Study unique artistic lopburi province for design brass tea set of bantahkrayang community

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Abstract. The objectives of this study were as follows: 1) to study the production process of handcrafted Brass Tea Set; and 2) to design and develop the handcrafted of Brass Tea Set. The process of design was started by mutual analytical processes and conceptual framework for product design, Quality Function Deployment, Theory of Inventive Problem Solving, Principles of Craft Design, and Principle of Reverse Engineering. The experts in field of both Industrial Product Design and Brass Handicraft Product, have evaluated the Brass Tea Set design and created prototype of Brass tea set by the sample of consumers who have ever bought the Brass Tea Set of Bantahkrayang Community on this research. The statistics methods used were percentage, mean (\(\bar{X} = \)) and standard deviation (S.D.) 3. To assess consumer satisfaction toward of handcrafted Brass tea set was at the high level.

1. Introduction

Bantahkrayang Community, Tahlaechupsorn District, Lopburi Province, one of villages inherits the intellect of creating the local handcraft. Brass is a metal handcraft and always a popular local handcraft of Bantahkrayang community that is inheritance from the past. The manufacture of Brass is evolved from skills of what the body of knowledge is collected via inheritance, improvement and development. Then it transforms into the Brass at present. It inherits from intellectual to intellectual and generation to generation.

The production of Brass has got a beautiful shape, unique and very interesting. The Brass casting of Lopburi Province has been originated for long time. The finding of historical evidence was shown that the northern of Bantahkrayang, at the back of Tong Pu Temple has ever been the village of smith and some unburned remains of antique kiln were found. According to the evidence, the metal casting of Bantahkrayang is a heritage of ancestor by taking the metal to cast into equipment what is suitable for any era. Moreover, it cast into the artistic and animal shapes [1].

The Occupational Group of Brass Caster, Bantahkrayang is facing with the issue of product shape that the design development isn’t various, the number of consumers are decreased, the purchases order of exportation are also decreased due to inbound competitors who manufacture the Brass instead. Moreover, the national competition of producing the Brass is increased for provinces at present. The cost of Brass and fuel oil is more expensive [2].

The Brass Tea Set is one of a popular product among the consumers who love making of tea. The shape of Brass Tea Set of Bantahkrayang Community can buy anywhere and it’s not unique. This has an effect on the decreased choice or taste of buying because it’s special for consumers who love Brass Handicraft only.
The detail above, researcher is interested in studying the unique artistic Lopburi Province in order to design the Brass Tea Set of Bantahkrayang. It’s to add the value of product and the distribution channel. It’s also the everlasting conservation of Brass casting which is the intellectual of Thai people.

2. Objective
- To study on identity and the production process of handcrafted Brass Tea Set
- To design the handcrafted Brass Tea Set
- To assess consumer satisfaction toward of handcrafted Brass tea set

3. Research methods
The methodologies of this study were as follows.

3.1. Study the production process and the style of Handcrafted Brass Tea Set
The researcher studied the production methods of handcrafted Brass Tea Set by document, book, interview and the related study. Then all the data were analyzed and approached to the development of Handcrafted Brass Tea Set.

![Diagram of Production Process of the Handcrafted Brass Tea Set](image)

**Figure 1.** Diagram of Production Process of the Handcrafted Brass Tea Set

There are several steps for production process as follows.
1. Clay is modeled for plaster model, 2. Remove the silicone from primary model to pour the wax inside, 3. Pour wax into the model, 4. Remove the model in water with normal temperature to get wax model, 5. Plaster is poured by the wax model, 6. Daub the clay on the plastered model, 7. Melt the Brass at a temperature of 1500°C for 4 hours, 8. When the Brass is boiled, pour it in the model that you prepared, 9. Get the model for the first step, smash the Brass model when it is cool, 10. Polish the Brass model as you want. Then it finishes.

