A Kansei Design Collaboration Platform in Taiwan

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Abstract:

Taiwanese researchers began research on Kansei design in 1999. Until now, there was no comprehensive study regarding the industrial needs for Kansei design. The first part of this paper summarizes the survey results from 86 companies, including design studios and domestic product manufacturers. These companies need support from Taiwan's research organizations in the following fields: trend and lifestyle research, design and market databases, rapid prototyping services, design talents, business matchmaking, etc.

Industrial Technology Research Institute (ITRI), a major non-profit research organization in Taiwan, established the ITRI Emotional Design Office (EDO) in 2013 at its new campus in Central Taiwan. EDO started their emotional design program to develop advanced emotional design methodologies and to provide assistance and services to companies in central Taiwan. It provides an open lab and functions as a collaboration platform that fosters collaboration between academia and industry. The second part of this paper covers the strategy plan to support industry.

Keywords: Kansei design, emotional design, industrial survey, collaboration platform

1. INTRODUCTION

Industry in Taiwan grew fast during the early 1970s. It was a period of export-oriented industrialization. Many manufacturing industries benefited from OEM and ODM business. Taiwan's industry gradually upgraded itself by advancing high-quality manufacturing technologies and lowering costs to enhance competitiveness and profitability [1]. With the growing threat of low-cost manufacturing and labor from Southeast Asia and China, it is necessary for Taiwan's companies to develop competitive products and to transform their business model from OEM, ODM to OBM. This transformation is challenging because manufacturers are used to the OEM model in which the focus is to drive costs down and to satisfy their clients' requirements. End-users' needs and requirements were not normally considered in their product development process.

As time moved on, customer's product expectations of also changed. In the experience economy stage, price is no longer the main concern. Expectation expanded to include branding, product

appearance, usability, and value. Consequently, understanding culture, lifestyle, user behavior, and addressing end-user's needs became more important for product development. Companies that shifted from the OEM to the ODM or OBM business models are gradually changing their product design strategy from manufacturing-driven to user-driven. Although manufacturing companies normally contract design studios for product appearance type of design, many of them formed in-house design teams [2] that adopted the emotional design concept and incorporated emotional design into their product development. As for design studios, the majority of the services provided are small scale, low budget types of product appearance design [3]. The types of design works and the opportunities for personal career growth are limited in design studios. This is why new graduates from design schools prefer working in manufacturing companies.

According to the ITRI's Industrial Economics & Knowledge Center (IEK), most design service companies in Taiwan are small-scale firms with around 10 employees. Insufficient human resources and lacking business opportunities from manufacturing companies created obstacles for them to develop new design skills and provide new services such as research on users and user behavior, ergonomic surveys, physiological and psychology measurements for industrial needs [4].

ITRI established their emotional design office (EDO) at its new central Taiwan campus aiming at upgrading the design capabilities and competitiveness for both manufacturing and design service companies. EDO started their emotional design program to develop advanced emotional design methodologies. It provides an open lab and functions as a collaboration platform that fosters collaboration between academia, industry and non-profit research organizations.

The purpose of the research stated in this paper was to investigate the needs of manufacturing and design service companies, and to develop strategic plans for the emotional design program to help industrial transformation.

2. INVESTIGATIONS OF CENTRAL TAIWAN MANUFACTURING COMPANIES AND DESIGN SCHOOLS

2.1. Subjects

In order to understand the needs of central Taiwan manufacturing, design service companies and academic resources, 86 companies and organizations were interviewed, including 70 manufacturing companies, nine design studios and seven design schools. The following is the type of the industry and the number of companies in these industries.

- Toy industry: three companies

- Healthcare industry (assistive technology): 23 companies

- Bicycle and accessories industry: 20 companies

- LED general lighting industry: 10 companies

- Automotive and accessories industry: 10 companies

- Other: four companies

Companies' needs for support are compiled into seven categories, namely: "Market and Industry Trends", "Equipment Services", "New Technology Information", "Emotional Design Database", "Design Methods and Tools", "Marketing and Channel", and "Talent Training".

