PRODUCT DIVERSIFICATION AND WASTE RECYCLING
FOR THE CLAY-BASED CRAFT INDUSTRY DEVELOPMENT

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ABSTRACT

Local potency comes from clay based small crafts industry center has been existed in great number especially from the central part of Java. Clay based product can be categorized into two types, building material product and ready use product. First type of product such as roof tile or earthenware usually has been inherited from generation to generation. Some industrial centers that have been popular of their existence since many years ago are Soka rooftop from Kebumen and earthenware vessels from Kasongan, Klampok and Dinoyo Malang. Moreover, earthenware vessels from Bayat Klaten is widely known for its existence since the beginning of Islamic spreading.

Craftsman product can be considered as a local wisdom based creativity that can be developed because of its potencies. They area sustainability aspect since been given from generation to generation, environmental aspect by using local natural resources and economical aspect as it provides job opportunity for local community. Meanwhile there is common weakness that must be overcame by tradition-based small business enterprises that is product development. This weakness might make small craftsman become hard to compete with modern industry that has better resources.

This essay will discuss the obstacles faced by clay-based craftsman and possible solutions through creativity-based- approach in product development. It will explore alternative for waste recycling and product development hence can maintain its existence.

Keywords : Clay based crafts; product diversification; waste recycling
I. INTRODUCTION

In the history, trading activities has been started by barter (exchanging) between groups of people, for example bartering foods and clay product such as earthenware. This earthenware was the milestone for processing technology of materials firstly made by humans. Since Sumerian empire, bricks making technology has been emerged and used to build castles and homes. Historians, further, acknowledge that earthenware is the visual milestone of cultural diversity. Before the emergence of metal culture, earthenware was the most historical artifacts due to their fast changing. The durability of the earthenware, the world can recognize ancient civilizations through the writings made on tablet (burned-clay). The traditions of making things form clay by burning it keep on continuing from ancient time to today moment. We will easily find terracotta in every land of civilizations. With different styles and techniques, earthenware is highly-valued cultural products; e.g. Hellenic’s luxurious ceramics jars with smooth curvature which can be found in Greek. There are also Chinese’s colorful ceramics jars. The development of processing technique results on the more varied qualities and visual characters ceramics; it includes the development of burning, glazing and coating techniques. However, producing earthenware using a very simple way still exists until now with the product of red bricks and roof tiles.

In Indonesia, the center of craft industries using clay as the material develops very fast. This industry can be found in Singkawang Kalimantan, Kasongan Yogyakarta, Klampok Banjarnegeara, Dinoyo Malang, Bali and many more. There are many home industries producing bricks, roof tile or the ornaments of roof. In general, clay industry can be divided into 2: ornamental ceramics and building ceramics. The quality and the appearance of the product will be very much affected by the material composition used. In a big scale industry, the materials used are kaolin, illite, feldspar and ball clay. Lime and quartz sand may also be added to the mix to make a stronger ceramics. The simplest and cheapest process in this industry is by using the clay, then shape, dry and burns it.

II. CERAMICS CRAFT AND THE ENVIRONMENT SUSTAINABILITY

In facing the changes in economical and trading sector which happen locally and globally, it needs critical and creative attitudes of Indonesian to survive in this era. One of government programs dealing with this, hold by Trading Ministry, is by supporting the creative industries which is believed to answer short-term and middle-term problems in economics and trading. China and India have proved this by significantly increasing their economic development through creative economy. Creative industry—as a part of creative economy—is assumed to be able to answer the challenge of global issues related to environment, such as global warming, deforestation, renewable energy, and carbon emission. The government makes commitment on this by making Creative Economic Development Plan 2009-2015 and 14 Sub-sector Development Plan 2009-2015 Creative Industries (Rencana Pengembangan Ekonomi Kreatif 2009-2015 dan Rencana Pengembangan 14

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1 Arnold Toynbee (translator: Agung Prihantoro, 2004 : 55) ;“…. in the world of clay craft, style and the decoration changes as fast as fashion, and clay fragments can not be destroyed”.
2 Lyons (2007: 242)
Subsektor Industri Kreatif 2009-2015) in which we can find industrial sub-sector of cultures and arts: Crafts Sub-sector and Art Markets Sub-sector.