3.2. Design the Handcrafted Brass Tea Set
Design the Handcrafted Brass Tea Set that based on a theory of Wiroon Tungcharoen [3]. This theory was applied to the design relating to the quality of product, and it is a conceptual product development, The instruments used were primary data collection, interviews and questionnaires. The designing process then started by using collected data, through analytical processes with conceptual framework for product design; The Quality Function Deployment, the theory of inventive Problem Solving, Principles of Craft Design, and the Resverse Engineering Principle. The experts from both the fields of Industrial Product Design and Brass handicraft product, whom concern Brass Tea Set format, were included to evaluate the design and creates prototype of brass tea set, the researcher have drafted 30 models of sketch Design and by using “Reverse engineering” to analyze, the best 3 forms were selected and assessed by experts and creates prototype of Brass Tea Set.
Figure 2. shows the thinking process of Quality Function Deployment framework From the Theory of Inventive Problem Solving framework, the “structure of product” is a technical conflict. According to the 40 of TRIZ. The 10th principle is “Prior action”

Source: Vuttipong Pliansiri Somchai Seveset

Figure 3. Shows drafted 30 models of sketch Design and by using “Reverse engineering” to analyze, the best 3 forms (Fig.27 Fig.13 Fig.10) were selected and assessed by experts and creates prototype of Brass Tea Set.
Table 1. The optimum scores on considering model selection are for Brass Tea Set Development

| No. | Considerable Criteria | Design 1 | | | Design 2 | | | Design 3 | | |
|-----|-----------------------|----------|---|---|----------|---|---|----------|---|---|
|     |                       | $\bar{x}$ | S.D. | | $\bar{x}$ | S.D. | | $\bar{x}$ | S.D. | |
| 1   | Aesthetic             | 4.33     | 0.38 | | 3.33     | 0.38 | | 3.55     | 0.19 | |
| 2   | The matching with usability | 4.11     | 0.71 | | 3.55     | 0.57 | | 2.88     | 0.76 | |
| 3   | The optimum of production material | 3.88     | 0.57 | | 3.44     | 0.57 | | 3.33     | 0.38 | |
| 4   | The matching with production | 4.00     | 0.38 | | 3.77     | 0.38 | | 3.11     | 0.71 | |
|     | Total Mean Optimum    | 4.10     | 0.51 | | 3.52     | 0.48 | | 3.22     | 0.51 | |

Table 1. Researchers have drafted 30 models of sketch Design and by using “Reverse engineering” to analyze, the best 3 forms were selected and assessed by experts. The handcrafted expert gave an opinion to the design of Brass Tea Set as follows; Design 1 was the most favorable of 3 designs by means ($\bar{x} = 4.10$, S.D.=0.51). When each aspect was considered, it found that (1) Total mean of Aesthetic ($\bar{x} = 4.33$, S.D.=0.38); (2) Total mean of the matching with usability ($\bar{x} = 4.11$, S.D.=0.71); (3) Total mean of the optimum of production material ($\bar{x} = 3.88$, S.D.=0.57); and (4) Total mean of the matching with production ($\bar{x}=4.00$, S.D.=0.38)

3.3. Assess consumer satisfaction toward Brass tea set
Assess consumer satisfaction toward Brass tea set (1) Total mean of Aesthetic ($\bar{x}=4.33$, SD=0.38); Total mean of matching with usability ($\bar{x}=4.11$, SD=0.71); (3) Total mean of the optimum of production material ($\bar{x}=3.88$, SD=0.57); and (4) Total mean of the matching with production ($\bar{x}=4.00$, SD=0.38)

4. Research’s result

4.1. The result from the study of the identity and process of brass tea set
The result from the study of the identity and process of brass tea set craft is found that, the identity of Lop Buri province is its ancient land since prehistoric period, which has many archaeological evidences, such as ancient community, ancient remains, antiquites, and the Lop Buri’s animal which is monkey living with the resident for a long time. Nowadays, brass tea set has varied process, which are 1. Forging shape forming, 2. Turning shape forming. These processes are complex and need manufacturing only; the community cannot produce by itself. Thus this research is applied “Lost Wax” to produce Brass Tea Set so that the community is supported to produce Brass Tea Set by itself.

