

Developing a Design Process Model for Cultural Creative Product: Case Study of a Table Lamp

Lee, Yi-Chang^{*a}; Lin, Chun Yu^b

^a National Taiwan Ocean University, Keelung, Taiwan

^b Soochow University, Taipei City, Taiwan

* Leewwqq@gmail.com

This study proposes a design process model for developing cultural creative products which includes four stages, i.e. association, concretisation, transformation, and implementation. The design process model was tested and applied via a realistic case study, i.e. designing a table lamp. The case study was conducted through a practice-based research approach, i.e. research through design. A series of four workshops, which were carefully organised to be a structured design decision-making process, were arranged to conduct the case study. Participants had to make critical decisions in the end of every workshop. Three different data collection methods were simultaneously applied during the workshops: observation, research diary, and interviews. It was demonstrated that the proposed design process model has the ability to facilitate the efficiency of design project and guide the participants to being identifying and using proper design methods in different design phases. The outcomes of the study show that the design process model is effective, and can be as a reference used for developing different types of cultural creative products.

Keywords: cultural creative product; design process; table lamp

1 Introduction

Facing pressure of global competition and era of knowledge economy, Taiwanese industries gradually moving towards design and branding strategy from original equipment manufacturer (OEM) and original design manufacturer (ODM). The concept of cultural creative industries is regarded by academia and Taiwanese government as one of the most important strategies to accelerate the progress of industrial upgrading and transformation. Moreover, it is also seen by industries as a good approach to increase profit and pursue innovation.

The concept of cultural creative industries was officially launched by Executive Yuan's project in Taiwan in 2002. Since then, the broad concepts of cultural creative industries has been criticised from time to time. However, it is clear that cultural creative industries have been developing very well in recent years in Taiwan. For example, many cultural creative industry parks, tourism factories, and cultural creative stores and companies are established in the past few years. We may say that the policy of cultural creative industries is a valid strategy to Taiwan.

Thus, numerous new products are launched into the related markets. Although much research has looked at cultural creative products design process and method (Lin, 2006; Chan and Lee, 2008; Wang and Hung, 2011; Shiu and Lin, 2011; Chen and Chen, 2014), very few attempts have been made to integrate decision-making approach into design process. Thus, this study develops a decision-based design process model for cultural creative product, testing and applying this design process model via a realistic case study, i.e. designing a table lamp. The case study is conducted via a practice-based research approach, i.e. research through design (Schneider, 2007). A series of four workshops were arranged to conduct the case study, and the research. The aim of this research focus on developing an efficient design process model for cultural creative products.

2 Literature review

2.1 Innovative cultural creative product

To thrive or even survive in today's competitive world, it is critical to nurture and develop innovation capabilities. Design plays a significant and important role to the creation of an innovative product (HMSO, 1995; Berends et al., 2010). A cultural creative product can be defined as an outcome of design activities in which cultural resources and elements are creatively and strategically utilised and transformed into new products (Lee, 2018). The primary purpose of developing a cultural creative product is very similar with developing any other new product, i.e. producing a competitive, innovative, and profitable new product. Product differentiation is a good strategy to fulfil the purpose (Gebauer et al., 2011). It is an effective approach to distinguish a product from its competitors on one or more basic performance or image features (Sharp and Dawes, 2001; Dickson, 1997).

However, to achieve product differentiation in today's competitive markets is difficult, especially in cultural creative markets. It is not enough to only put effort in products' forms or functions nowadays, because consumers are more demanding than ever. They are not only expecting reasonable price with good quality products, but looking for emotional values. Products could evoke positive and memorable experiences are more popular (Norman, 2005). Moreover, product has connections with cultures, community and environment could produce more emotional value to users and consumers (Shiu and Lin, 2011; Chen, 2017). We may say that embedding cultural connections in product design process is one of the important differentiated strategies in today's competitive marketplace.