2.2. Needs from Manufacturing Companies

Figure 1 shows the survey results for the needs from the 70 central Taiwan manufacturers. It

shows that the largest needs are in "New Technology Information" at 29% of which 84% are related to new technology integration. "Emotional Design Database" at 20% and "Design Methods and Tools" at 22% show there are strong demands for support related to designs. The total percentages of other needs are less in 30%: "Marketing and Channel" is 4%, "Equipment Service" 8% and "Talent Training" is 4%.
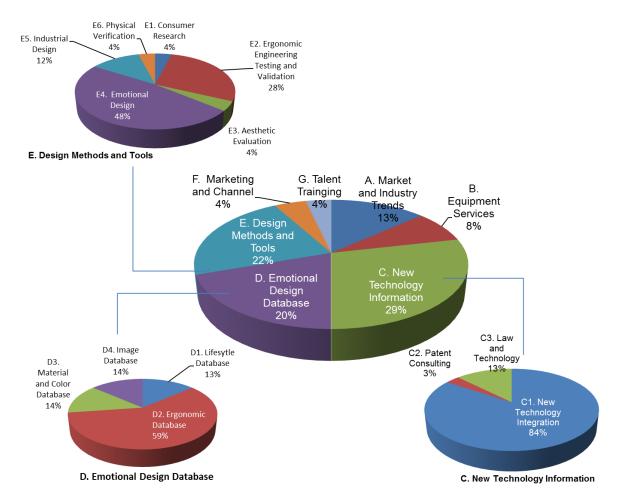

Figure 1: Desired services from ITRI EDO reported from manufacturing companies

The following further describes the needs in each category:

Market and Industry Trends (13%): Healthcare, bicycle and toy companies need the latest industry trends and international design information to set business strategies and to set directions for new product development.

Equipment Services (8%): Although only 8% of the needs are in this category, but the areas of interests are clearly identified. For example, the healthcare and bicycle companies like to have rapid prototyping (RP) services. Similarly, LED general lighting companies also need high-precision RP machines for lens development using transparent materials. They specifically asked for 3D optical simulation software and design software.

New Technology Information (29%): Integrating new technologies into new product design is very important for product's competitiveness. The companies have expressed

interest to know where to find this information and wish ITRI can provide them the technologies. Bicycle manufacturers wish to have new bicycle mechanism and new materials to improve the seat cushion for a more comfortable ride. Both bicycle and healthcare companies expressed the need for making lightweight products. Healthcare companies need advanced technologies for body-signal sensing and controlling, medical engineering, material science and electrical and mechanical engineering. Automotive companies need analytical methods and tools to test hydromechanics and applied mechanics. The toy, automotive and healthcare companies all expressed the need for safety verification.

Emotional Design Database (20%): Bicycle companies emphasized their need for an ergonomic study database relating to riding posture, especially in different countries. Healthcare companies are interested in an ergonomics database for walking aids and wheelchairs. For the toy companies, they needed lifestyle studies in different countries. Additionally, many companies showed strong desire for a good materials database.

Design Methods and Tools (22%): Bicycle manufacturers are looking for usability testing tools. The LED general lighting manufacturers want to know the relationship between human emotions and lighting. Vehicle lighting companies in the automotive industry want to understand the relationship between human emotions and optical pattern switching. In short, these companies are interested in ergonomic testing and validation services. Although emotional design is quite new to the surveyed companies, these companies are interested in knowing whether it can help in product design and product development strategies. As a result, the need for "Emotional Design" takes up 48% in this category.

Marketing and Channel (4%): Companies need a platform to expand into different industries, and to connect with resources for technical support and marketing consultation.

Talent Training (6%): Brain drain, or human capital flight, has been an increasing problem in many Taiwan companies. Companies face the problem of maintaining and recruiting talented people, and/or developing talents within the companies. They expect R&D organizations such as ITRI-EDO to provide training courses to bridge the gaps between the schools and industries.

2.3. Needs from Design Service IndustryCompanies

Taiwan's Ministry of Economic Affairs in response to the changing trends in product design, encouraged the industrial design service providers to upgrade from primarily color and shape design to incorporate new materials, service design and take into account of business strategies in their design process [2]. There are four types of design service providers in Taiwan. The primary business of most of the companies is concept and industrial design. Only a small portion of them do user research because such research demands high man power and cost. Another type of design service firms focus on user experience research. They provide their customers with business and product development strategies based on in-depth studies on user behavior. The third type of design companies provides services to companies that have their own brands. The forth type targets specific industries, for example, transportation companies.