4.2. The design and development of handicraft products, brass tea sets
The design and development of handicraft products, brass tea sets Ban Tha Kra Yang community, Lop Buri Province, found that the identity of Lopburi province was related to the Slogan of the province. It was inspired to design pattern include monkey, wang Narai, phra prang sam yod and pikul flower of
Lop Buri Province, By analysis the handcrafted expert gave an opinion to the design of Brass Tea Set as follows; Design 2 was the most favorable of 3 designs by means ($\bar{x} = 4.61$, S.D.=0.42). When each aspect was considered, it found that (1) Total mean of Aesthetic, Results the design study Brass tea set of Bantahkrayang it was inspired by shape relating to Historical remains of Lopburi Province, and designed in the framework of the core of the industrial design Udomsak Saributr [4] consider all 4 sides Aesthetic, Function, Manufacturing, The matching with production Researchers have drafted 30 models of sketch Design and Analytical principles "Product Design Theory" To select the appropriate model of the product.

4.3. Consumer satisfaction assessment results for Brass Tea Set Handicraft

Consumer Satisfaction Assessment Results for Brass Tea Set Handicraft The results of the study on identity and production process, as well as the design and development of brass tea set in Bantahkrayang Community to consumer satisfaction was to assess consumer satisfaction toward Brass tea set, (1) Total mean of Aesthetic($\bar{x} = 4.33$, S.D.=0.38)

5. Discuss and summarize

According to the study on Handcrafted Brass Tea Set of Bantahkrayang Community divided into 3 parts.

The study of Handcrafted Brass Tea Set production process and design, it was found that the casting of wax models could be applied with other metal casting, for example, silver, copper and accessory molding work, which is in accordance with the research from Phensri Tongnoppakhun for developing the process of molding in accessory industry, which is careful process in order to reduce the damages and mistakes of works to the least [5].

To design the handcrafted of Brass Tea Set. The instruments used were primary data collection, interviews and questionnaires. The designing process then started by using collected data, through analytical processes with conceptual framework for product design; The Quality Function Deployment, the theory of inventive Problem Solving, Principles of Craft Design, and the Reverse Engineering Principle. The experts from both the fields of Industrial Product Design and Brass handicraft product, whom concern Brass Tea Set format, were included to evaluate the design and creates prototype of brass tea set.

To assess consumer satisfaction toward of handcrafted Brass tea set was at the high level.

6. Suggestions

6.1. Suggestion on this research

1. The Brass Tea Set is too heavy to reduce the thickness, 2. The handle should be wider for easy to use.

6.2. Applying the research’s result

6.2.1. Study the production process and design of handcrafted Brass Tea Set. The researcher aimed to study the production process and design of handcrafted Brass Tea Set of Bantahkrayang Community, Lop Buri. Thus the research’s result should be applied as a guideline of developing the handcrafted Brass Tea Set that can be also applied to other castings; silver, copper and others. Each casting is varied itself.

6.2.2. The development of handcrafted Brass Tea Set. The development of handcrafted Brass Tea Set Bantahkrayang Community must be mainly considered on the style because there are no technological manufactures for every process to help the production. The style is mainly on handicraft. Thus the development and design should be focused on the possibility of shape forming or casting those handicrafts.
6.2.3. **Consumer satisfaction assessment results for Brass Tea Set.** Consumer Satisfaction Assessment Results for Brass Tea Set Handicraft was shown that there were 2 consumer groups, one have bought to use daily and another have bought for home decoration. Thus, the product design should be varied for usability so that the consumer groups can be more varied and increasingly. These suggestions could be applied to improve the data on the design of Brass home decoration product development.

**References**

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