ISSN 2580 6378
E-ISSN 2580 7048

JURNAL ASIA PACIFIC STUDIES

Journal of International Relations Study Program
Faculty of Social and Political Sciences
Universitas Kristen Indonesia

Volume 6 | Number 2 | July - December 2022

Jurnal Asia Pacific Studies Volume 6 Number 2 / July - December 2022
https://doi.org/10.33541/japs.v6i2.4699 pp. 139 – 157

TEAPOT INNOVATION TO INCREASE THE QUALITY OF TRADITIONAL CERAMIC PRODUCTS IN PAGERJURANG BAYAT, KLATEN, CENTRAL JAVA, INDONESIA

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Abstract

This research aims to create an innovation in traditional ceramics through high-temperature firing. This ceramic teapot innovation utilizes earthenware clay material from Pagerjurang Bayat Village, Klaten, Central Java. Pagerjurang Village is one of the traditional ceramics-producing areas in Indonesia. Pagerjurang clay raw materials can only be burned at a temperature of 750 O C-900^{OC}, this is classified as low-quality pottery material. This writing aims to create a teapot innovation on traditional Pagerjurang ceramics through high-temperature combustion. Product quality while increasing artistic value leads to an increase in the selling value of Pagerjurang ceramics. This paper uses an exploratory qualitative method with experimentation on the quality of clay materials and artistic value in ceramic body decoration. The quality of the ingredients by adding silica material of as much as 25 percent to the Pagerjurang clay dough, so that it can be glazed at a temperature of 1100 ^{O}C. This innovation can improve the quality of Pagerjurang's traditional ceramic products. Stages of innovation through the exploration of materials, shapes, and the application of glaze coatings. The innovation resulted in four teapot product creation findings: (1) "Cobalt Glazed Long Handle Teapot", (2) "White Rustic Glazed Teapot", (3) "Translucent ellipse Teapot", and (4) "Flooring Cobalt Glazed Teapot". This innovative finding has better material quality and artistic value than before. It is expected to be a reference for developing the quality of ceramic teapots and improving the welfare of the Pagerjurang ceramic craftsman community.

Keywords: Product design, household appliances, quality, ceramics industry, Pagerjurang, and Indonesia

Abstrak

Inovasi teko keramik ini memanfaatkan bahan tanah liat earthenware dari Desa Pagerjurang Bayat Klaten Jawa Tengah. Desa Pagerjurang merupakan salah satu wilayah penghasil keramik tradisional di Indonesia. Bahan baku tanah liat Pagerjurang hanya mampu dibakar pada suhu 750^{O}C-900^{O}C, hal ini tergolong pada bahan gerabah kualitas rendah. Tujuan penulisan ini menciptakan inovasi teko pada keramik tradisonal Pagerjurang melalui pembakaran suhu tinggi. Kualitas produk sekaligus meningkatkan nilai artistic berujung pada peningkatan nilai jual keramik Pagerjurang. Tulisan ini menggunakan metode kualitatif ekplorartif dengan eksperimentasi kualitas bahan tanah liat dan nilai artistic pada dekorasi badan keramik. Kualitas bahan dengan menambahkan material silica sebanyak 25 persen pada adonan tanah liat Pagerjurang, sehingga dapat diglasir pada suhu 1100 ^{O}C. Inovasi ini dapat meningkatkan kualitas produk keramik tradisional Pagerjurang. Tahapan inovasi melalui eksplorasi bahan, bentuk, dan penerapan pelapis berupa glasir. Inovasi menghasilkan empat temuan penciptaan produk teko (1) “Cobalt Glazed Long Handle Teko” (2) “ White Rustic Glazed Teko” (3) “Translucent ellipse Teko”, dan (4) “Floaring Cobalt Glazed Teko”. Temuan inovasi ini memiliki kualitas bahan dan nilai artistic yang lebih baik dari sebelumnya. Diharapkan dapat menjadi rujukan pengembangan kualitas teko keramik dan meningkatkan kesejahteraan masyarakat pengrajin keramik Pagerjurang.

