The Art of Kelantan Traditional Pottery: The Limitations and Way Forward (sub-theme:17)

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ABSTRACT

The traditional pottery of Kelantan is not only known for unique forms and techniques, but also the realistic aesthetic pottery traditional concept of art in Malay. These have led to an increasing demand for Kelantan pottery wares. Hence, this paper seeks to illuminate on the traditional pottery of Kelantan state in Malaysia. The paper investigates and reviewed the history of Malay pottery down to Kelantan pottery, and also analysed the techniques and processes used in Kelantan traditional pottery production. This was achieved by first visiting three traditional pottery centres in Kelantan. The outcome of the visit revealed how Kelantan potters create models by hand turning or carving the concepts in plaster (POP) using turning wheel. Also, from the information gathered, the paper reviewed the production process from the conceptualisation stage to realisation stage, highlighted the limitations of the method and finally proposed a way forward. The proposed way forward (digital and rapid technology) was then tested to know it's viability by using it to develop a product. The findings from this revealed that digital and rapid technology is a viable tool for reducing development time, enhancing prototype quality (accuracy), preventing material wastage, producing exclusive designs and durable prototypes, however, the research shows that rapid prototyping is an expensive approach.

Keywords: Art, Ceramics, Mass production, Kelantan Traditional Pottery, Digital and Rapid Prototyping

Introduction

Pottery is made by forming a clay body into objects of a required shape and heating them to high temperatures in a kiln to remove water from the clay and this induce reaction that leads to permanent changes and increase in strength. ASTM (2007) defines pottery as fired ceramic wares that contain clay when formed, except technical, structural and refractory products. Pottery also refers to the art of craft of the potter or the manufacturer of pottery wares (Paul, 1988). The major types of pottery include earthenware, stoneware and porcelain (Allen, 1986).

Art is a diverse range of human activities and the product of those activities include painting, sculpture, pottery, etc. Therefore, the study of pottery artefacts has been helpful in the development of theories on the organization, economic condition and the cultural development of societies that produced or acquired them. According to Tajul et al (2011), the art in Malay culture traditionally existed alongside with the invention of utility items. Traditionally in Malay communities, pottery was typically a woman's work which she would do once her chores were over (Ham, 2005). Several articles discuss specifically about prehistory pottery in Kelantan, this include Tweedie, (1953) who revealed the discovery of pottery wares in Gua Musang. Also Sieveking et al., (1956) revealed the discovery of pottery wares in Cha cave, Ulu Kelantan. The traditional pottery of Kelantan is not only known for unique forms and techniques, but also the realistic aesthetic pottery traditional concept of art in Malay. These have led to an increasing demand for Kelantan pottery wares. In order to meet up with the market demand, Kelantan potters have explored the art of mass production which has been able to reduce production time and cost to some extent (Olalere, 2012). Hence, this paper seeks to illuminate on the traditional pottery of Kelantan state in Malaysia. The paper investigates and reviewed the history of Malay pottery down to Kelantan pottery, and also analysed the techniques and processes used for mass production in Kelantan traditional pottery production.

This was achieved by first visiting three traditional pottery centres in Kelantan. The places visited include; Zutah Ceramic at Ceribong, Kesdec Ceramics at Pulai Chondong and Belipot Ceramics at Bunut Payong. The outcome of the visit revealed how Kelantan potters uses plaster of Paris (POP) to create prototypes using turning wheel and thereafter use it to generate master mould and case mould for mass production.

The Art of Mass Production

The Oxford English Dictionary (1999) defines art as a skill used in creating something beautiful while mass production is define as manufacturing products in large quantities. Therefore, the art of mass production can be explained as the process and skill used in manufacturing products in large quantities. The increasing demand for Kelantan pottery wares due to its uniqueness and the seek for faster, easier and less costly production process by Kelantan potter as brought about the present method they use for mass producing their products. Therefore, this section briefly explain the materials and equipments used in pottery production, illuminates the step by step approach used by Kelantan potter to mass produce their pottery wares, its limitations and also proposed the way forward.

Materials and Equipment

Local pottery makers in Kelantan community also works in basic science related material which includes the basic aspects of selection of materials suitable for use as clay to produce pottery that is easy to process forms, not fragile and has unique features such as colours and interesting effects of a mixture of natural materials. The mineral materials present in the clay composition used by Kelantan potters are Aluminium Oxide, Iron Oxide, Silica, Calcium Oxide, Sodium Oxide, Potassium Oxide, Phosphorus Oxide and Magnesium (Tajul et al, 2011). Each mineral has a material interest and function either as an alternative to facilitate the process of production work or it works as a media character that embody the aesthetic value of pottery wares.

