1. INTRODUCTION

In today's competitive market, “innovation” serves as a competitive advantage allowing companies to dominate particular market segments. With respect to corporate design strategy, innovation is not only the key to extending market share, but also the key to increasing commercial gains. According to Norman’s mental model [1], innovative products must be appreciated and recognized by the users. Only if product innovation meets consumers demands can earn the most economic effect [2, 3]. Several researchers proposed different classifications for categories of innovative products. For example, Veryzer [4] identified four innovation categories according to the dimensions of both product and technology. Crawford and Di Benedetto [5] introduced five definitions of new products, based on the product itself and how the product was perceived. The five types of products were included: (1) New-to-the-world; (2) New category entries; (3) Additions to Product lines; (4) Product improvements and (5) Repositioning. Finally, from the viewpoint of marketing, Orihata and Watanabe [6] divided the driving forces of innovation into four categories: (1) Market driven; (2) Technology driven; (3) Me-Too and (4) Concept driven based on the “market insight” and “technological innovation”. Thus, the importance of cultural features and the concept of “global market, local design” are not well-studied in design strategy.

In the global market - local design era, connections among local culture, global market and innovative products in design strategy have become increasingly close. For design strategy, cultural value-adding creates the core of product value. It’s the same for culture; design strategy is the motivation for pushing the development of creative industries forward. Recently, creative industries have been continually emerging in design field and can become a key trend in design strategy. Obviously, we need a better understanding of cultural aspects in design strategy, and not only for the global market but also for local design. While cross-cultural factors become important issues for design strategy in the global economy, the intersection of design strategy and cultural features becomes a key issue making both local design and the global market worthy of further in-depth study [7, 8].

To be successful, innovative products must have a clear and significant difference features that is related to market need. Furthermore, changes in consumer perceptions regarding innovation are also important in product design. In addition, “Culture” plays an important role in the design field, and “cross cultural design” will be a key design evaluation point in the future [9, 10]. Designing “local features” into modern product will be a design trend in the global market. Design strategy is considered to be one of the pivotal components in cultural
and creative design industries, and this will have a significant impact on consumer perception of innovation.

The importance of studying design strategy has been shown repeatedly in several studies in various areas of the design field [11, 12]. Despite the recognized importance of design strategy with local culture and global market, industries lack a systematic approach to study design strategy. Understanding the design strategy for global market and how to design “culture” into “innovate product” for designers are important research issues, and until now these topics have not been well covered. In order to design “local features” into “innovative products”, we need to study how to link between “local culture” and “global market”, then the results can be transformed into “design strategy” [13]. Therefore, this paper proposes an approach for illustrating how to transform “local culture” into “global market” by using a systematic research. The approach integrates the local features and innovative products into the design strategy based on the on consumer perception of innovation. Through the approach, we have been able to merge local culture, innovative design, and global market into design strategy.

The purpose of this study is intended to provide designers with an approach of how to establish design strategy, and with an idea of how to concentrate their efforts when designing innovative products to meet the requirements of design strategy. This study also illustrates some other implications of the approach through the cultural perspective for the design strategy. The results of this study can be used as future reference for designers in the design strategy of the application of local culture for the global market. From a user-centered viewpoint, this study attempts to cover the attributes of marketing and local features which impact product innovation by studying consumer perceptions of innovative product.

2. RESEARCH FRAMEWORK

With the development of global market, most companies gradually realize that the keys of product innovation are not only market and technology aspects but also emotional design. Ulrich and Pearson [14] pointed out that user-centered design has received increased attention in the academic and business communities over the past decade. Both academics and practitioners had emphasized that the role of emotional design in innovative product development relates not only to aesthetics, but also to aspects such as local features, global market, ergonomics, user friendly, efficient use of materials, and functional performance, and so on [15].

