; RMSEA =  $0.10$ ). Overall, all index values in our model reached or were close to the acceptable levels. This showed that our model had a good fit in terms of the theoretical and empirical data structure.

(2) Composite reliability (CR) and average variance extracted (AVE): The CR in all aspects of our study, as well as the AVE, were higher than or compliant with the recommended values of 0.60 and 0.50, respectively, from [26]. [27] also proposed that the CR must be at least 3.0, and must have reached a significant level to be able to discriminate. This allowed the questions of the brand demand scale to be retained. Results from the project analysis showed that the CR value ( $t$ ) was between 0.90 and 0.98, that the AVE value was between 0.75 and 0.95, and that all of the values reached the significant value of 0.001. All questions of this study complied with the standards and were therefore retained.

(3) Convergent validity and discriminant validity: Our study collected valid survey results and used CFA to evaluate the measurement model in terms of its convergent validity and discriminant validity. The CFA results for the standard factor loading (SFL). Function factors were between 0.86 and 0.95, design was between 0.89 and 0.91, and emotion was between 0.77 and 0.93. Most of the questions had SFL values of  $> 0.70$ . Squared multiplication correlation values (SMC) were greater than 0.50, thus showing convergent validity, according to [26].

The discriminant validity refers to the measurements performed on two different constructs. If the relevance is small after correlation analysis is performed, it means that these two constructs have discriminant validity [24,28]. In terms of the discriminant validity tests, we set the criteria to determine the results: the square root of each AVE had to be greater than the correlation coefficient number and at least 75% of the variance in the variable had to be explained [29]. Based on this, and by observing the contents of this study, we found that the square roots of all of the AVE values were between 0.87 and 0.91, which was greater than the corresponding correlation coefficient numbers, meaning that more than 75% of the variance in the variable had been explained. This showed that our measurement variables had discriminant validity. These results indicated that the measurement system complied with the standards.

(4) Model fit statistics: this study shows the model fit statistics for the measurement results. The results showed that the chi-square differences between the restricted mode values were significant, and the RMSEA, NFI, CFI, IFI and RFI equivalent amount of changes were less than 0.05. Design-related and non-design related measurements were made for the two groups in measurement weights, measurement intercepts, structural covariance and measurement residuals, showing scale measurement of identity in the two groups.

**4.3. Taiwanese brands and global brands from the demands of difference.** The second objective of this work was to investigate Taiwanese brands and global brands through the “brand demand scale” after the detection of differences. Accordingly, the 13 brands were divided into the Taiwanese brand and global brand groups, and the two groups’ brand demand factors and function, design, and emotion metrics were tested to establish their degree of difference.

Through the path parameter of the model, we found that the question, “The product of this brand has a meticulous modeling structure”, on the functional dimension of Taiwanese brands was more significant than other questions. Further, each question on the design dimension of Taiwanese brands was almost the same level. We also found that

the question, “The product of this brand is fashionable”, on the emotional dimension of Taiwanese brands was the most significant, and that only the question, “The product of this brand evokes brand recognition”, was significantly lower than all of the questions on all dimensions. We also determined that the question, “The product of this brand is fashionable”, on the emotional dimension of global brands was significantly higher than other questions. The structural equation models for Taiwanese brands and global brands are shown in Figures 3 and 4, respectively.