Kata kunci: inovasi, teko, kualitas, keramik, traditional, dan Pagerjurang

1. Introduction

1.1 Background

The innovation process in creating an artistic product always starts with ideas, further refined by imagination and thinking. In decorative ceramics, innovation is enabled through collaborative processes involving the mainstream, external people, and craftspeople. The involvement of these various aspects increases the likelihood that innovation succeeds. These aspects interact with each other to create a new method and, at the same time to consume it (Patriotta and Hirsch 2016). For a potter, sources of ideas are limitless, and the universe, experience, and environment are some common examples. Ideas combined with the ability to connect to others' mental states have dominated psychology and other related subjects (Mirski and Bickhard 2021), including creative ceramic art.

Art is a medium to express feelings and ideas. Expression is a unique creative element in the intervention and development process (X.-h. Lin et al. 2021). Inspiration to create might come from one's or another's experiences, an idea, or the representation of an image. Innovating in art allows people to develop expressively, emotionally, and intellectually freely to express what they want and show (Chauhan 2020).

Pagerjurang village is known for its Pagerjurang ceramics, producing teapot products unique to the area and found nowhere else in Indonesia. The local population has used clay media in Pagerjurang Bayat Klaten to create ceramic products. The type of clay found in Pagerjurang is porous and red-brown. Pottery from this type of clay is resistant to heat and absorbs sound (Lee et al., 2021).

Pagerjurang ceramic products' particular characteristics are their red-brown color- from the finishing process by surface compaction and reduction firing, which produces a shiny brown color. Oxygen binds to the clay during the reduction firing process, making this color (Feng, Wang, and Simatrang 2020). Pagejurang teapot products have improved over time and attracted various domestic and international visitors. Visitors have used social media during the pandemic to remain informed (Melnychenko et al. 2021).

The potential of Pagerjurang Bayat ceramics must be increased to improve the quality of the products and improve product saleability. The village also has the necessary attributes, such as location, memorability, functionality, and suitability, to be visited by consumers (Antchak and Adams, 2020). Pagerjurang ceramic products have a shiny brown surface due to reduction firing during the cooling process using green Trembesi leaf (*Samanea saman*) as the fuel. Generally, the ceramic production process and technique still use the traditional tilted throwing approach. This is a conventional technique in which the potters' wheels are tilted to one side.

With the improvement of quality in terms of standard combustion

temperatures in ceramic science and the use of glaze as finishing, there is an increase in competitiveness in ceramics that meet quality standards while being in demand by consumers, which means increasing selling power. Thus, people's welfare is increasing at a significant selling price.

1.2 Problem Formulation

The Pagerjurang ceramic type is categorized as a low-temperature ceramic and below the ductile-brittle transition temperature at room temperature (Shon 2021). In terms of aesthetics and ergonomics, the products have passed the norm; however, the products are not food grade, and the interactions and effects of water temperature with the vessel are not up to par (Alresheedi and Basu 2020). Because of the porous characteristics of the ceramics, food and beverage residue can become stuck within the pores and cause bacterial build-up. Thus, an increase in teapot quality is needed without decreasing the special local rate of the Pagerjurang teapot. One way to increase the quality is by using the glazing technique. Glazing could increase the shine factor (Guan et al. 2021) and create a protective layer on the ceramic wall.

1.3 Purpose and Objectives

To increase the ceramic quality in Pagerjurang village, extensive research and testing of the raw material are needed to ensure that it can be glazed. To achieve the glazing process's firing temperature of 1100 ◦C, 25% silica is added to the clay. Silica is an additive that increases the mixture's firing temperature and mechanical and chemical properties (Rahman and Padavettan 2012), thereby improving material quality and aesthetic value.

This innovation does not diminish the ceramics existing traditional quality. Maintaining the teapot's standard rate, the ceramic products' relevance to customers is maintained (Sharifi et al. 2021). Silica, as an additive, also serves as a base for the glazing process, which occurs at 1050 ◦C. Glazing frit made of recycled glass is used instead of the conventional frit used in the ceramic industry (Gol et al. 2021). At low temperatures, the glaze has good flexibility at the start of the firing process. At temperatures of 950-1000 ◦C, the geopolymer within the glaze changes into leucite crystals, but basalt fibers can withstand the temperature.

1.4 Research Usability

Based on the desire to increase the potential of available clay, a high-quality and artistically valuable ceramic teapot is made from said clay to target mid to high-income customers. These customers consider the variety, quality, and price of the teapot. Furthermore, customer experience, parking space, and kiosk aesthetics influence customers' decisions to purchase products (Gupta et al., 2021).

