

Developing Native Materials of the Green Craft Considering Sustainable Development

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ABSTRACT—*The purpose of this study is to research thoughts on green and native materials of the culture industry in Taiwan. Initially, we discuss the eco-material study, green demand and then analyze sustainable development conveys respect “Design Anthropology” that can provide new thinking for the crafters who engage in eco-related cultural industries. This research investigate Taiwanese aboriginal crafters in their workshop using qualitative interviews who applied natural materials for craft practices. This study looked at material design principles as well as sustainable and ecological perspectives at what material learning is and how it might play a role in the creative thinking process. The innovative thinking matrix of cross matching “story concept and material concept” in multidisciplinary filed of design anthropology. As a result, this study takes “green design” thinking as a basis to establish a set of material designs and assist designers in examining the environmentally friendly in the cultural industry.*

Keywords—Design Anthropology, Native Materials, Green Craft, Culture Industry, Sustainable Development, Circular Economy Value

1. INTRODUCTION

The huge market potential for cultural goods has attracted chemical companies, plastic factories and electronics makers to invest in this field. Goods materials are very likely to become part of fashion and these businesses are rapidly developing. The material revolution has to rethink environmental protection in the future and material thinking must re-examine design. It seems necessary to reconsider or redefine the materials between the cultural industry, sustainable principles and environmental protection. What is the future direction of the cultural industry? It should certainly break through conventional politics, but retain the benefits of green craft approaches consolidated. How can the crafters stay abreast of advancements in information technology and find their own new directions and markets? These are questions related craft businesses ought to ponder. The United Nations Educational, Scientific and Cultural Organization (UNESCO) had an excellent opportunity to develop its approach to poverty eradication through handicrafts, especially in the poorest women. After all, the final goal of the cultural industry is to make goods that can take “Sustainable Development” to the human environment.

Material goods are the manifestation of culture and of civilization, as well as the integration of artistic expression and personal aesthetics. Material goods also exhibit one's perception of life and quality, and this display of one's emotional perception can draw resonance. The “green design” can allow the designer to apply this logic in “material design” to connect, assemble, and design to guide the users' thought and satisfy the users' product experience. Therefore, the craftsmanship tends to have qualities and excluded from this new use of creativity (O'Connor John-Joseph, J. Art 2006).

Williams mentioned elimination of waste begins by the design process; reusable materials should be chosen to extend the value of materials (Williams 2005). For this reason, this study encourages the use of natural materials in artistic design to ensure green design that adopts to the cultural, environmental and social changes so products can ultimately meet the expectations for environmental sustainability. It also explores how to consolidate material design through the

“Sustainable Development” approach for the craft designer to empathize with the crafters and establish principles of material evaluation that are in line with both the demands of users and the concept of green design. This is why the cultural industries are practical example of the symbolic and material of the hybrid and complex relationships between production and consumption (Pratt 2008). In this study, natural materials and sustainable concepts are discussed in the hope works of design, apart from meeting their elemental purposes, can also fulfill the “sustainable function”. A successful cultural goods designer not only seeks solutions for “culture” issues when working on a design, but also tries to convey certain “materials” outside the expected elements by applying the green-design approach and sustainable techniques to create a product that can move and convince users for consumption.

2. LITERATURE REVIEW

2.1 Perspective of “Design Anthropology”

Halse (2008) pointed the Design anthropology challenges the reification of concepts such as domain, organization economical etc. As handicrafts are a part of the culture of a nation or ethnic group and represent a key component of socio-economic life. Economic success and societal benefits can be expected by bringing the creative and the material communities closer together. Richard (2007) argued the crafts sectors offer a level of importance in developing countries. As with nature, it may well be efficacious for craft activities to be touched by hands rather than being machine-made; what is more, the crafting systems intertwines with traditional craft skills of home economics (Wildman 2015). An important force in creating physical products and building rural social culture has been established (Le 2009). Accordingly, the green economy takes an anthropocentric perspective. This perspective not only centers on humans, but also nature’s own sustainable resources that humans must take advantage of to assist economic growth (Gudynas et al. 2011). A creative approach in conceiving, developing, producing, using and recycling materials can be effective in strengthening the competitiveness and success. As a consequence, the role of green design in the crafter’s view will be to help think and take care of needs in people’s lives as well as to continue to improve the efficiency of context (local story) and use factor (material design). Green products are often associated with nature. These types of products are considered earth-friendly if they are biodegradable, meaning they pose no threat to the earth and environment.