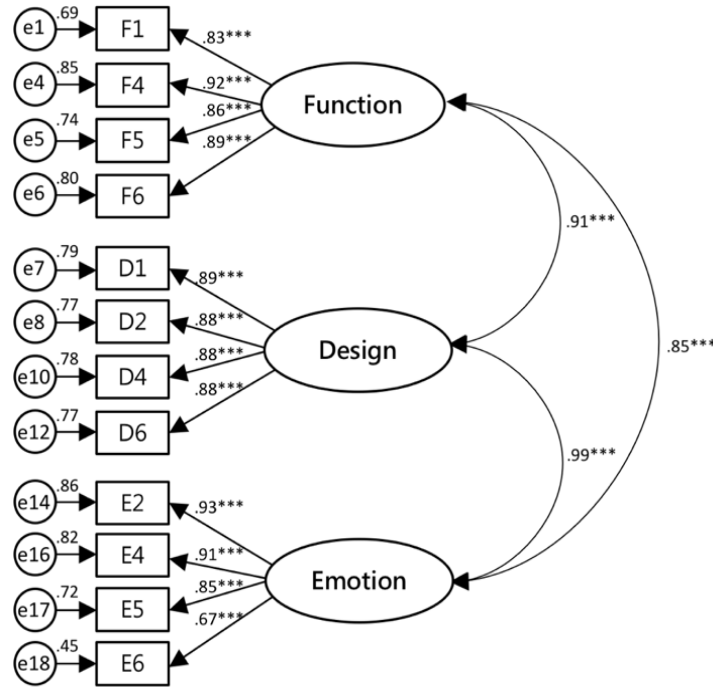


FIGURE 3. Proposed measurement model for Taiwanese brand demand

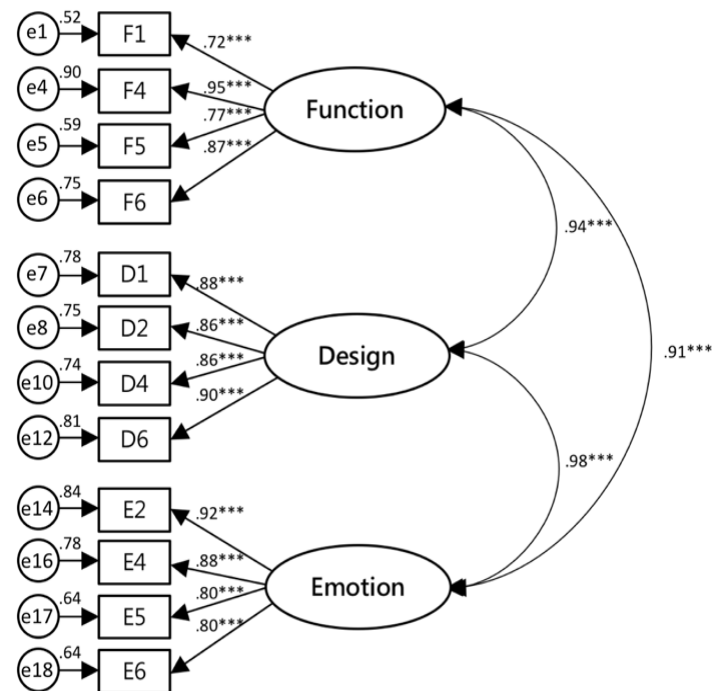


FIGURE 4. Proposed measurement model for global brand demand



## 5. Conclusions.

(1) The feasibility of the “brand demand scale”: This study was based on the theory of scale, mainly in the extent of the measurement of brands’ and products’ function, design, and emotional needs. Thus, one of the research objectives was to develop the “brand demand scale” and use CFA to confirm the validity of the scale degrees. The “brand demand scale” contains three levels (function, design, and emotion) and 12 questions. Analyzing the scale with EFA, CFA, and model fit statistics analysis, results showed that for the scale with the ideal adapters, reliability and validity of the scale are good. Questions on the scale can be used for public development and the assessment of good empirical data fit. The scale is appropriate for all age groups and groups of consumers, thereby confirming its widespread applicability and the suitability of its levels.

(2) Brand demand assessment analysis of Taiwanese and global brands: When Taiwanese brands were compared with global brands using the three dimensions, we found that the functional dimension of Taiwanese brands as a whole is significantly above that of global brands, in line with Taiwanese products’ long-standing reputation of possessing high quality. Taiwanese brands and global brands exhibited no significant differences in the design dimension, which is indicative of the improvements in Taiwanese product design capability in recent years. In the emotional dimension, results showed that Taiwanese brands’ largest disadvantage is their lack of brand recognition. This is serious because time is of the essence in expanding Taiwanese brands. Through the structural equation model of different brands, one can distinguish between Taiwanese and global brands and their products; through an in-depth discussion of function, design, and emotion, one can establish the factors of brand demand. This article is a preliminary study for the future study of the reference, and the results of this study could contribute to future follow-up studies on product design-related factors that affect brands. Based on the above research, we conclude that Taiwanese brands are still recognized as being of good quality in the functional sense, yet there is great room for improvement in terms of brand recognition. It would be essential to establish Taiwanese brands in the minds of consumers.

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