Some of the major materials and equipments used by local potter in Kelantan are; plaster (POP), ball clay, glaze composition, oxides (e.g. red oxide), sodium silicate, clay mixer (blunger), turning wheel, Pressure casting machine and gas kiln.

Production Process and Techniques

The process used in Kelantan pottery production involves several stages which are explained below;

Concept Development

This is the first stage of product development process used by potters in Kelantan. The product idea is brought out into well detailed 2D-drawings. This is achieved with the aid of some common drawing instruments such as pencil, ruler etc. Some potters also improvise the instruments they use at this stage. Figure 1 below shows an example of detailed drawings developed at KESDEC ceramics.

(Insert Fig. 1 about here)

Creation of Models

The idea developed into detailed drawing is used at this stage as guideline to create physical models. The technique used is hand turning and hand carving method and the material use for creating models is plaster of Paris (POP). In hand turning method, the plaster is mixed in the appropriate proportion with water and the mixture is allowed to solidify, after which the solidified plaster is mounted on the turning wheel and the plaster is shaped out into desired form with the aid of some shaping tools (see Fig. 2). This method has restricted most Kelantan pottery to perfect round shape because intricate geometric shapes cannot be achieved with this method. Figure 2 shows the turning wheel, shaping tools and some examples of models produced with the turning wheel.

(Insert Fig. 2 about here)

However, although, hand carving method takes consumes time, some Kelantan potter still use the method to create models. Just like in hand turning method, they first create a block of solid plaster, after which they carve out the model by chipping out the unwanted parts using carving tools. Fig. 3 shows model built with hand carving method.

(Insert Fig. 3 about here)

Creation of Mould

The technique used by Kelantan potter at this stage has three steps. Firstly, the plaster model created using hand turning and hand carving method are first used to produce the master mould (see Fig. 4a). Thereafter, the mould is used to create case mould and lastly, the case mould is then used to generate multiple master moulds which are then use for slip casting (mass production). Figure 4b illustrates how a case mould is used to create master mould.

(Insert Fig. 4a&b about here)

Casting

This is the stage where the master moulds produced from the case mould are used for slip casting. At this stage, the clay slip is prepared by mixing all the composition together. According to Mr. Wong (a potter

interviewed at KESDEC ceramics), the composition of the slip used includes processed ball clay, kaolin, water and few drops of sodium silicate. This composition is mixed together inside blunger after which the slip is poured into the plaster mould. Normal atmospheric pressure casting takes between 30-90 minutes depending on the weather condition. However, for KESDEC industry that uses high pressure casting, the casting process takes within 15minutes. Fig. 5 shows plaster mould and the wares casted from it.

(Insert Fig. 5 about here)

Drying and Fettling

Fettling is the process of correcting parts that has any defect after casting process. This is done after removing the piece from the plaster mould, after this, the wares are allowed to dry under atmospheric condition to reduce the moisture contents down to around 0.8%.

Decoration

There are different methods used by Kelantan potters to decorate their pottery wares. Some wares are decorated using glaze, coloured oxides and or carving/engraving.

- Glazing: it is interesting to realise that some Kelantan potters fire wares directly from green ware to gloss ware in a onetime firing process. After the drying and fettling process, they applied glaze on the green wares and then load them into the kiln for firing process. The common glaze application method used by Kelantan potters are dipping and brushing method. However, not all Kelantan pottery wares are glazed (gloss wares), some are bisque wares. Therefore, bisque product don't pass through this stage, they are bisque fired immediately after drying process.
- Oxides: Apart from glazing, some wares are decorated with coloured oxides. This is applied using brush as the ware rotates on the turning wheel, or painted inform of motifs on the surface of the wares (see Fig. 6).

  (Insert Fig. 6 about here)
- Carving/ Engraving: Kelantan pottery wares are also decorated by carving/engraving on the surface of the wares. Kelantan potters use natural patterns on wares; these include the combination of dots, lines or patterns of flowers and leaf (see Fig. 7). This is due to the influence of Islam culture as most (if not all) Kelantan potters are Muslims. Islamic culture encourages natural forms and styles but rejects portrayal of figures (Mohamad, 2005).