The Taiwanese craft industry is gradually moving toward the development of green and eco-friendly craft products that are bound to be mainstream in the future. This has also made designers and educators begin to mull over the new chances for and further directions of crafts. For instance, the National Taiwan Craft Research and Development Center has recently made unsparing efforts to promote “green and eco-friendly crafts” by integrating nature and arts to create the drive to push sustainable development of contemporary crafts. It has also examined the excess in cultural and creative products from the angle of green crafts. The issues are no longer limited to craft values, but also include the development of more humanistic and sustainable approaches of education to discuss the nature and significance of the sustainable development of mankind. According to interpretations from the National Taiwan Craft Research and Development Institute (2012) mentioned that green crafts refer to (1) manufacturing crafts that consolidate resources, consume less energy, use less consumables, and produce no waste, contamination or public nuisance; whereas green products refer to recyclable and reusable industrial products that create no pollution or public nuisance; (2) As solvents and sandblasting are not used, green crafts are particularly beneficial to environmental protection.

2.2 Presentation of “Design Anthropology”: Green products

Green products are also applied to design idea for processes and four cardinal principles need to be observed. (1) Provide a good conceptual principle (Visualize): A good conceptual principle allows the user to know in advance the results of user demand. If you do not have a good conceptual principle, the user will only say in accordance with the others that they do not understand what impact their consume concept in the mind. (2) Natural material (Friendly): The choice of material is an important step in the design process. The materials designers select affective forms of the eventual products. Therefore, the choice of material requires careful evaluation. Different materials give dissimilar mental or physical perceptions and also convey different connotations and senses of the value of products. In other words, materials play an important role when a product is presented. (3) Consolidated green knowledge (Sustainability): Besides meeting everyday life needs and presenting the ecological characteristics of the materials used, aboriginal cultural products should also be able to reflect the demand for green consumption and have practical environmental protection functions or awaken eco-consciousness. (4) The sensory qualities of cultural products (Reasonable): Designers should be stimulated to use appearances, colors, textures, materials, green knowledge and spiritual contents to convey stories to consumers through green packaging and create resonance by using texts, colors and materials that can lead to interaction and sharing of cultural learning for globalization.

2.3 Sustainable Development” conveys respect “Design Anthropology”

Helena (2013) mentioned sustainable development brings forth the immense challenge of combining innovative ideas regarding design, materials and products with non-polluting processes and technologies, conserving energy and other

natural resources. Sustainable development (SD) is based on obligations to nature and the requirements of human welfare (1996). European Commission (2012) promote sustainable and responsible approaches to reduce consumption and the principle of circular economy of material. In the general SD context of moving towards sustainable production and consumption, environmental issues should be managed throughout all stages of the product life-cycle. This can minimize the overall negative environmental effects of products and their manufacturing. Environmental concerns such as performance, quality and safety must be integrated with product development ; The new ideas and the conception of new products, connect players along the value chain, and speed up access to market. Dryzek (1997) argued the discourse of SD is connected to society, nature, and economies and their relationships. In this study, Humanistic care continues to be an important natural concept of sustainable development; Trusted materials is an environmentally friendly concept; Provision of meaningful messages and a responsibility to crafters are necessary; A unique culture is also concerned with sustainable concepts. Through the green design principles, the morality and responsibility of the crafters for environmental protection can be cultivated.

3. RESEARCH METHOD

The study method adopt on qualitative interviews with the crafters. To discuss examples of cultural goods with green design in which sustainable value has been applied; To explore how the crafter applies green materials in cultural products; To establish a “natural material design principles” designated for bag design, as well as help designers evaluate the demand for material experience in the eco-future (Halse 2008).