As often as not, consumers shape a total image of a product instantly from its appearance or form, without pondering deeply over it [16]. The formation of a product’s image is heavily tied to its perceived form, thus product form is a significant factor that draws people’s attention. Smets and Overbeeke [17] indicated that the importance of product appearance was congruent with other sensory aspects of cultural features. Some people simply place more emphasis on local features than others do [18]. Aspects such as function, performance, efficiency and ergonomics can be conveyed to some extent by the visual form of the product [19]. Customers’ emotional response is derived from their perception of cultural attributes expressed by products, playing a significant role in their visual appearance [20]. As a result, form is the key factor for innovative products. In other words, the product form must be endowed with an immediate attraction and this therefore renders user perception of innovative product form an important issue for study. Therefore, how to design “local features” into “global market” become an important trend for design strategy.

For the local features, localization means that within a specific area, the life style of the residents is taken for granted as habitual and repeated cultural activity. Localization is a way of designing and marketing the product to the target consumers of the country. Localization integrates the product into the both the life style and the local culture of the intended region. To be successful in localization, designers must pay particular attention to the technical specifications, sub-culture, and life style of the consumer, and to the nature of the product itself. There are numerous factors to consider for successful localization.

For the global market, globalization accompanied and allegedly contributed to economic growth, it refers to the increasingly global relationships of people, culture, and economic activity. It means the process of the crossing of time and space limits by the social life, and the generation of interactive links by local cultural features through the propagation of media. Through this process, different societies, cultures, systems and individuals in the world fuse. In the globalization process, due to the fusion of cultures of similar nature, the consumer can become familiarized with a more diversified and wider local culture.

Under the influence of economic globalization and design localization, glocalization is a Portmanteau word of globalization and localization. The term “glocal” refers to the individual, group, division, unit, organization, and community which is willing and able to “think globally and
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From design point of view, glocalization is the trend of product design in finding difference from similarity under the concept of globalization and localization.

After reviewing the previous studies, it is clear that local culture is the force pushing cultural and creative industries development forward. The main purpose of this paper is to study factors affecting the design strategy. These factors are discussed in order to understand design strategy in cultural and creative design industries. The conceptual framework focuses on how to extract cultural features from local culture and then transfer these features to the innovate product; finally, through the factor analysis of local culture, innovative product and global market by using the three group of different products, cultural products, Alessi products, and 2011 IF gold awards products. Then, a conceptual framework is proposed for defining, classifying, assessing, and modeling the design strategy for the cultural and creative industries. The conceptual framework consists of three main parts; local culture, innovative product and global market as shown in Figure 1.

3. METHOD

Based on the previous studies, this study involved using questionnaires’ interviews and MDS analysis to derive the key factors that affect the design strategy as shown in Figure 2. The study can be divided into three sessions. In session I, a literature review was used as a way to understand the relationship between localization and globalization, and to explore how local culture and innovative product influence global market. In session II, four professional designers and four design professors served as the subjects for interviewing to select stimulus products and attributes for the preference evaluation and similarity rankings. In session III, this study involved using MDS approach to study the key factors that influence design strategy. Fifteen attributes with their fifteen reference products from the session II were used to collect the data for the MDS analysis. Similarity ranking and preference evaluation data were applied to the MDPREF analysis.

3.1 Selecting stimulus products and attributes

The stimulus products came from three categories: cultural products, Alessi products and innovative products as shown in Figure 3. For the cultural products, in 2005, the National Palace Museum conducted a plan called “old is new” trying to transform the “old archive stuff” into “new modern products”, and collaborated with ALESSI to develop cultural products by authorized the archive staff of the National Palace Museum. The collaboration created a new approach to design “culture” into products for the cultural and creative industry. “The Chin Family”
was designed in 2006 for table wares Stefano Giovannoni of Alessi’s designers under the project of “old is new.” It is a typical cultural product design using the portrait of Emperor Chien-Lung in the Chin Dynasty archived in the National Palace Museum as the cultural design element. In Figure 3, P08 was chosen from “The Chin Family” as the stimulus product representing the group of cultural products, moreover, P01, 06, 10 and 15 were chosen from different cultural product design competition.