  (Insert Fig. 7 about here)

Firing

Firing makes physical and chemical reaction takes place on the ware and gives it a fixed shape. The common kiln used by Kelantan potters is gas kiln. Glazed wares are fired to 1100ºC while bisque wares are fired to 900ºC.

Sorting and Packing

After firing, the wares are sorted to separate wares with defects from the successful ones. Therefore, wares without defects are package for selling or dispatch (see Fig. 8).

(Insert Fig. 8 about here)

Limitations of the Method

The method used by Kelantan potters for mass production has some limitations, these include;

- Despite the prodigious skills of the carvers that produce the models, the process still never produced accurate models.
- The process of hand carving and hand turning models are time consuming.
- The subtractive method (hand turning and carving) used for creating the models/prototypes waste materials (Plaster of Paris) and this waste causes pollution to the environment.
- The plaster models can only be use once for creating master mould. This is because they don't have enough strength to withstand long usage; therefore potters lose their models after using it once to create master mould.
- The hand turning method used in creating models restricted them to perfect round shapes for their products. This limits their creative ability to specific shapes.

Way Forward

In order to address the limitations states above, digital and rapid technology was proposed can address these issues. Therefore, further research was carried out to test the viability of digital and rapid technology in; improving the accuracy of models, reducing development time, eliminating wastage of materials, producing durable models and also building creative and exclusive design. A digital method of product development was developed which has four stages (Conceptual design; Idea development; Creation of model; Testing and evaluation). Therefore, to test the viability of the proposed digital method, a product was created using the four stages of the method.

Conceptual Design (Digital Sketching)

At this first stage of digital prototyping, Autodesk Sketchbook Designer software was used to sketch the conceptual designs of the product (Fig. 9).

(Insert Fig. 9 about here)

Idea Development (Design, Analysis and Testing)

This is the second stage of digital prototyping where the product idea was developed into detailed drawings. The stage includes three steps which are design, analysis and testing. During the design stage, the conceptualized design was first developed into detailed two-dimensional drawing with the aid of AutoCAD. After which the detailed 2D drawing was used as guide to build the three dimensional (3D) model and finally analysed using Solidworks software. Fig. 10 shows the 2D drawing, 3D model and the analysis of the selected products.

(Insert Fig. 10 about here)

Creation of Model (Rapid Prototyping)

After the idea development which includes the design of 2D and 3D model, analysis and testing, the 3D computer model were used to generate rapid prototype using rapid prototyping (RP) machine. The RP-Machine used for building the physical prototypes is uPrint 3D Printer. It uses additive approach that starts with nothing and builds an object incrementally by adding materials (Venuvinod, & Ma, 2004). Therefore, this approach doesn't waste materials and is built with Thermoplastic (ABS-plus), which is highly durable. Fig. 11 shows the rapid prototype built with 3D-printer

(Insert Fig. 11 about here)

Testing and Evaluation

This is the last stage in digital method proposed for product development. At this stage, the rapid prototype was examined, tested, and evaluated. This was achieved by creating a real functional ceramic prototype from the RP-model. Digital or CAD tools are not applicable at this stage, therefore conventional method was used at this stage to test and evaluate the models. The process of testing and evaluation has four steps which are illustrated in Fig. 12 below. Also, Fig. 13 shows the final ceramic prototype and Table 1 illustrates the overall time and cost of developing the selected products.

(Insert Fig. 12 & 13 about here)

(Insert Table 1 about here)

Conclusion

Mass production, a process of producing products in large quantity has been a process employed by most manufacturers so as to meet up with consumers demand by reducing production time and also the cost of production. The said process has also been widely used by potters in Kelantan state of Malaysia. Therefore, this paper has been able to investigate and illuminate on the systematic process used by Kelantan Potters for mass production. This paper reviewed the production process from the conceptualisation stage to realisation stage, highlights the limitations of the method and finally proposed a way forward. The proposed way forward (digital and rapid technology) was then tested to know it's viability by using it to develop a product. The findings from this revealed that digital and rapid technology is a viable tool for reducing development time and enhancing prototype quality (accuracy), preventing material wastage, producing exclusive designs and durable prototypes. However, the research shows that rapid prototyping is an expensive approach.

Future Work

Based on the findings from this research, the further research will be to explore other available rapid

prototyping technology since this research only used Fused Deposition Modeling (FDM) technology. Other RP-technology such as CNC, Laminated Object Manufacturing (LOM), Selective Laser Sintering (SLS) can also be tested to know whether they will be cost effective than the one used for this research.

References

Allen, D. (1986). *Pottery Science: Materials, process and products*. Ellis Horwood Limited.