2. Method

This study used the qualitative-exploratory method to define the teapot innovation process. This method increases the likelihood of innovation success by paying critical attention to success and challenges (Meixner and Hathcoat 2019). The qualitative-experimental approach aims to develop new ideas and strategies in research and exploratory applications (Zheng and Chang 2021). At the same time, to obtain a coherent image of the usage of visual art elements, aesthetic values, such as lines, color, texture, rhythm, and form, are explored thoroughly (Panova 2018). An aesthetic approach to obtaining beauty and unique characteristics through a production process is a detailed procedure developed and applied systematically (Koonthong, Aphirathing, and Sriruksa 2020). Balance, harmony, contrast, and proportions are other aesthetics that effectively produce a direct evaluation of product credibility (Alsudani and Casey, 2009).

Beyond forms and colors, function and texture can also influence the end product of innovation (Yueming 2021). Aesthetic theory helps in the design process. The creation of the teapot focuses on aesthetic appearance and physical function as unique characteristics (Jalali-Farahani et al. 2021). The aesthetic theory emphasizes artistic work as the center of interest in terms of exciting visuals so that creation becomes the consumer's center of attention (Ray 2019). As- this can also be used to demonstrate the freshness and uniqueness of new teapot innovations. Art has a disclosive function that engages in beauty and enunciates existential truths. The experimental process, combined with material innovation and finishing, creates new ideas and strategies for exploring new creations (Zheng and Chang 2021). Uniqueness is sought because of the substantial freedom related to its creation and fabrication (Marsico et al., 2020). Thus, this innovation offers a new image for Pagerjurang's ceramic products using the glazing technique.

The exploration phase in the creative process is needed to create a teapot that is both artistic and creative (Goryacheva and Kartavtseva 2021). Researching references and new ideas to develop new concepts are some things that must be done in the exploration phase. Inspiration for ideas could also come from subliminal sources (Park and Kang 2021). A well-developed concept and product lead to a more meaningful teapot product. This method was used in this teapot innovation before the teapot entered clay media. Shape exploration can be performed faster by sketching various teapot shapes on paper. The best sketch is then selected and made in clay media. The creation of the teapot is performed in coherent stages so that the desired expression and theme remain consistent during the creation process, namely starting from data collection, sketch analysis, designing, preparation of tools and materials, and the process of creating the teapot and finishing it. The creation of this teapot begins with the transformation of a sketch into a three-dimensional form by making the teapot's body using the wheel throwing technique. After completing the body, the next step is baking biscuits, which is then continued with the application of the glazing material. The final creation process is the application of glaze at a high temperature. The glaze in flake form is attached to the ceramic body through the high-temperature combustion process (Brasileiro et al. 2021).

The innovation process begins with direct observation of the nature and character of Pagerju- rang's clay and ceramic products. Exploration of theoretical foundations, sources, and references, as well as visual references that can be used as material, is undertaken to obtain a base concept. Reference sources from literature studies, such as craft, aesthetic,

and ergonomic theories, are explained as the sources of innovation and theoretical basis. The design stage transforms ideas into a two-dimensional design. The design of the teapot sketch considers several aspects of the material, technique, form, process, aesthetic elements, message, and ergonomics. The next step is visualizing ideas from the sketch design in the three-dimensional structure.

The technology to create new products for this ceramic teapot expands on existing traditional ceramic-making technology (Hansen 2021). The conventional technology in Pagerjurang uses a tilted throwing technique. This technique is a local signature technique for making Pagerjurang ceramics. The current innovation uses this technique as a basis. The next stage is assembling each part, such as the body, handle, funnel, and lid, to form a single teapot. The product of the throwing technique is generally cylindrical. The geometric properties and basic topology of the master teapot are both cylindrical and connected (Bray et al. 2021). Then, the process of drying, glazing, and burning occurs. Glazing gives the impression of developed technology, imitation, and modern (Guan et al. 2021). Next is the evaluation of all processes covering various aspects, in terms of aesthetics, function, and ergonomics. This teapot innovation is designed to have a practical function as a drinking container that has aesthetic value and is comfortable when used.

3. Results and Discussion

3.1 Innovation source

The development of the potential of natural resources in the form of clay from Pagerjurang earth-unware is the main focus in the manufacture of this innovation. This ceramic teapot innovation maintains the unique characteristics of the Pagerjurang clay product using engobe decorations and finishing glaze (Mastuti 2019). These characteristics are used to create a visual identity and quality from the creation of teapot innovations with self-branding and to be attractive to consumers.