3.1 Understanding Context

A designer can look at people and problems separately through “Externalization” to ponder the influence of problem descriptions for the user and which part of the user’s behavior may be affected. “Transformation” means finding the main axle and branches of the local story through the progression of the local story. The crafter finds new meanings and possibilities of further development among the branches. “Reformation” refers to the crafter’s choice of available solutions in the new meanings and the possibilities of further development to address the problem and rewrite the local story or come up with new developments. Application of narrative design thinking as the foundation of green design takes place after the designer has observed the user’s environment and behavior, so she can fully utilize her imagination and make up a local story to convince herself, as well as the user, to produce a better design. A narrative mode gives rise to: good stories, gripping drama, believable (though not necessarily “true”) historical accounts. The designer should also be able to add sensible thinking and expressive thinking in narrative design sensible thinking enabling the local story to touch and explain things for the user, as well as emphasize only imagination and cultivation of sensibility are the focus of narrative thinking in green design. Recognizing that people interpret their lives according to the cultural narratives available to them, narrative analysts focus not only on the “simple” telling of stories but also on the story’s underlying assumptions (Richards, 2007). The strategy of green craft design is the concept of also consolidating narrative design approaches with the cultural code levels. Especially, this study focus on Design Anthropology moves from observation and interpretation to collaboration, intervention and co-creation. Its practitioners participate in multidisciplinary design teams working towards concrete solutions for problems that are sometimes ill-defined (Wildman, 2015).

3.2 Statistical analysis of Questionnaire

This study also performed to ask 60 randomly selected consumers what characteristics they thought materials for green crafts should have and the percentages of different materials should be in green products (Table 1). The objective was to establish references for future development of green craft design and the results were as follows (Table 2):

Table 1: Products Using Green Materials Should Be According to Interviewees (Consumers)

<i>Characteristic</i>	<i>No. of Concurring Interviewees</i>	<i>Percentage (%)</i>
Use of low-contamination materials	34	27.2
Use of reusable materials	24	19.2
Reduction of material weight	9	7.2
Reduction of production procedures	9	7.2
Reduction of manufacturing waste	16	12.8
Consolidation of product functions	8	6.4
Maintainability and reparability of products	8	6.4
High stability and durability	16	12.8
Others	1	0.8

Table 2: Percentages of Applications of Green Materials Should Be According to Interviewees (Consumers) %

	<i>Furniture</i>	<i>Dining Ware</i>	<i>Lights</i>	<i>Decorations</i>	<i>Bag Accessories</i>	<i>Ornaments</i>
Bamboo	18.4	18.4	7.9	26.3	13.2	15.8
Wood	23.3	14.4	15.6	20.0	10.0	16.7
Clay	8.7	21.7	13.2	30.0	13.2	13.2
Paint	0	0	0	100	0	0

4. RESEARCH ANALYSIS

For this study, Taiwanese aboriginal craft workshops were interviewed to understand the green materials from natural resources they had jointly developed and used. Kao etc. also emphasized the importance of the green materials aboriginal craft designers use and the products in which such eco-materials are applied, including the following items: (1) Bamboo and false staghorn fern: woven bamboo vessels, decorations, and decorative bells; (2) Rattan, rush, rice straw: woven rattan vessels, and bag accessories; (3) Rock (shale, hematite): colored totem designs, home decorations, placemats; (4) Ramie: weavings (fabric, threads); (5) Soft clay: colored totem designs, figurines, picture frames, badges, mugs, decorations; (6) Boar tusks: clothes and hat accessories, necklaces, hanging decorations; (7) Animal bones and horns: clothes and hat accessories, necklaces, hanging decorations; (8) Wood ash: vegetal dye for fabrics; (9) Cassava: vegetal dye for fabrics; (10) Minerals (black mud): dyes for fabrics; (11) Wood: wooden totem carvings, decorations; (12) Driftwood: home decorations; (13) Dye yam: vegetal dye for fabrics; (14) Pearl barley, jumby beans, rosary peas: handmade ornaments; (15) Tree bark, betel nut palm: clothes accessories, light accessories, coasters; (16) Recycled resources (discarded components, packing PP straps and plastic strings): woven vessels, bags, decorations; (17) Dry leaves, coconut leaves, corn leaves, beech leaves: home decorations, handmade ornaments; (18) Fruits, coconut shells: home decorations, handmade decorations; (19) Seashells: home decorations, handmade ornaments; (20) Dye paste: leather dye.