For the global market, Alessi products were chosen as the stimulus products because the product is “glocal” and well-developed in the global market. Hence, in order to explore the concept of glocalization in Alessi’s design strategy, P14 known as Mandarin was chosen as the representing Alessi’s products because the Mandarin was designed by Stefano Giovannoni, and the idea also came from the portrait of Emperor Chien-Lung in the Chin Dynasty. In addition, P03, 05, 07 and 12 were chosen from Alessi’s best sell of global products as the stimulus products.

For innovative products, the 2011 iF gold award products were chosen as the stimulus products because the German iF product design award is A globally recognized and is also well known as the Oscar Award in the design industry. The iF design competition awards was devoted to encouraging products with creative design elements to enter the global market. In Figure 3, P09 was chosen from 2011 iF gold award product as the stimulus product representing the group of innovative products, moreover, P02, 11, 12 and 13 were chosen from different categorize in 2011 iF product design competition.

Based on different innovation aspects, Orihata and Watanabe [6] generalized “market driven, technology driven, me-too and concept driven” as four categories for exploring product design innovation. Nevertheless, they neglected the vital aspect - “design”. For this reason, this study focused on “design driven” as the key issue to study the relationship between cultural and innovative products, and how to integrate into global market. After selecting the fifteen stimulus products of three categories, fifteen attributes were discussed and selected for fifteen stimulus products by eight professional designers or design professors, as shown in Figure 3. Thus, cultural attributes are local feature (A01), emotional design (A02), story-telling (A03), cultural meaning (A04), and aesthetic image (A05), respectively. For the innovative attributes, there are five attributes namely, innovation level (A06), design quality (A07), product function (A08), total image (A09) and material texture (A10). Finally, self-image (A11), pleasurable (A12), unique idea (A13), fashion (A14) and imagination (A15) are to show the marketing attributes.

### 3.2 MultiDimensional Scaling - MDPREF Analysis

Multidimensional scaling (MDS) was used as the main method to build the perceptual space. The main advantage of this method is that the tests are based on instinctive dissimilarity assessments which do not rely upon any predefined criteria or semantic scales. This method provides a spatial visualization of the perception of products. The preference and evaluation data were analyzed using MultiDimensional Preference analysis (MDPREF). The analysis is usually conducted on a matrix of averaged preference evaluations and converts the data into a visual perceptual preference space [21]. Using the perceptual space, the factors that affect consumer perception of innovative products can be studied and differences in consumers with and without design backgrounds in innovation product design can be identified. MDPREF is a vector model for constructing a perceptual space displaying attribute vectors. Like factors analysis, MDPREF analysis decides the adequacy of the number of spatial dimensions by referring to the relationship between the cumulative proportion of variance accounted for by the model and the number of dimensions. Using MDPREF analysis, the perception of innovation categories and innovative forms were separated according to the design background of the different subject groups.

A total two hundred undergraduate students volunteers participated in the various phase of this study. The subjects were four groups with different background, 52 subjects with design-related background, 49 subjects with humanity related background, 25 subjects with business related background, and 74 subjects with information related background as shown in Table 1. The subjects were between the ages of 20 and 40. Subjects were asked to evaluate each stimulus product with the fifteen attributes of the three categories namely, cultural, marketing and innovative attributes based on a nine-point Likert scale. Preference evaluations were conducted to evaluate the 15 stimuli products (Figure 1) with the 15 attributes of the three innovation categories. For evaluation of the innovation categories, each stimulus sample, the 15 attributes, and the rating scale were listed together on a single piece of paper. While subjects were evaluating the stimuli, pictures of all the

<table>
<thead>
<tr>
<th>Background</th>
<th>Subjects</th>
<th></th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td>Design Related</td>
<td>8</td>
<td>44</td>
<td>52</td>
</tr>
<tr>
<td>Humanity Related</td>
<td>9</td>
<td>40</td>
<td>49</td>
</tr>
<tr>
<td>Business Related</td>
<td>4</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td>Information Related</td>
<td>41</td>
<td>33</td>
<td>74</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>138</td>
<td>200</td>
</tr>
</tbody>
</table>

Table 1: Subjects in The Experiments
stimulus products were shown in a PowerPoint slide for their reference.