One of Small and Medium Enterprises (UKM) easily found in Indonesia is the ceramics industry. People tend to choose this industry due to the easiness in gathering the raw material, simple technology require in producing and the tradition attached to the society. There are some categories of ceramics products, namely earthenware, stone ware, and fine ceramic. Earthenware takes its material from color clay which is burned in 400-800º C temperature. Due to the material and the burning, this type of ceramics has high level of porosity so water can easily seep. The burning results on orange to old red color so most of the time it is called terracotta. Potteries, roof tiles and bricks are the examples. Stone ware gets its name from the burning process which results on white coral stone color. This ceramics is also porous even is burned in 1200-1280ºC temperature. Yet, it is more waterproof compared to the first. The third is fine ceramics or porcelain which is burned in 1280-1400ºC temperature. Mostly, this type of ceramics is covered by glass layer (glaze). This layer makes the ceramics be waterproof, bold and easily cleaned. It is just needed to be burned in hotter temperature: 700 ºC to 1200 ºC. Glaze with low melting point results on more expensive price compared to the higher melting point. From its type and finishing technique, it can be seen that fine ceramics demand difficult material and high energy consuming.

Clay products easily found in Indonesia for building category are bricks and roof tiles, earthenware, meanwhile, are commonly products used for daily usage. The clay used for those products are mostly taken from surrounding areas such as bricks of Soka Kebumen and earthenwares of Kasongan. Fine ceramics, in other hand, are a bit difficult to be found. Fine ceramics produced in Kiaracondong Bandung are porcelain type. Porcelain need better in qualities of raw materials compared to the earthenware. Furthermore, the temperature for burning is also higher which is up to 1280ºC. The burning activities in small industries are using various materials. Single earthenware burning for bricks, roof tiles and other supportive building material, the industries still use wood for burning ornaments earthenware, however, the industries usually maintain to use special gas stove or electrical one. The emission level of CO2 in wood burning is sure higher than the gas or electrical stove but wood burning is cheaper. This is why people tend to choose wood compared to gas or electrical stove. Besides wood, the small industries also make use of agricultural wastes to burn their products. Capital is the main problem face by small industries of earthenware. This causes their industries are underdeveloped especially for earthenware with glaze. This happens in Bayat Klaten where the producers keep on producing single type of earthenware without glaze for this need burning at average temperature of 800 ºC. The clay found and used in Bayat creates certain color of the earthenware: red to black. As the replacement of finishing process, Bayat ceramics makers choose to use fogging or coating techniques.

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4 The composition are: feldspar 30%, kaolin 35%, quarz 20% and ball clay 15% in the firing temperatures of 1280 ºC. (Subari, Aristianto, 2003: 12)
On the point of view of ecological sustainability, the bigger human interferences in processing or the higher level of technology used, the bigger impact gathered for the ecology. In big ceramics industries, technology play a great role; it can be seen from mining process, taking the material to the manufacture, producing, until delivering the results to the consumers. This type of industries requires a lot mining material as well as huge energies, especially in the glazing processes where it needs high temperature. In small industries, in the other hand, the material consumed is relatively small in quantity; the producing process demands woods only, which is very cheap. The finishing process, further, uses nothing of glazing process. But the technology also gives the advantages in reducing nature distruction, such as the water consumption in industry that can be reduced dramatically\(^5\).

CO2 emission takes role also in the impact caused by the earthenware industries. Besides burning, the transportation of taking material from the mining and delivering the products to the customers also result on emission. This means that Small and Medium Enterprises that are making use of surrounding materials, having minimum transportation activities, and using lower temperature in burning (max 800 °C) are categorized as industries contributing minimum emission of CO2.

To sum up, here are the small industries characteristics which concern on the environmental issues:

1. Minimum exploitation over the material resources.
2. Make use of surrounding material.
3. Minimum exposure of technologies.
4. Minimum usage of fuel (oil and gas).

Those positives sides of small industries should be maintained in preserving the nature and for the sake of the industries sustainability. The next issue, then, is how to increase the value of the ceramics with no high consumption of material, energy and gas emission.

### III. PRODUCT DIVERSIFICATION

Design becomes important key in earthenware market competition besides qualified material and purposed prices. We can find various products of clay from big and Small and Medium Enterprises. From the quality of the material, finishing process and price, surely big industries will win the competition due to the mass production and the winning of competition. The development of technology, furthermore, replaces human skill and shortens production time. Therefore, Small and Medium Industries (**UKM**) need helps in sustaining and developing their products as well as winning competition in global markets. If **UKM** does not get any help, it will be crashed by ceramics products from China and India which are better in qualities and cheaper.