This study show the survey samples and interview questions. Example: 47-year-old female, work experience 11 years, free crafter (Figure 1):

I hope to show local culture, and I explore how they express natural design. I think the material, local story, symbol, colors, meaning, expressive, aesthetic, etc., When I feel like that I just tell them how to deconstructivelocal story, then try and say something about different stories to design. You know, try and be positive...get them to think about the influence of the environment and that material really well. It gets them thinking. When they evaluate it, they realize the effect it would have. So that is good. To understanding the connection between our legends is important. If there is a feeling to the local story, it seems to help the design. It impresses and touches me, and makes me willing to show the green product and kept my economic capable stat.



Figure 1: The Yi Jiang creative workshop



Figure 2: The natural materials for craft practices

(https://www.youtube.com/watch?v=R0U_XBSrj1k)

The natural materials for craft practices (Figure 2) also exhibit the local community’s perception to toward life and this display of the people’s emotional perception. As expected, this development that can draw resonance. The concept of SD is used to analyze which innovations will have the greatest impact on green craft design and to explore how to consolidate environmental effects through the use of native materials to develop empathy with users and establish ecological perspectives that are in line with both user demands and the green design concept. A successful craft designer does not only seek solutions for “functional” issues when working on green design.

4.1 Sample observations and interviews via “green design principles”

Design anthropology practices occur across different scales and timelines and involve many disciplines, each bringing their own distinct ways of knowing and doing. They create strategies for innovation in business and marketing; and they develop plans for urban and rural developments and sustainable forms of living (Gunn, 2013). In the past, product design was regarded as a process of creating diverse functions and better functions (Noble, 2008). For instance, Charter (1998) and Hanssen (2005) both suggest the key feature of green craft design is ecological design, meaning products are eco-friendly and have less negative influence on the environment. Meanwhile, Gagnon, Leduc and Savard (2009) proposed that green craft design can be evaluated from three aspects: social, economic and environmental. Burall (1991) indicated designers ought to understand and learn green design and its future tendencies while at the same time incorporate environmental protection concepts in design guidelines and limitations to ensure their products comply with environmental protection requirements. Clarke (2002) pointed out the from design ethnography to cultural probing, innovative designers in the 21st century are relying on anthropological methods to illicit the meaning, rather than the mere form and function of stuff. Therefore, the crafter can think about how to add additional material functionality, for example, moving the environmental protection towards a more diversified future, in accordance with the characteristics designed to meet the principles of green product design (Table 3). Through observation and interviews of design anthropology, it was found the use of materials through professional cultural knowledge, and experience, that is, local legend, many of the subjects said this design bag, with its meaning and material design, although it might not be perfect, the value could be improved to achieve the purpose of environmental protection and to incorporate green thinking as a whole. Especially, the design anthropology offers the definitive guide to the issues facing the shapers of our increasingly complex material world (Ogot and Kremer, 2004).