4. RESULTS AND DISCUSSION

4.1 Analysis of Preference data in Attribute Vectors

Similar to factor analysis, the number of dimensions was determined by referring to the relationship between the cumulative proportion of variance and the number of dimensions. Based on the MDPREF analysis, the proportion of variance for three factors were 46.6%, 38.2%, and 11.4%; totally they explained 96.2% of the variance of the subjective data pertaining to cultural, marketing and innovative attributes. The cumulative proportions of variance from one to three dimensions are 46.6%, 84.8%, and 96.2%, respectively. A sensible factor pattern was derived from 15 attributes as shown in Table 2. There are three groups of attribute vectors in Figure 4. One group is made of the attributes: “local feature (A01),” “emotional design (A02),” ”story-telling (A03),” and “cultural meaning (A04);” these attributes belongs to local culture representing “localization,” the other group comprises the five attributes: innovation level (A06) and design quality (A07) from innovative product group representing “globalization”, and the other three attributes are self-image (A11), unique idea (A13), and fashion (A14) which came from marketing attributes group representing “glocalization.”

MDPREF is known as a vector model attempting to identify a perceptual map displaying attribute vectors. The correlation of 15 attributes, which is the inverse cosine of the angle between any two attributes. Value of 1, 0, or -1 indicate an angle of 0°, 90°, or 180°, respectively, between vectors representing the relationships of the attributes. Table 3 shows the cosine of the angle between any two attributes. For example, the vector of attribute A1 (local feature) interests with A05 (aesthetic image), A09 (total image), A11 (self-image), and A13 (unique idea) at nearly a right angle for 87.1°, 88.8°, 89°, and 89°, respectively. The vector of attribute A02 (emotional design) intersects with attribute A07 (design quality) for 93.7°, and with attribute A13 (unique idea) for 89.8°. The vector of attribute A03 (story-telling) intersects with attribute A10 (material texture) for 89.4°, and with attribute A13 (unique idea) for 94.8°. The vector of attribute A04 (cultural meaning) intersects with attribute A06 (innovation level) for 92.1°, and with attribute A07 (design quality) for 89°. The vector of attributes A05 (aesthetic image) and A08 (product function) intersects at nearly a right angle (94.4°). Finally, The vector of attribute A08 (product function) intersects with attribute A13 (unique idea) for 92.5°, and with attribute A14 (fashion) for 91.6°.

![Figure 4: Preference Space from A Three-Dimensional MDPREF Analysis](image-url)
Figure 4 shows the preference space with the three vectors: A02 (emotional design), A13 (unique idea) and A08 (product function). From the above data, the attribute vectors A02 (emotional design) and A13 (unique idea) intersects at nearly a right angle (89.8°), forming two orthogonal attribute dimensions, while the attribute vector A02 (emotional design) is aligned with the X-axis. In addition, the attribute vector A13 (unique idea) intersects with A08 (product function) for 92.5°, while the attribute vector A08 (product function) intersects with A02 (emotional design) 95.4°. Based on the MDPREF analysis, the main factors affecting subjects’ preference evaluation in cultural, marketing and innovative attributes are identified as A02 (emotional design), A13 (unique idea) and A08 (product function), respectively, for constructing three dimensional preference space as shown in Figure 4.