It is clear that focusing on emotional connection (Norman, 2005; Suen, 2008), emotional benefits (Barrena et al., 2009), or emotional value (Desmet et al., 2001) might be more feasible and practical in the field of cultural creative products in terms of product differentiation. Furthermore, to imitate emotional features of a cultural creative product is not easy as coping the forms and functions. For example, storytelling is a good way to embed emotional feature into a product (Chiou, 2017). Experience created by a special story behind a product is not easy to be imitated.

Norman (2005) asserts that the reactions of users to design can be divided into three experience levels: visceral, behavioural and reflective. Visceral level experience in design is related to intuition. It is an immediate powerful reaction to a design and "includes the basic perceptual tasks of distinguishing objects and forming our true first impressions" (Bennett et al., 2007). The behavioural level is experienced during the use of a design. It builds upon output from the visceral level, and "focuses on issues such as readability and usability"

(Bennett et al., 2007). The reflective level refers to the higher levels of emotion and cognition. Design in this area is usually focus on analytic and cognitive skills, as Norman (2015) said: “It represents an attempt to make a design better by incorporating the experience of users and their knowledge of goals and objectives of the product or service”. To develop products with added emotional value need to carefully use the three design strategies (Norman, 2005).

Based on the innovation driven approach, product innovation can be categorised as two types: technology-push innovation and Market-pull innovation (Clark and Guy, 1998). In the design research field, there is another approach called “design driven innovation”, “design-led innovation”, “design inspired innovation”, or “design innovation”, in which concepts of new products stem from design thinking, or the design process, or the newness of new product development outcomes based on a design perspective (Cantarello et al., 2011; Rampino, 2011). Design driven innovation can be categorised into four levels (Rampino, 2011) (see Figure 1):

Aesthetic Innovation: is related to product recognition, i.e. to how much a product’s appearance differs from that of the competitors’ products.

Innovation of use: involves the degree to which a product improves or modifies its usage, perhaps adding new functions, as compared to products already on the market.

Meaning innovation: concerns the emotional and symbolic aspects of a product, i.e. what a product is able to communicate.

Typological innovation: relates to the deviation of a product from its formal archetype, i.e. a dominant design.

(Rampino, 2011)

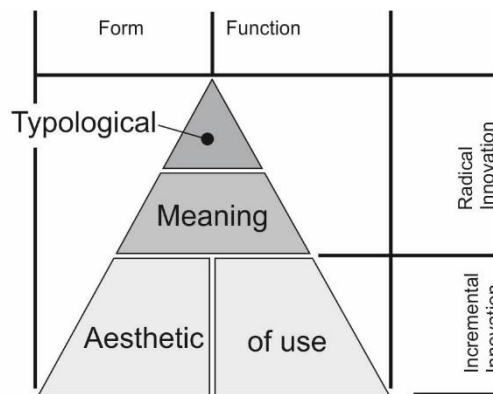


Figure 1 The innovation pyramid (Rampino, 2011)

In Rampino’s (2011) innovation pyramid, typological innovation means a dominant design which is a product’s basic architecture that has become the accepted market standard in a specific product category (Abernathy and Utterback, 1978), e.g. Apple’s ipad and iphone. It is interesting that Norman’s (2015) three design strategies for pursuing emotional value could be well integrated with and Rampino’s (2011) theory of innovation pyramid if we only look at the other three design innovation (see Figure 2). The two theories both insist on the importance of meaning in the process of experiencing products, i.e. giving reflective emotional level experience a high degree of opinion. To achieve the high level of emotional value, or design innovation, requires carefully developing products’ visual aesthetics and creativity of use. This is the key to sustainable success for cultural creative products.