Pagerjurang ceramics are made using low-temperature firing. The firing process is traditionally performed using a wood-fired stove (Astuti 2018). In general, in Indonesia, many ceramic objects refer to clay that is burned at low temperatures and is brick red or sometimes blackish-brown in color. The base of this type of ceramic object remains part of the science of ceramics, namely the manufacture of objects from nonorganic materials as a result of the firing process.

The experiment on clay was conducted by mixing the available clay with silica. This combination produces new properties in the mixture, which can be fired at higher temperatures. Ceramic products undergo microstructural changes that depend on the origin, the type of material selected, the process, and the composition for the specified thermal, heating rate, and temperature (Figueirêdo et al. 2019). In this teapot innovation process, experiments were performed to obtain the correct formulation so that the clay material could be glazed.

The teapot as a container for drinking water is a functional object that has been produced by Pagerjurang craftspeople for a long time. The Majapahit Kingdom left archaeological traces in various areas in East Java in the form of teapots. The Majapahit Kingdom also left many terracotta ceramics. The legacy of the Majapahit Kingdom in Java takes the form of *kendhi*, a type of drinking water vessel, which is still made today by the craftsmen of Mlaten Trowulan

Mojokerto, East Java (Budiarto, Setianingsih, and Artiono 2020). Some teapots can also be seen on some of the terracotta products in the Trowulan Museum. Many of the found ceramic objects were in the form of *kendhi*, proving that the ceramic product displays high craftsmanship, especially at the aesthetic level. A teapot is an object that is quite iconic for several purposes in every region. Not only is it a functional object as a container for drinking water, but it is also a medium for certain rituals in certain areas. Most of the ceramic objects used as offerings or ritual tools are in the form of jars, statues, and others (Independent researcher, Yucatan, Mexico, et al. 2021). Therefore, teapot innovation is a step toward developing the potential of cultural and natural resources to be able to adapt to contemporary culture.

Approximately 30 percent of the craftspeople in Pagerjurang focus their efforts on teapot products. However, the shape and types of finishing used remain the same. Regarding the teapot's classic function as a drinking vessel, preparation steps are needed so that the smell of clay is not overpowering during initial use. Traditionally, this step was accomplished by boiling the teapot in a strong brew of tea (Chung et al. 2015). Both of these factors serve as an inspiration point for the realization of this innovation by applying materials and finishes that allow the soil to be nonporous so that it can be used directly, and it does not smell or taste like clay and is aesthetically pleasing.

The aesthetic approach has a role in analyzing the shape of the reference teapot in terms of shape, color, and texture. Understanding relational dynamics is central to aesthetics (Louis- grand and Islam 2021). An ergonomic approach is used to analyze functional and economical aspects. Cultural aspects in the form of beauty are also a consideration and a motivation to preserve ecological diversity in certain areas (Tribot et al. 2016). The innovation process begins by conducting a real-time survey of selected craftspeople (Abd Halim et al. 2018). Additional references are obtained by collecting data through literary research into reference books, journals, and other sources.

3.2 Teapot Design

The initial stage in the teapot-making innovation process is creating a design drawing. Each design is drawn independently, producing sketches that are relatively free and sufficiently ambiguous to obtain various options from the design process (Purcell and Gero 1998). The design of the teapot makes it easier for the innovation steps to be realized. The teapot innovation stages are exploration, design, and creation. Based on the results of the analysis, the sketch is then used to create a teapot design, which is transformed into an innovative ceramic teapot. Some of the teapot designs that have been created and selected can be seen in Figures 2-5.

Figure 1. Teapot design sketch for Cobalt-Glazed Long Handle Teko (Sketch: Timbul Raharjo, 2021)

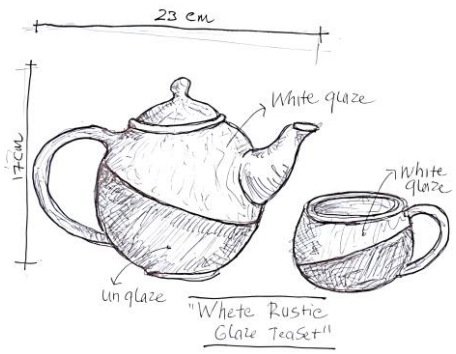

Figure 2. Teapot design sketch for White Rustic Glaze Teko (Sketch: Timbul Raharjo, 2021)