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\(^5\) The ceramics industry in Italy has developed an efficient re-circulating system with a simple filter for the waste sludge. In this way they have reduced the quantity of water used and kept the sludge effluent to a minimum. Berge (2000: 119)
One way to solve it is by product diversification strategy and offering concepts which are not only focusing on tangible values of the products. Diversification will create changes in new creations of product designs as well as the functions. For building products, besides bricks and roof tile, the artists may produce various floor and wall layers with a little touch of hand skill. For ornamental, there are a lot more products resulted from the richness of ideas.

**UKM** focusing on crafts are mostly blind about product concept, further, there are a lot things made only by duplicating the design of popular products with a very little innovation on the shape. Therefore, small craft ship industry on clay need to know the product concept so they can make new innovations: visual concept based on local traditions, product concept related to environmental issues, social issues, trusts and many more.

![Pic. 01 3D Ceramics tiles.](http://www.kls-design.fr/spip.php?rubrique15)

Nature-inspired 3D ceramic tiles by French company KLS Design. These 3D tiles are made of baked clay and earthenware with glazed and enameled finishes measuring 20 by 20 cm or 10 by 10 cm.  
(downloaded: August 2, 2012)


Terracotta reliefs on temple walls at the time of Majapahit. Collection of Balique Arts of Indonesia.  
(downloaded: Oktober 2, 2012)
IV. PROJECT EXAMPLE : THE RE-USE OF ROOF TILE WASTE

In ceramics industries, there are very little example of industries using the waste as the main material. They prefer to mine for new raw materials. In the case of UKM, they only use clay from surrounding area without testing it in laboratory. The wastes, UKM mostly use are some fail products due to broken or cracks. Those wastes will be grinded to make powder called grog. This powder may function as filler which can maintain the ceramics structure during the burning process so the ceramics will not be de-formed.

In the recent research, the writer explores some possibility in reusing of clay product waste. This research finds that useless things from building (roof tile) can be used as wall layer by changing the pieces of roof tile into artificial coral through blunting process. We can put color on the artificial coral; it can be useful for ornament in layering wall, furniture or other horizontal surfaces. The main result of this research is method to re-use roof tile waste as wall layers.

![Example of the reuse of terracotta waste: pieces of roof tile changed into artificial coral. Source: Private work.](image)

Roof tile waste processed as tile for wall has some superiorities, such as:

1. Coping problems on solid disposal from roof tile industries and useless roof tile.

Roof tile wastes are resulted from roof tile maker, areas destructed from earthquakes, constructions, and renovations and so on. According to Industrial Department and UMKM Bakorwil II Central Java under the supervision of Indonesian Bank, roof tile industries in Solo Raya are mostly found in Klaten (20 industries), Sukoharjo (12 industries) and some other regions in Surakarta. Yet, there are still dozens craft industry have not been registered at Industrial Department.

2. Substituting natural stones which is more expensive and unrenewable.

There various types of material used as layer for interior and exteriors of a building, such as natural stone (marble and granite) or artificial one (ceramics, porcelains, and terracotta). Beside those two stones, now small stones (peable) used as wall cover, such as white coral, black Alor, and so on. Those stones in nature are getting fewer in existence due to the continuous mining. Artificial stones made from ceramics and porcelain are relatively...
expensive. That is why wall cover made by roof tile disposal can be the substitution which is relatively cheaper due to the ease of material gathered.

3. Becoming product diversification model from roof tile industries

Based on the material and the techniques, there are some types of roof tile industries in Solo Raya: a. press roof tile, b. concrete roof tile, and c. ceramics roof tile. Press and ceramics roof tile use clay as the main material; the clay then is burned. For ceramics roof tile, the burning is done twice where the last burning is purposed as finishing by glazing the roof tile, so it does not need coating when it is used in roof of a house. There are some side products of roof tile industries: roof ornaments (Javanese: wuwungan) and ventilation box from clay. The waste both from the roof tile product or the side products are usually thrown away or sold to people use it as material for making red cement. Tile for wall cover as the result of this research can be used as alternative product or diversification from roof tile industry by adding other material used as tile. Finally by making these new products—tile for wall cover—a new job field has been successfully created.

V. CONCLUSION

Small industries problems in increasing and developing the business are sometimes clashed with the effort in preserving the environment. The example will be the raw material needed by the industry which should be dig out form the soil and huge amount of fuel to process it. The development of industry in general requires more raw material and fuel. There should be effort to make the small industries sustainably developed without damaging the environment in fulfilling the needs of raw material and the fuel.

Product diversity model through design development with encourage concept and concern on waste reuse that can be one of the alternatives in increasing the value of craft. This means there will be crafters who are able increasing their income by having qualified products.

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