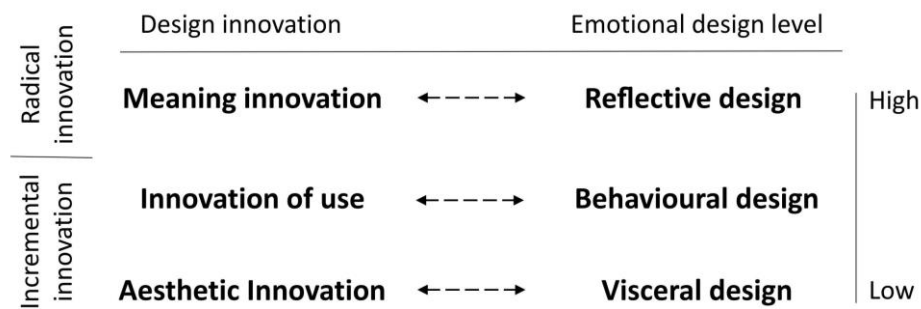


Figure 2 Design innovation and emotional design level

2.2 A design process model for cultural creative product

Since Taiwanese government promote the policy of cultural creative industries, how to develop successful products effectively and efficiently become a critical question. Thus, scholars have put forth a variety of design models and approaches for designing cultural creative products (Fan, 2004; Shiu, 2005; Lin, 2006; Chan and Lee, 2008; Wang and Hung, 2011; Shiu and Lin, 2011; Chen, 2012; Chen and Chen, 2014; Lin, 2015; Shiao, 2016; Chen, 2017). It is worth to be pointed that many of the models (Fan, 2004; Shiu, 2005; Chen, 2012; Lin, 2015; Shiao, 2016; Chen, 2017) were developed based on You et al.'s (1996) concept of image transforming design process which was on the basis of product semantics theories. You et al.'s (1996) design process included three steps (see Figure 3): association, transformation, and implementation. This design process model focuses on transforming abstract concepts to symbolic images to realistic product forms, closely linking the notion of designing a cultural creative product, i.e. creatively and strategically utilising and transforming cultural resources and elements into new products.



Figure 3 You et al.'s (1996) image transforming design process

To develop a successful new cultural creative product is not a singular event but a process in which a series of activities are linked, providing a framework for controlling chaos without precisely dictating each step (Gaynor, 2002; Trott, 2005; Vogel et al., 2005). Although You et al.'s (1996) design process is divided into sequential three phases, its framework does not provide designers or design teams with sufficient guidance to facilitate decisions for improving design teams' operation. Lee (2015) assert that the key to achieving successful innovation is to identify critical design decision-making points and manage the design process effectively. Roger G. Cooper (2000) proposed an extensively accepted model for new product design, namely, the stage-gate process (see Figure 4). Stage is the activities of design, and gate plays a guard rule to judge and evaluate the result of front stage is whether good enough to move to next stage. Gate serves as the quality control and Go/Kill check point in the process. The concept of stage-gate model can be integrated with You et al.'s (1996) three steps design process, i.e. providing a framework that embedding design decision-making points for effectivity and efficiently.

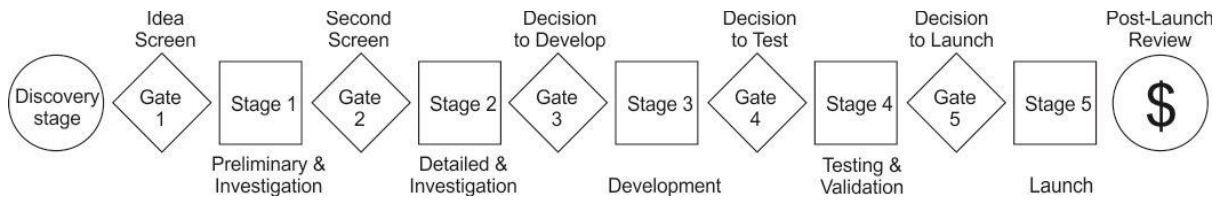


Figure 4 Cooper's (2000) stage-gate model

Design is a carrier of innovation by which creativity may occur during the design process. Aristizabal (2012) states that divergent and convergent thinking skills are both important aspects to creativity. According to Lee (2015), divergent and convergent thinking are adopted interchangeably during design process. You et al.'s (1996) design process model lacks a mechanism to manage divergent and convergent thinking. The British Design Council (2006) proposed a design process based on in-house research studying eleven leading companies: The "double diamond" design process model (see Figure 5). The model is divided into four distinct phases, Discover, Define, Develop and Deliver. It presents the divergent and convergent nature of the stages in the design process. In the discover and develop stages, the design team would attempt to find opportunities and solutions as soon as possible while deciding which solution should be progressed, and focusing on problem-solving in the define and deliver stages. The structure of double diamond design process provides a guide to invoke divergent and convergent thinking in different design stages.