Figure 2 shows the needs from the design service companies. Comparing to the results in Figure 1, some obvious differences should be noticed. The needs for emotional design database from design service firms are 36%. It is a 16% increase compared to the manufacturing companies. It

shows the design service industry has greater needs for a design database. On the other hand, design service firms are familiar with design technologies, therefore their needs for "Design Methods and Tools" is relatively low at 5%, a big drop from 22% from the manufacturing companies. Their needs in "New Technology Information" also dropped from 29% to 21%. "Market and Industry Trends" in Figure 1 and Figure 2 are the same. Demands for support in the "Marketing and Channel" are 5%. Both manufacturing companies and design service companies have less demand for support in the "Marketing and Channel" (5%). The survey also shows that "Talent Training" and "Equipment Services" are more important for design service companies than manufacturing companies.
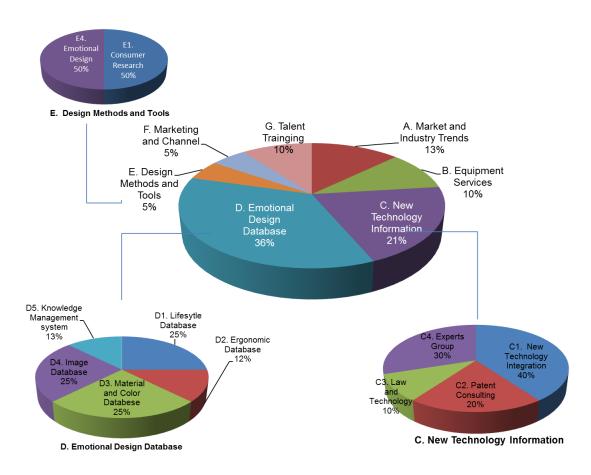

Figure 2: Needs of design service companies

Market and Industry Trends (13%): Because most of the design service companies are small scale, they don't have enough resources to link with global industries. Therefore, they requested global market and industry information of several industries.

Equipment Services (10%): For most design service companies, the need for high level 3D printers with professional technicians is the main requirement in equipment services.

New Technology Information (21%): They asked ITRI-EDO to build a platform to gather new technology resources and experts in various fields. Patent consulting services are also important in the design process; it helps understand technology trends and to develop their patent portfolio. It is also beneficial to know product regulations in advance to save time and

costs.

Emotional Design Database (36%): As mentioned earlier, this service is the most important for design service companies. The five types of requests mentioned were: lifestyle database, image database, materials database, ergonomics database, and knowledge management system. Designers have to consider lifestyle and user behaviors in different countries. Currently, some information is obtained from the client, and some from the internet. However, the information is interpreted by the designer's subjective experience. A lifestyle database can shorten the design process and fill the gap between designer and client. Designers also get ergonomic information from international papers. It is difficult for them to investigate the information in a new design project. The ergonomic database should include transnational human factors for various products. This database is also expected to include an image library of different cultures.

Changing the color and materials gives a different feeling. There was a strong need for a material database that includes diverse color pallets and material samples. Having access to the latest new material information and samples are important to many companies. Knowledge management system can help design companies train new designers.

Design Methods and Tools (5%): The need for design methods and tools is not as high as other needs. That is because design service companies are more concern about the extensive time needed for Kansei engineering process. ITRI-EDO's contribution for these companies is to provide more efficient methods and design verification tools to help them reduce the design process time and costs.

Marketing and Channel (5%): Only five percent of the needs are in this category. This is because design companies dedicated to serve the brand name companies generally have established good marketing and channeling by themselves.

Talent Training (10%): It takes about one year to train a new designer before they can work on a design project independently. Young designers often quit their job because they felt they were not getting the proper training to develop their potential. Consequently, the return on investment for training is low, which in return reduces companies' incentive to train new designers. For some companies, this situation leads to a downward spiral. Quickly bring up the skills of new designers is a very important task for many design service companies.

2.4. Design Schools Needs

Emotional design engineering has been studied in Taiwan's for many years. Seven universities with emotional design engineering curriculum were interviewed. ITRI-EDO initiated a forum with The Taiwan Institute of Kansei in 2013. All participants agreed that the study of Kansei engineering and its applications should not be limited to industrial design. Many other fields can also benefit from Kansei design engineering. Besides, most design schools are interested in long-term joint research programs using emotional design engineering for specific types of products. ITRI-EDO can assist academia to promote Kansei design.

3. EMOTIONAL DESIGN PROGRAM STRATEGIC PLANNING

To better serve industries in central Taiwan, ITRI-EDO's Emotional Design Systematic Platform (EDSP) will function as a collaboration platform where the design service industry, academia and

manufacturers work and contribute together through the open lab operation and get support from EDO.