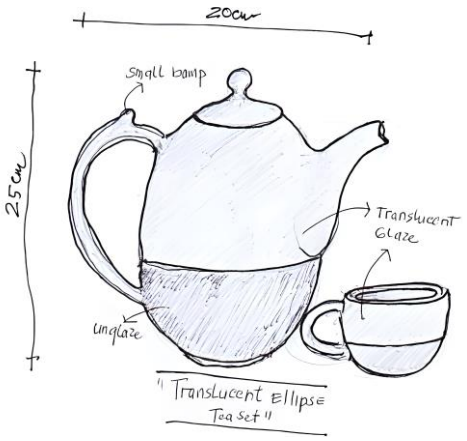

Figure 3. Teapot design sketch for Translucent Elips Teko (Sketch: Timbul Raharjo, 2021)

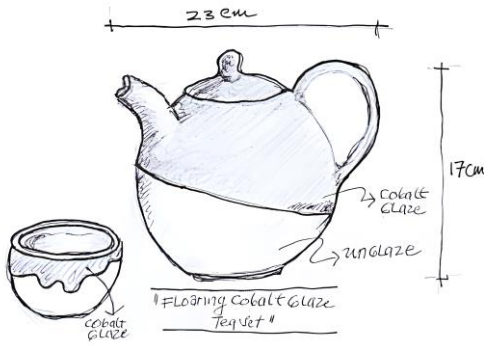

Figure 4: Teapot design sketch for Floating Cobalt-Glazed Teko (Sketch: Timbul Raharjo, 2021)

3.3 Creation Process

Ceramic materials consist mainly of silicates combined with silicon dioxide compounds (SiO2) and other metal oxides, such as Al2O3, CaO, K2O, or MgO (Matencio 2020). There are several types of clay used in the process of making ceramic teapots. Earthenware clay from Pagerjurang is sifted using a US 80 mesh sieve. Types of clay used as materials in the industry are very conservative in some parts of the world (Anbarasu and Sathyamoorthy 2020). This clay is generally reddish brown to dark brown and is brick red at 750 ◦C - 900 ◦C but will turn dark brown at 1150 ◦C. Pagerjurang clay is a soil material that tends to be dark in color and has high plasticity, so it is easy to shape (Mastuti 2019). The physical characteristics of being sticky and plastic make it easy to shape by turning.

Silica powder is usually the main ingredient in the glaze formula as a glass former. Still, when mixed with clay, it functions as a grog or material that can increase the strength of the clay's characteristics so that it is resistant to cracking and thermal shock. In addition, silica also increases the clay's melting point so that the mixture can be fired at high temperatures and glazed. Ceramics requiring high temperatures greater than 1000 ◦C show that nonfiring silica sintering is effective for compacting clay (Nakashima et al. 2018).

Ceramic glaze is a nonmetallic inorganic material containing at least some functional crystals and residual glass (Deubener et al. 2018). The glaze on ceramic teapots is necessary for valuable objects, especially food and drink containers. Glaze manufacturing teapots are used as a coating and coloring agent, which is applied to the clay body through a high-temperature firing process. Aside from being used as a pattern and texture, the glaze also functions as a coating layer that fills the pores in the ceramic body. Thus, the ceramic teapot can be cleaned quickly and prevent mold or bacteria from growing within the pores. Placing a glaze layer on the ceramic body is generally used to manufacture environmentally friendly industrial objects (Dantas et al. 2019).

The tools used in teapot innovation are divided into three groups: means for shaping, glazing, and firing. The turntable serves to form cylindrical items. The Butsir or loop tool is a detailing tool to shape parts of the clay body by scraping. The spatula helps to smooth the clay body and reduces parts of the clay body. Sponges serve to smooth the clay body surface. Cutting rope or wire serves to cut the clay and separate ceramics that are still wet from the turntable. Brushes are tools for coloring ceramic objects before burning them in the glaze. The furnace

operates for the process of firing biscuits and firing to glaze. The banding wheel serves as a place to place the body of the teapot to be decorated. This tool can be rotated to see the position of all parts of the teapot body.