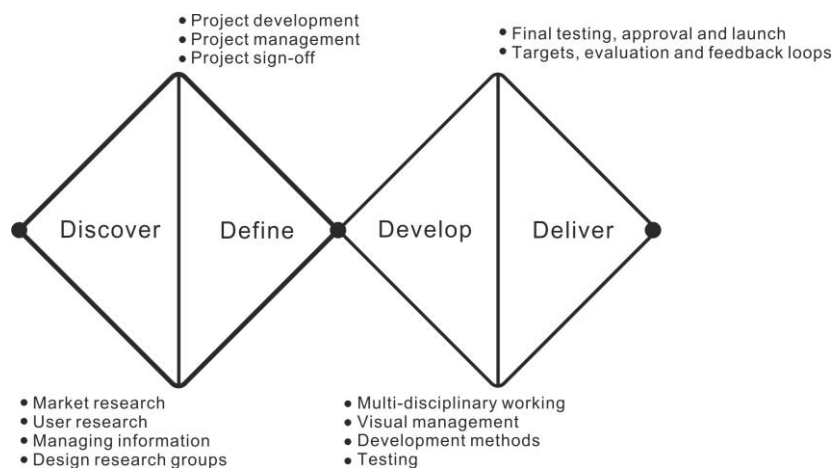


Figure 5 The double diamond design process model (British Design Council, 2006)

As mentioned above, the three design process models are all demonstrated as practical and effective models, and can be combined into one framework. Therefore, we propose a design process model based on You et al.'s (1996) image transforming design process, embedded the concept of critical decision-making points from Cooper's (2000) stage-gate process, and integrated the concept of divergent and convergent thinking guideline from The British Design Council's (2006) double diamond design process (see Figure 5). This design model includes four stages (see Figure 6):

(1) Association: is the first design stage in which the main purpose is to explore and describe experience, ideas, memory, and perception of the design subject, i.e. reflecting available cultural resources. In this stage, design process mainly relies on divergent thinking supplements by convergent thinking because this is a creativity-oriented stage. Design team discovers and reviews the important issues and true value of the design subject throughout

associated techniques, such as mind mapping and concept mapping. Resulting creative ideas will be screened before starting the second stage. Furthermore, the new product's preliminary design or design specification is defined in this stage.

(2) Concretisation: is the second stage of design process which mainly relies on convergent thinking supplements by divergent thinking. In this stage, the main activity is to concretise abstract ideas, defining the design objectives by using visual image approach, such as mood board and image positioning map, to delineate, particularise, and exemplify the selected abstract concepts into some concrete representation. The design objectives usually involve some positive emotional expressions the design team would like to achieve.

(3) Transformation: is the third stage in design process which mainly relies on divergent thinking supplements by convergent thinking. In this stage, the main activity is to visualise and symbolise concepts from selected ideas and images to simplified graphics to feasible product forms via free-hand sketching or computer software. This is also the phase which has been described as a "black box" stage (Rowe, 1987; Jones, 1992; Won, 2001), in which ideas appear without evidence or identification of the source (Kurtoglu et al., 2010).

(4) Implementation: is the final stage of design process which mainly relies on convergent thinking supplements by divergent thinking. In this stage, the main activity is to develop selected product concepts into products or real scale prototypes. Product form details, structure design, colour plan, and material selection are all finished in this stage. In some situations, design team also needs to consider issues of production.