4.2 Analysis of Preference data in Stimulus Products

Each stimulus product can be projected onto every attribute vector. Based on the output of the MDPREF program, a second score matrix file provides the values of projections from each stimulus onto each attribute in preference space: these projections show the average subject’s preference for each stimulus product with respect to the attribute vectors. Those attributes that have a similar order of stimulus products appear to have common factors and can be grouped together. Table 4 lists the values of projections (coordinates) for the MDPREF solution for stimulus product. Each stimulus product can be projected onto the three factors which show the average subjects metric preference of the products with respect to the factor. Figure 5 plots the stimulus products using the values of projection onto Factor I (X-axis) and Factor II (Y-axis), Figure 6 and 7 plots for X-Z axis and Y-Z axis, respectively.

Table 4: Stimulus Coordinates of The MDPREF Solution

<table>
<thead>
<tr>
<th>Stimulus Product</th>
<th>Factor I</th>
<th>Factor II</th>
<th>Factor III</th>
</tr>
</thead>
<tbody>
<tr>
<td>P01</td>
<td>.1837</td>
<td>.1987</td>
<td>.4390</td>
</tr>
<tr>
<td>P02</td>
<td>.1652</td>
<td>.4548</td>
<td>.6811</td>
</tr>
<tr>
<td>P03</td>
<td>-.0216</td>
<td>.2781</td>
<td>.0200</td>
</tr>
<tr>
<td>P04</td>
<td>-.4076</td>
<td>-.0704</td>
<td>-.1666</td>
</tr>
<tr>
<td>P05</td>
<td>.1372</td>
<td>-.0259</td>
<td>.2531</td>
</tr>
<tr>
<td>P06</td>
<td>-.3012</td>
<td>-.2516</td>
<td>.0231</td>
</tr>
<tr>
<td>P07</td>
<td>.2054</td>
<td>-.1087</td>
<td>-.0252</td>
</tr>
<tr>
<td>P08</td>
<td>-.3050</td>
<td>-.2055</td>
<td>.0272</td>
</tr>
<tr>
<td>P09</td>
<td>.2702</td>
<td>-.0165</td>
<td>-.1581</td>
</tr>
<tr>
<td>P10</td>
<td>-.1526</td>
<td>.2493</td>
<td>.0698</td>
</tr>
<tr>
<td>P11</td>
<td>-.1952</td>
<td>-.1768</td>
<td>-.2240</td>
</tr>
<tr>
<td>P12</td>
<td>.1180</td>
<td>.3016</td>
<td>-.3816</td>
</tr>
<tr>
<td>P13</td>
<td>.5631</td>
<td>.5604</td>
<td>.1045</td>
</tr>
<tr>
<td>P14</td>
<td>-.2534</td>
<td>-.1777</td>
<td>-.1047</td>
</tr>
<tr>
<td>P15</td>
<td>-.0048</td>
<td>.1189</td>
<td>.0411</td>
</tr>
</tbody>
</table>
A Design Strategy for Turning Local Culture into Global Market Products

The locations of stimulus products grouped together representing the products have similar attributes, while their locations separated away representing the products held different attributes. Four groups were identified in Figure 5. For the X-dimension (emotional design / localization), the stimulus products P9, P5, and P7 were grouped together along with the X axis, while P4, P6, P8, P11 and P14 were grouped together along with the X axis at the opposite direction. For the Y-dimension (unique idea / glocalization), the stimulus products P1, P2, P3, P10, P12 and P15 were grouped up with the Y axis direction, while the stimulus product P13 separated far away down the Y axis. For the stimulus product group, P8 from local culture group, P14 from global market group, and P9 from innovative product group could be taken as the reference stimulus products to explore the preference space. For example, the stimulus products of innovative product group scattered in the preference space as a triangle, P2 located at up-side Y-dimension expressing the strong attribute of “unique idea”; P4 located at the left hand side of X-dimension representing the strong attribute of “emotional design”; and P13 located far away down the Y-dimension showing the attribute of “me-too”.

For the Z-dimension (product function / globalization), in Figure 6 and 7, there are two groups of stimulus products separated along with the Z-dimension. The stimulus products of cultural and marketing attribute were grouped together at up side of Z-dimension as shown in circle, while the stimulus products of innovative attribute separated from the other group shown in a triangle. The plots of the stimulus products in Figure 5, 6 and 7 can be used to confirm the appropriateness of the preference space.