3.4 Creation Technique

The turntable is a rotated disc so that the craftsperson can work on forming ceramics with cylindrical shapes using the throwing technique. This technique has several stages: centering, coning, perforating, raising the wall, thickness determination, and trimming. The teapot creation in this innovation process consists of several steps. First, clay is prepared by kneading to render the soil homogeneous. This method releases air bubbles or air pockets contained in the clay material. Air bubbles are considered in the formation so as not to cause damage as the temperature changes in the drying and firing processes (Liu et al. 2019). There are several techniques in the kneading process: pats, spiral folds, and the buffalo head technique. The technique used at this stage of creation is the lock technique because it pushes and rotates the clay consistently to form a clay spiral. The kneading process is performed on a table that can absorb water and is not sticky, generally using a table made of gypsum.

The sculpting of the teapot follows the design of the sketch. Sculpting with the throwing technique creates a balanced body size and even thickness. The throwing technique can be performed in three parts by making the lower, middle, and upper ceramic bodies, which are then joined in a semidry state (Mudra, Raharja, and Sukarya 2019). After the clay body is formed, it is allowed to stand until it is half dry. When it is half dry, the trimming process can be performed. Trimming aims to tidy up the lower part of the body by reducing the clay bit by bit, especially on the bottom of the teapot. The complementary aspects of the teapot body in the form of a funnel and handle are connected by gluing them using clay slip. Subsequently, the surface of each joint is smoothed using a wet sponge. The drying step is performed slowly (Delpech, Axcell, and Jouhara 2019), and the biscuits and glaze are fired. One week of air drying ensures that the teapot is free of moisture

Table 1, Glaze Formula (Primary, 2021)

Teapot Name	Material	Amount (%)
Cobalt Glazed Long Handle Teko	TSG	90
	Cobalt	5
	Manganese	5
White Rustic Glazed Teko	TSG	80
	Zircon	20
Translucent Elipa Teko	TSG	90
	Red Stain	10
Floating Cobalt Glazed Teko	TSG	80
	Manganese	5
	Zircon	15

Note.–TSG = Transparent Soft Glaze

3.5 Biscuit Firing

The first step in firing biscuits is to arrange the ceramic teapot in the furnace. Firing the biscuits at 900 ◦C produces a hardened teapot. This firing is performed to facilitate glaze application to the biscuits and reduce the risk of cracking when applying the glaze. We also considered shrinkage, water absorption, abrasion, and flexural strength in the biscuit firing process (D.-F. Lin et al. 2005). Firing biscuits usually takes approximately 6 hours; every 30 minutes, the temperature of the biscuits is increased slowly because they are prone to cracking due to the trapped water content, which quickly evaporates.

3.6 Glazing

After the biscuit firing process, the teapot is cleaned using a damp sponge to remove the remaining dust and residue from the combustion to ensure that the glaze can adhere properly. If there is a rough surface, it can be smoothed using sandpaper and then cleaned using a wet sponge to clean off the remaining dust from the sandpaper. After cleaning, the glaze is sprayed on and smeared on the ceramic surface (Kim et al. 2019). The glaze used in this innovation employs an independently developed glaze formula. The following are some glaze formulas applied during the teapot innovation process at a temperature of 1165 ˚C.

The glaze in this innovation uses a firing temperature of 1100 ˚C - 1165 ˚C. By identifying the temperature in the glaze firing process, it is possible to determine the characteristics of the glaze results, such as the color and texture of the glaze. The glaze firing process requires a relatively long time. The firing process can take up to 10 hours. Usually, the propane gas used to fuel the firing becomes cold and freezes, reducing gas pressure and making it difficult to increase the temperature. The way to overcome this obstacle is by pouring boiling water into the gas cylinder to remain liquid and maintain the gas pressure.

3.7 Innovation Results

The teapot is equipment to serve beverages, such as hot tea, to be enjoyed while conversing. The culture of drinking tea is well-developed with the proliferation of cafes and restaurants serving tea. Visually, the teapots from this innovation have better aesthetics and quality than their predecessors, including improvements in shape, aesthetics, ergonomics, and the quality of the clay material.

Figure 5. Innovation result entitled Cobalt Glazed Long Handle Teko (Photo: Sidik 2021)

In the first teapot innovation (Figure 6), a handle is on top, along with two cups with handles on the side. This blue-colored glaze is a float glaze that produces a melting effect containing flux on cobalt and manganese oxide. The melting result is supported by the white glaze applied over the blue glaze. At the time of the firing process, such a reaction occurs on the surface of the glaze. Applying the glaze uses a pouring and brushing technique utilizing different layering glazes that are burned at a temperature of 1180 ˚C. This teapot can hold approximately 800 ml of water, while the cup can hold 120 ml of water. Seen as a whole, this teapot shows a visually dark feel. It is a deliberate attempt to show that this ceramic teapot is made of earthenware. Thus, this innovation does not leave the characteristics of the material and culture of the Pagerjurang ceramic teapot.