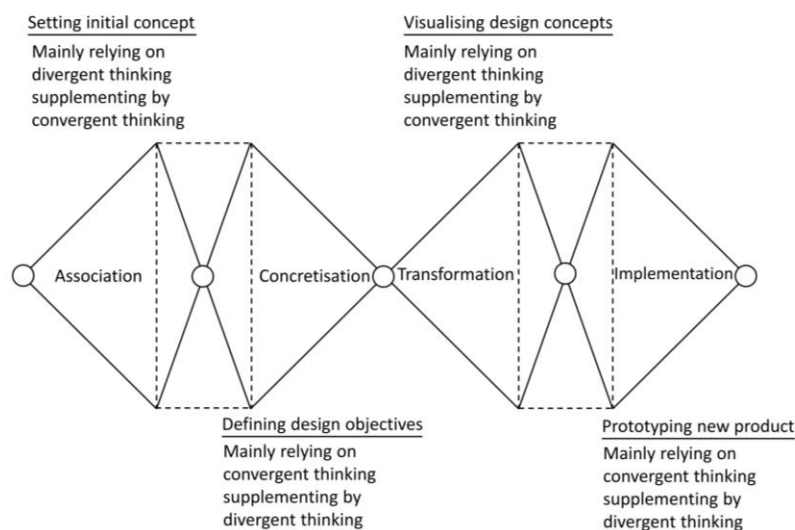


Figure 6 the four stages of design process of this study

3 Methodology

Based on research through design approach (Frayling, 1994; Zimmerman et al.2007), an empirical study was designed to implement and assess the proposed design process model. Literature review and case study are employed as main research methods. The literature review focuses on design process model, the relationship between innovation and cultural creative product. The case study was conducted via a series of four workshops at a university in north Taiwan to understand the participants' experience of the design model and to explore themes that will underpin the future development of the proposed design

process model. Twenty novice designers as participants attended the workshops to develop and prototype a cultural creative product, i.e. a table lamp, based on four design stages. According to the four sequential stages of the design process, the four workshops were carefully organised to be a structured design decision-making process. Each workshop has its specific outcomes. Participants had to make critical decisions in the end of every workshop, i.e. critical decision-making point. Thus, data collection was conducted during the workshops alongside several other techniques, such as a research diary, observation and interviews. Finally, analysing and synthesising the data for refinement that completed the current model.

4 Case study: from ocean image to a cultural creative product

In this section, a new product development project using the proposed design process model in a series of workshops is shown as an example case. Based on the four stages of the design process model, four workshops were held in sequential weeks in Keelung, Taiwan as the case study to prove the practicability of the model. Twenty participant design team members were all novice designers, i.e. year 3 students, from Taiwan Ocean University. The assignment given to the design team was “developing a cultural creative product inspired from kelp, analysing and applying image of ocean to product design”. In addition, this new product would be used in a small kelp museum for the purpose of public education. In the following sections, the case study is reported to document the details of the design process.

4.1 Association stage: setting initial concept

4.1.1 Symbolising ocean image to evoke environmental sustainability

Taiwanese, including the aboriginals and the ancestors from the Mainland China, have a long relationship with ocean and believe they have the gene of ocean in their bloods. Taiwanese are proud of their ocean culture. Thus, Taiwanese called ocean “Mother” because it provides plenty of natural resources. However, it is over exploited, and has been sacrificed for the demand of economy growth in the past fifty years. Everyone knows the fact that ocean pollution is getting more serious, and the marine life is also getting more endangered. However, we are still damaging the ocean today.

For example, Taoyuan Guanxin algal reef will be jeopardized by Chinese Petroleum Corporation’s (CPC) new liquefied natural gas (LNG) terminal (United Daily News, 2018). Many scholars and activists revealed that the location of CPC’s new LNG terminal will absolutely damage the algal reef and its ecosystem, but the government does not stop the plan and is still evaluating the cons and pros (Lin, 2018). Moreover, according to their research, Lin (2018) found that not all the residents care about the controversial issue and their environment. It is possible that they may not understand the value of Guanxin algal reef, or they perhaps are used to receive feedback money from CPC (Lin, 2018).