Table 3: An Example of Use of “Green Product Design Principles” on Sustainable Bags (arranged for this study)

Product Life Cycle	Green Product Design Principles
1. Choice of material	<ul style="list-style-type: none"> a. Select materials suitable for the purpose of the product b. Avoid using materials containing toxic or hazardous substances c. Use biodegradable materials as much as possible d. Use single type materials and avoid use of mixed materials e. Use recyclable and reusable materials as much as possible f. Minimize quantities of materials used g. Make sure materials are combined correctly h. Pay attention to material characteristics and material conditions when in use i. Use compatible materials j. Minimize chemical treatment to materials (painting, plating, etc.) k. Adopt more tenon-mortise design and minimized use of screws
Sustainable bag components	<ul style="list-style-type: none"> 1. Unbleached cloth and similar fabrics 2. Hardware structure design 3. Eco-friendly leather processed with vegetal tanning 4. Reduced use of chemical dyes 5. Use of recycled clothes for production 6. Use of decomposable materials, such as starch
2. Mechanism design	<ul style="list-style-type: none"> a. Avoid designing disposable products b. Reduce volumes as much as possible c. Avoid making designs to meet current fads d. Simplify product structures e. Design products that can be assembled and are easy to dismantle f. Design structures easy for replacement of parts g. Increase structural strength h. Make sure maintenance and cleaning are easy i. Improve people’s attitude toward product use
Sustainable bag production considerations	<ul style="list-style-type: none"> 1. Take size changes into consideration 2. Make designs suitable for different consumers 3. Ensure easy replacement of hardware components 4. Make sure materials used are easy to clean and durable 5. Simplify product design 6. Minimize the number of components 7. Adopt components that can extend product life spans
3. Production procedures	<ul style="list-style-type: none"> a. Adopt material-saving production processes b. Minimize generation of waste throughout production c. Use natural materials as much as possible d. Minimize discharge of wastewater, exhaust and toxic waste and also reduce noise e. Develop technologies that can save more energy f. Make good use of excessive energy from production
Sustainable bag production	<ul style="list-style-type: none"> 1. Recycle plastic materials

considerations	2. Minimize transportation and deliveries 3. Minimize toxicity and hazards 4. Enhance reusability and biological compatibility 5. Avoid using extra components that have few functions 6. Design products that can be easily maintained on the spot
4. Packaging design	a. Adopt simple packaging b. Use simple structures for strength reinforcement c. Avoid over-packaging d. Minimize use of foamed plastics e. Use natural materials or paper products as much as possible f. Use non-toxic, decomposable, recyclable and reusable packaging materials g. Use simple materials as much as possible h. Minimize use of ink i. Create designs that combine products and packaging j. Take consumer safety into consideration
Sustainable bag production considerations	1. Minimize product sizes. 2. Design packaging as part of product. 3. Minimize packaging. 4. Use reusable materials.
5. Transportation and distribution	1. Adopt the most economical way of transportation 2. Minimize pollution created during transportation 3. Recycle and reuse pallets used in transportation
Sustainable bag production considerations	1. Design products with components that can be assembled on the spot 2. Reduce sales outlets to cut down on transportation
6. Product use by consumers	a. Increase efficiency and satisfaction of use for consumers b. Simplify functions and operating modes c. Minimize malfunction rates and provide correct operating instructions d. Assure user safety e. Minimize pollution from use of product f. Maximize energy use efficiency g. Minimize emissions of pollutants during use of product
Use of sustainable bag	1. Minimize discharge of toxic and hazardous substances during use and disposal of product 2. Avoid use of additives 3. Assure easy replacement of parts
7. Disposal and Recycling	a. Encourage users to recycle. b. Establish decent recycling systems. c. Make efforts to ensure recycling and reuse of materials d. Choose the most appropriate way of waste disposal
Sustainable bag components	1. Design products that allow easy replacement of components 2. Use materials that can be easily broken down and separated
8. Environmental protection regulations	a. Comply with environmental protection regulations and standards of different countries b. Acquire different environmental protection certificates
Sustainable bag production considerations	1. Support enactment of regulations on reduction of materials used in production 2. Minimize consumption of energy when products are in default conditions

4.2 Politics of application of green design

From the angle of circular economy and material analysis, expression through green design is conveyable. From analyzing examples of the green design of future products, this study has concluded the four following application politics for circular economy value:

- (1). Human characteristics: A diversified sense of value and the meaning of multiple cultures should be integrated in a crafter's aesthetic to display different possible lifestyles and arouse resonance from consumers.
- (2). Cultural codes: The formation of material performance is closely related to the particular local cultural features at that time. It takes a shared sense of perception and keen insight for the designer to feel the cultural pulse, which is also an important element in distinguishing different cultures.
- (3) Material (natural materials) composition: It is a set connected according to the ecological and sustainable principle order, while in the environment, the goal is to achieve sustainable development.
- (4). Sustainability certifications: Regardless of the mode or expression or application of sustainable materials, the purpose of sustainable materials is to make green design more feasible for human.