3.1. Emotional Design Systematic Platform (EDSP)

Figure 3 shows the Emotional Design Systematic Platform (EDSP) structure. There are five service segments: Data Tank, Technology Discovery, Test & Validation, Tools & Methodology, and Consulting & Branding. ITRI-EDO will provide services and linkage with industry and academia based on these five modules.

Data Tank focuses on research and data analysis on lifestyle, consumer behavior, industry trends and market. Technology Discovery helps build three to five year technology roadmaps for industry and products. Testing and Validation establishes an open lab operation for product and usability testing. The Tools and Methodology module will construct general and customized emotional design tools and methodologies. The Consulting and Branding module will help industry define their business strategies.

Based on the survey results and the program resources, Data Tank, Testing & Validation, and Tools & Methodology are the top three priorities to be established.
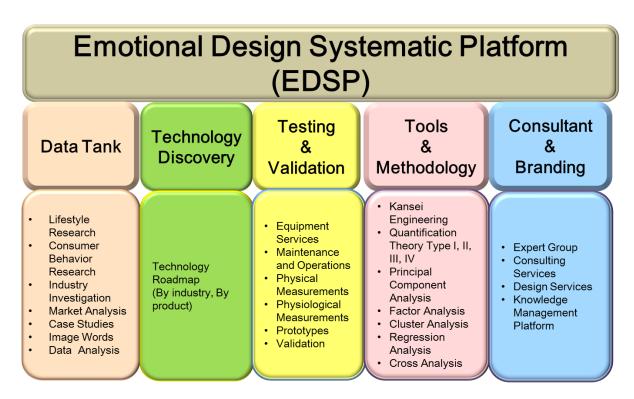
Figure 3: Emotional design systematic platform structure

3.2. Rapid Prototyping Center

There is a great demand for rapid prototyping service. The ITRI-EDO's rapid prototyping center has three laboratories: (1) User Research Laboratory provides facilities and support for user research. Eye-tracking, motion capture, tactile pressure measurement and behavior observation rooms will be established in this laboratory. (2) Prototype Making and Analysis Laboratories are

intended for making models, testing and validation. There will be two 3D RP machines, 3D Scanners and commercial design software in this laboratory. (3) The Material Laboratory establishes a linkage between new materials, especially those developed by other ITRI-R&D programs.

3.3. Taiwan Emotional Design User Alliance

Through The Taiwan Emotional Design User Alliance, manufacturers, design academia, design studios, non-profit R&D organizations, and ITRI itself network together. ITRI-EDO provides its members the technological and marketing information for emotional design. It will initiate a facility and equipment sharing program to assist the members in developing their products.

Connecting with international organizations is very important. ITRI-EDO welcomes the opportunity to work with international organizations and companies in countries with different cultural, lifestyles, user behaviors, and advanced design technologies.

3.4. Industrial Cluster and Living Lab Establishment

ITRI-EDO plans to build a design cluster in central Taiwan and bring local manufacturers, design service industries, academia, and R&D organizations closer to ITRI-EDO. A living lab will be built to experience and share the emotional design accomplishments.
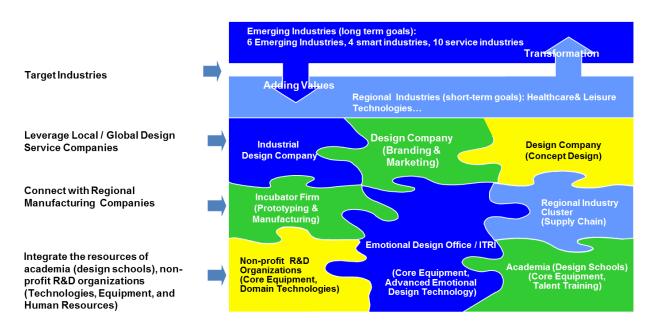

Figure 4: Model for creative and technology industrial cluster in central Taiwan

4. CONCLUSION

The research surveyed 86 companies and organizations to investigate their needs for emotional design. Based on the survey results, EDO-ITRI introduced a strategic plan and initiated an emotional design program in which an emotional design systematic platform is proposed which includes five major segments: Data Tank, Technology Discovery, Test & Validation, Tools & Methodology, and Consulting & Branding. EDO-ITRI will promote collaboration with industry and

academia and establish a creativity and technology industrial cluster. The aim of this program is to assist manufacturing companies and design service companies in central Taiwan to find product differentiations, create business opportunities for new product development, and to establish competitive design-driven innovation strengths for next generation products and industrial transformation.

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BIOGRAPHY

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