It is clear that we need to put more efforts on marine conservation education. Even the Taiwanese government launched “An Overview on the Ministry of Education’s Marine Education Policies” for improving the overall quality of the population in terms of ocean consciousness in 2012. Many Taiwanese are not conscious of the importance of sustainable ocean environment. Facilitating marine education is not only the government’s responsibility, but a responsibility of all citizens. Thus, the design team hopes to contribute on increasing the consciousness of ocean sustainability via developing a new product with symbolic

ocean images by which users might reflect on ocean sustainability issues in their daily life when using the product.

4.1.2 Developing a table lamp using kelp as material

Kelp, also called algae, is one of the important ingredients in Taiwanese cuisine. It is very popular in Taiwan because it is tasty and healthy, and its reasonable price. The design team utilised free association method to seek innovative opportunities and initial ideas during the very beginning stages of the design process in terms of kelp and ocean related information. Divergent thinking is dominant in the association stage when exploring initial ideas, providing as much as possible information for setting the initial framework of the new product. In this stage, the design team discovered a connection between kelp and sunlight which presents concepts of healthy and energetic. Therefore, the design team decided to develop a table lamp which using kelp as one of its materials or components by which users can be inspired by the appearance of the lamp and the interaction effects triggered by switching on the light. Mind mapping technique was used during this workshop, helping design team to exploring, seeking, and recording ideas (see Figure 7).