Only through the native materials will the emotional elements in green design be expressed, and only through the sustainable materials is it possible to realize the economy of the crafters in the particular green design. This study tries to construct the principal factor of the cultural element in the green design – sustainability certifications, and use “native materials” through material presentation to help designers to find the right emotional expression for the product. Simultaneously, narrative and sustainable thinking approaches are employed to help crafters learn to listen closely to customers and communicate with them. Meanwhile, Green design is practicing engineering with the inclusion of natural

system as a fundamental consideration (Sandborn and Myers, 2008). Environmental sustainability aims to increase energy and material efficiencies, preserve ecosystem integrity, and promote human health and happiness (Kiyoshi and Akira, 2003).

4.3 Collaboration with Aboriginal Workshop

Participants at the workshop supported the natural and material of design principal approaches to harmonizing aboriginal and industry interests in native design. Taiwan's aboriginal legends involve a collection of ancillary products designed to strengthen an important component of culture. The native design is constructed and reconstructed into green products and towards a circular economy value (Figure 3).



Figure 3: The circular economy value

5. CONCLUSION

Through re-discovery and re-estimation of potential regional resources, design activities are mainly based on using of regional resources by planning and practice of endogeneous regional development [26]. This study is aimed at guiding the use of native materials in green product, thereby improving industrial policy and materials to create consumer demand. Optimally designed cultural goods exhibit positive values and the contributions of sustainable policies and products. This study proved the concept of circular economy is pervasive at all cultural levels. And it also upgrade the cultural connotation of a product to meet the sustainable demands of users. The innovative thinking matrix of cross matching “story concept and material concept” in multidisciplinary filed of design anthropology.

The design of eco materials has a strong impact on future goods. It not only will affect the sustainable development of concepts for future products, as the equation of green life, but also have influence equal to that of green crafts in the future, even affecting social and economic performance and reshaping people’s sense of value toward green life (Figure 4).

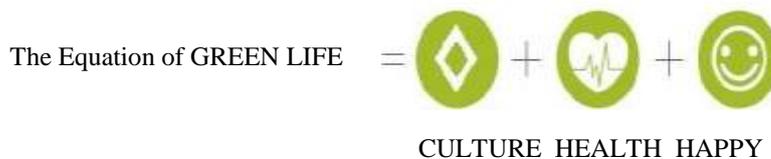


Figure 4. The equation of green life

In other words, the green design of different goods makers has become a unique method of material communication in local culture. Through expressing “green design principles” in different examples of the green product design process, this study explains the character and image of sustainable development can be established through circular economy manifestation and green materials. Green crafts can offer economic benefits to crafters as well as guide the concepts of craft and encourage reflection on sustainable development through green design. This study looked at material principles as well as sustainable and ecological perspectives at what material learning is and how it might play a role in the creative thinking process. We believe, based on the ideas and information in the paper, as well as our own politics, that material thinking can support an environment in which crafters feel encouraged to adopt sustainable development thinking.

6. ACKNOWLEDGMENT

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Note 1. The Story Mapping Method for Aboriginal Culture Product Design: A Preliminary Teaching Experiment of Design Anthropology (I), Kiyoshi Miyazaki, Shyh-Huei Hwang and Wei-Chen Chang, published on the JSSD Periodical of early 2010; 57(4).

Note 2. Post-test study on cultural product derived from aboriginal story mapping: Preliminary investigation into design anthropology (II) Weichen Chang, Shyh-Huei Hwang, Akira Ueda, Kiyoshi Miyazaki, published on the JSSD Periodical of early 2016; 63(1)

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