ASTM (2007). International Standard terminology of ceramic whitewares and related products. *ASTMC 242-01*

Ham, R. K. (2005). Malay pottery. *Craft and the Visual Art*, vol. 14.

Lucinda, C. & Martin, N. (1999). *Oxford English Dictionary (4th ed.).* Oxford University Press.

Mohamad, S. (2005). The Malay pottery in Malaysia. *Asia Ceramic Network*.

Paul, R. (1988). *An introduction to the technology of pottery (2nd ed.).* Institute of Ceramics & Perbamon Press,

Sieveking, G. (1956). Pottery cones from kodiang (Kedah). *JMBRAS 29*, Part 1.

Tajul, S. S., Harozila, R., & Mohd, F. S. (2011). Local genius of Mambong pottery in Kelantan, Malaysia. *International Journal of Humanities and Social Science*. Vol. 1 No.2.

Tweedie, M. W. F. (1953). The stone age in Malaya. *JMBRAS*, vol 26, part 2 (No. 162).

Venuvinod, P. K., & Ma, W. (2004). *Rapid prototyping: Laser-based & other technologies*. Boston, MA: Kluwer Academic.

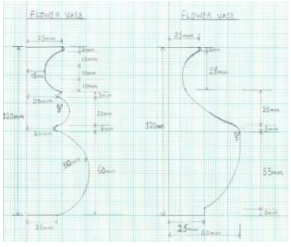

Figure 1: Detailed 2D drawing developed at KESDEC Ceramics

Figure 2: The turning wheel, shaping tools and models created

Figure 3: A model produced with plaster of Paris

Figure 4a: Creating master mould with the model

Figure 4b: Pictures illustrating how master mould is created from case mould

Figure 5: Plaster mould with the casted piece

Figure 6: Decorating with coloured oxide

Figure 7: Pictures of wares with engraved/carved patterns

Figure 8: Packaged finished products
Source: Zutah & Belipot Ceramics

Figure 9: Conceptualized digital sketch of the product

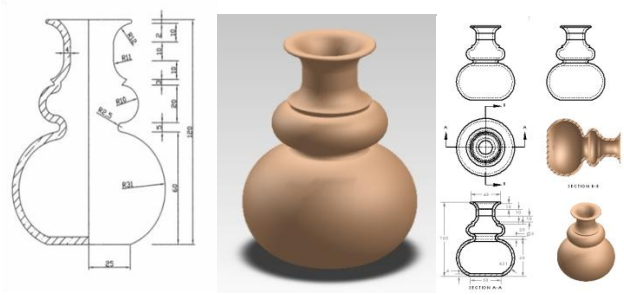

Figure 10: 2D drawing, 3D model and the analysis

Figure 11: Image of model built by RP-Machine

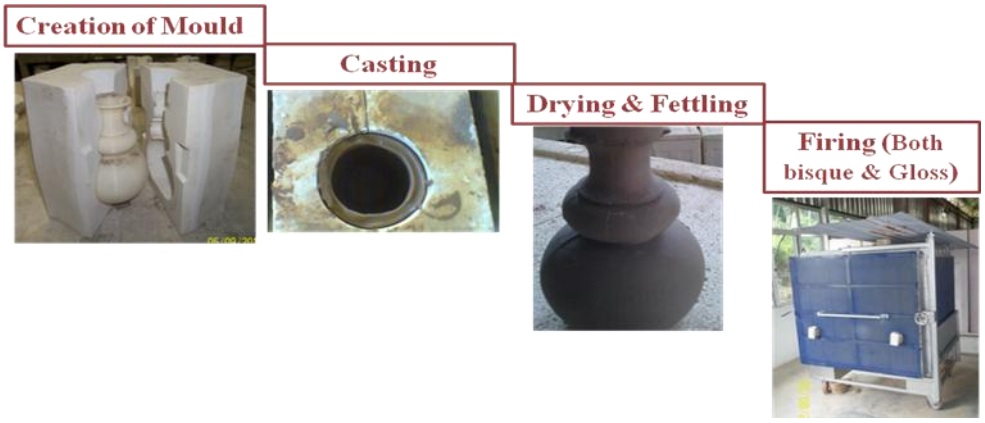

Figure 12: The four steps in testing and evaluation stage

Figure 13: Final ceramic prototypes of the selected product

Table 1: The overall time and cost of building the ceramic prototype

TIME/DAYS	COST/RM
8	350