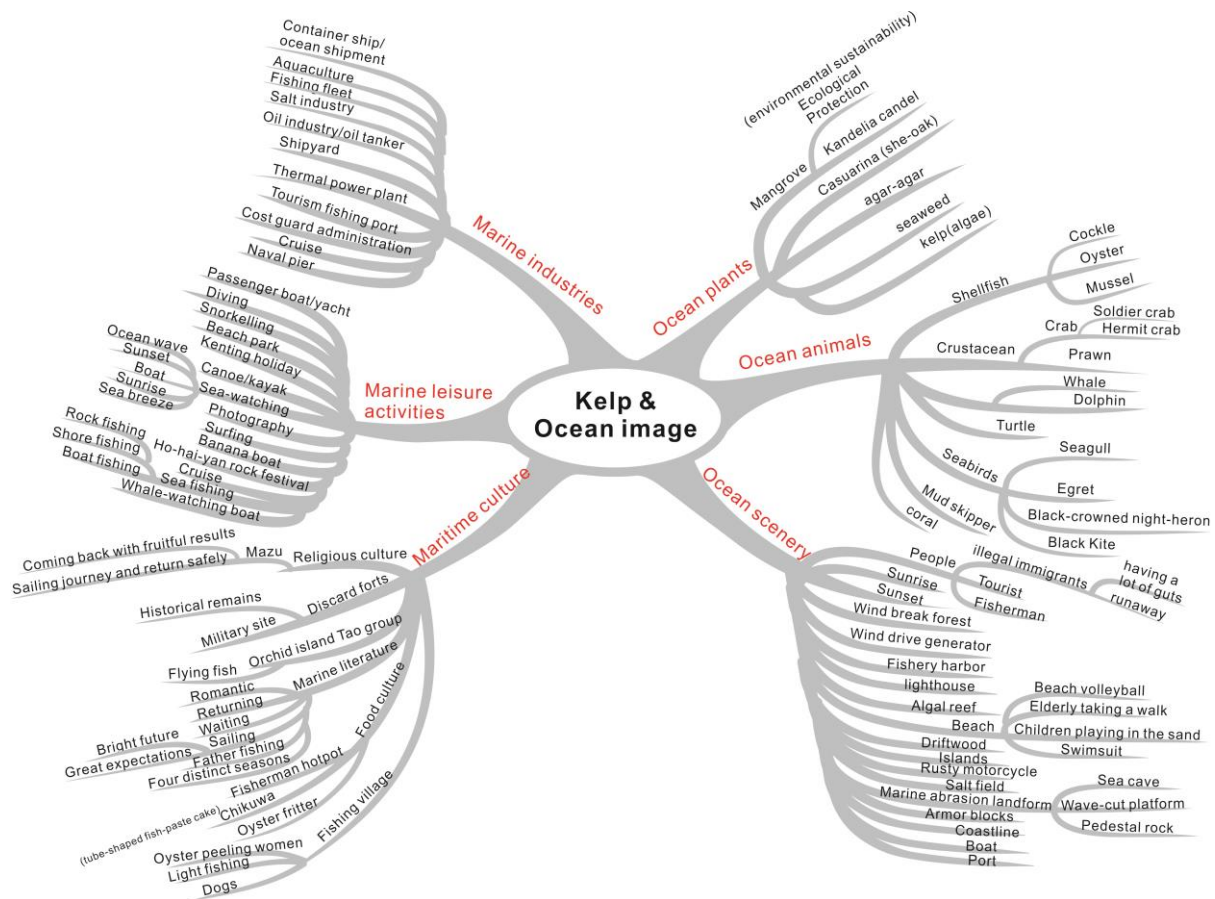


Figure 7 Using mind mapping techniques to exploring, seeking, and recording ideas

4.2 Concretisation stage: defining design objectives

Convergent thinking is dominant in the concretisation stage as the main activities is defining design objectives by concretising abstract ideas into more solid media. After analysing the ideas generated from the previous stage, the design team found three key concepts which have positive association to users and suitable to the direction of the design project as

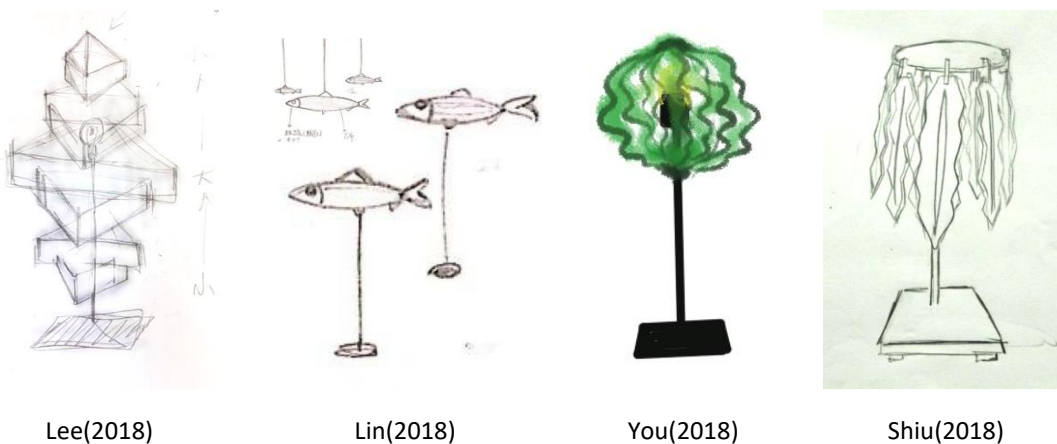
follows: hopeful, sustainable, and healthy leisure. Then using the three concepts as themes to compose mood boards for the design team's reference in the following stages (see Figure 8). The purpose of the mood boards is to inspire the design team to develop more creative and feasible ideas in the transformation stage. The three positive emotional terms were also the goal to achieve, i.e. delivering the emotional connections to users.



Figure 8 Using mood boards for inspiration

4.3 Transformation: visualising design concepts

This is an important stage in design process in which abstract ideas are transformed into concrete forms. The design activities is complicated and could be a iterative process in which divergent thinking and convergent thinking frequently interchange. The design team used their presentation skills to visualise and symbolise concepts from their mind which related to the three key concepts (see Figure 9). In the meantime, they also need to consider the basic structure of the product, possible way of manufacturing, and which parts of the product would be formed by kelp materials etc. In this very creative design activities, pursuing the core aim of the design project, i.e. using kelp as parts of materials, is a very important criterion, but feasibility and aesthetics are also important.