5. CONCLUSION

The power of innovation forces designers and managers to develop successful new products and services. For designers, the product is the most direct medium that connects the designer and the consumer, and the designer’s creativity must be transferred through product design to consumers. For managers, successful innovative products should have clear and definite properties and target markets. An innovative product is commercially successful only when it is accepted by consumers. This paper proposed an approach using MDS analysis to explore the relationship between local features and global market. The stimulus products are selected from three different attribute groups to study the relationships among local culture, global market and innovative product. Based on the MDPREF solution, A three-dimensional configuration is confirmed to construct a preference space. In Figure 8, the main factors affecting subjects’ preference evaluation could be identified as: (1) Localization dimension, which consists of cultural attributes including: local feature (A01), emotional design (A02), story-telling (A03) and cultural meaning (A4). (2) Glocalization dimension, which consists of marketing attributes including: innovation level (A06), design quality (A07), self-image (A11), unique idea (A13) and fashion (A14). (3) Globalization dimension, which consists of product function (A08) in innovative attributes.

Solomon [22] discussed and proposed a conceptual framework of the cultural production system which includes the set of individuals and organizations that design and market a cultural product. Based on the Solomon’s study, this study proposed a conceptual framework for turning “local features” to “global market” as shown in Figure 9. The system is comprised of attribute subsystem, cultural transformation subsystem, culture communication subsystem, and lastly to consumers. The attribute subsystem is responsible for generating and filtering new ideas.
The cultural transformation subsystem is responsible for selecting new ideas based on design strategy, making them tangible, mass producing these ideas, and then managing their distribution. The culture communications subsystem is responsible for giving meaning to the new “glocal products” and providing them with symbolic sets of attributes that are communicated to consumers.

The MDS analysis used in this study is a test of its utility as an approach to understanding the factors affecting local design and global market. This paper establishes a conceptual framework to provide designers and managers with a valuable reference for designing a successful cross-cultural product. There are some tendencies for subjective interpretation in the foregoing context, so it is expected that more specific and rigid methodology will be conducted to verify these results in the future.

REFERENCES

A Design Strategy for Turning Local Culture into Global Market Products

Chi-Hsien HSU
Chi-Hsien Hsu is a Doctoral candidate in the Graduate School of Creative Industry Design, National Taiwan University of Arts, Taiwan. He has nine-year working experience as a designer, research associate and lecturer. Furthermore, he is extremely interested in the Taiwanese traditional cultures and local specialty industries. So far, he has already published many articles and creative design products in this field.

Shu-Hsuan CHANG
Shu-Hsuan Chang is a Doctoral Student in the Graduate School of Creative Industry Design, National Taiwan University of Arts, Taiwan. He is also a Lecturer in Department of Commercial Design, Vanung University, Taiwan. He is good at commercial design, computer aid graphic design and art painting with 15-year experience of teaching in the school. Currently, he dedicates in the study of structural exploration related to consumers’ experience module.

Rungtai LIN
Rungtai Lin is a Professor in the Graduate School of Creative Industry Design, and is the Dean of Design College, National Taiwan University of Arts, Taipei, Taiwan. He is also the President of Taiwan Design Center. Professor Lin was President of Mingchi Institute of Technology, Taipei, Taiwan (1996-2002), and Chang Gung Institute of Technology, Tao-Yuan, Taiwan (2002-2003). He received his M.S. and Ph.D. degree in Engineering Design at Tufts University, MA, USA, in 1988 and 1992. Lin authored numerous publications, authored or co-authored over 150 papers, and presented over 100 papers at professional conferences throughout the world. His research interests are in Ergonomics in Product Design, Human-Computer Interaction, and Cognitive Approach in Design. Recently, his research has been involved in Cultural and Creative Product Design.