Figure 6: Innovation result entitled White Rustic Glazed Teko (Photo: Sidik 2021)

The teapot entitled" White Rustic Glazed Teko" (Figure 7) uses opaque or solid glaze, and the glaze's color evenly covers the ceramic body's surface. Before applying the glaze to the bottom of the ceramic body, the base is coated with a

barrier material in the form of duct tape so that the glaze does not stick to it. Thus, there is a difference between the surfaces exposed to frost and those not. A rustic impression is provided by sprinkling a black underglaze using a toothbrush.

Figure 7. Innovation result entitled Translucent ellipse Teko (Photo: Sidik 2021)

The innovation of the teapot entitled" Translucent Ellipse Teko" (Figure 8) has an oval shape and is vertically slender. The glaze used is of the translucent type, which is almost transparent. However, because the material used is earthenware, which tends to have dark coloration, the pleasing effect does not stand out too much. At the same time, the cream color impression is accomplished by mixing in manganese oxide. In addition to its unique shape, the design on the handle has a small bump that has an ergonomic function during usage.

Figure 8: Innovation result entitled Floating Cobalt Glazed Teko (Photo: Sidik 2021)

In the fourth teapot, the glaze is applied using the spray technique in blue, white, and red layer sequences. An effect arises from the glaze's reaction to the firing process that produces a smoother surface. The teapot gives the impression that it's sturdy occurs through the monochrome brown-black color combination. The glaze application is the final display of the image made by this teapot innovation. The

whole work is successful in every aspect of the creation; it is an effort such that the resulting teapot has its character, the invention that can attract the attention of buyers.

3.8 Analysis and Interpretation

Research usability of teapot innovation in Pagerjurang ceramics includes the use of the process method of acting for carrying out the ember method of making ceramics with innovations accompanied by material preparation technology and the combustion process. Craftsmen do not need to change the way ceramics are formed, tilting rotation techniques as a traditional local skill. But just change the technology of the material processing process, the application of glaze, and combustion.

The technological devices in this process in Pagerjurang have been owned at the Rota Bayat Vocational High School (SMK) in the ceramics study program has sufficient equipment to conduct learning in the field of glaze ceramics. Innovation towards improving the quality and artistic value is one of the educational goals of the school. Thus, this technology transfer is important so that Pagerjurang Ceramics has continuity with the development of new product initiatives and creations that follow the times.

The results of this innovation experiment can be used as an innovation model so that Pagerjurang teapot products can learn and develop standard quality teapot production processes. Thus, an ecosystem of ceramic goods manufacturing processes is formed that has a wider market.

4. Conclusion

This functional ceramic teapot innovation is an upgrade of the potential of natural resources in the form of clay and the existence of a teapot that the Pagerjurang Bayat Klaten ceramic industry has traditionally produced. This innovation improves the quality of the material and its aesthetics without abandoning the unique characteristic of earthenware products. The existing teapot was upgraded to a teapot innovation with a better and more elegant glaze. The process of making teapots is performed using a rotary technique; this technique is identical to that for creating the ceramic teapots made by the Pagerjurang craftspeople. The shape of the design can be more flexible and precise and have consistent wall thickness. The innovation of the teapot yields in a tangible form that this teapot innovation is made by hand. This quality improvement could offer the Pagerjurang ceramic industry a bargaining position to attract consumers. Finally, this innovation could improve the welfare of craftspeople and the sustainability of traditional ceramics in Pagerjurang Bayat Village, Klaten, Central Java, Indonesia.

Suggestions in this paper, the important role of stakeholders from various parties, namely the Pagerjurang ceramic craftsman group, the government, business people, and the world of education work together to improve quality improvement efforts from various aspects such as equipment assistance and new technology workshop activities for craftsmen.

The Department of Industry, Tourism, and Trade of Klaten Regency continue to be committed to trying to develop aspects of productivity, marketing, and the environment. So that the community has awareness as a ceramic-producing area that has competitiveness as an area visited by many tourists. Thus this ceramic industry can be used as the main business and become the driving force of the economy in the Pagerjurang area.

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