Lee(2018)

Lin(2018)

You(2018)

Shiu(2018)

Figure 9 Using presentation skills to visualise design concepts

4.4 Implementation: prototyping new product

Convergent thinking is dominant in this stage. The implementation stage can be divided into two sub-stages. In the first sub-stage, the design team focused on details design and modifying structure by using 3D computer software. Simulating the new product is an important task in this sub-stage (see Figure 10). In the second sub-stage, prototyping the new product is the main task. In this sub-stage, the design team needed to make the final critical decisions by verifying aesthetics of the form design and feasibility of the structure. Finally, four table lamps were selected to be displayed in a small kelp museum for the purpose of public education (see Figure 11). The four lamps all adopted kelp as partial materials which is symbolic of healthy. The light can be seen as a symbolic of positive and hopeful. The forms of the lamps are delightful. They do not only create aesthetic pleasure but evoke users' conscious of the importance of sustainable ocean environment especially when users turn the light on.

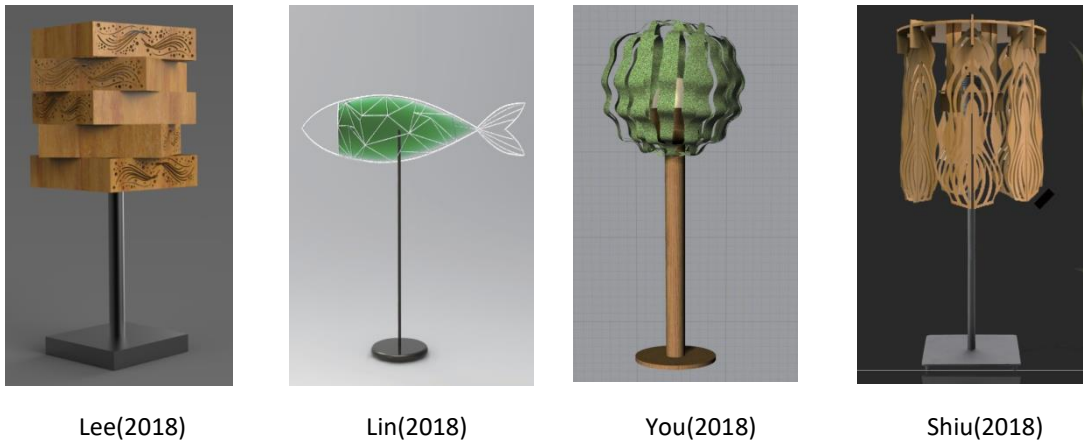


Figure 10 3D Computer software presentation



Figure 11 The prototypes of table lamps

5 Discussion and Conclusions

This study developed and tested a design process model which based on You et al.'s (1996) image transforming design process, embedded the concept of critical decision-making points from Cooper's (2000) stage-gate process, and integrated the concept of divergent and convergent thinking guideline from The British Design Council's (2006) double diamond

design process. The proposed design process model includes four stages: association, concretisation, transformation, and implementation. In the end of each design phase, a critical decision-making point is set to facilitate and expedite design process. In order to verify the feasibility of the proposed design process model, a series of four workshop were held to develop a kelp table lamp as the case study. It was demonstrated that the proposed design process model has the ability to facilitate the efficiency of design project and guide the participants to being identifying and using proper design methods in different design phases. The outcomes of the study show that the proposed design process model is effective and can be as a reference used for developing different types of cultural creative products, and furthering educational training. It was evident that the workshops were fruitful when participants keep adopting the method for other design project.

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About the Authors:

Dr. Yi-Chang Lee: is an Assistant Professor in department of Cultural Creative Design Industries at National Taiwan Ocean University, Taiwan.

Dr. Chun Yu Lin: is an Assistant Professor in Department of Social Work at Soochow University, Taiwan.