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# From Tacit Knowledge to Global Value: Mapping the Transformation Potential of Local Ceramic Knowledge in Kasongan, Bayat, and Banyumulek through Science, Innovation, and Creative Entrepreneurship

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**ABSTRACT**
Traditional pottery knowledge in Indonesia is largely embodied as tacit knowledge acquired through generations of practice. This study identifies tacit knowledge in three pottery centers Kasongan, Bayat, and Banyumulek, Lombok and examines its transformation through science, innovation, and creative entrepreneurship. A practice-based research approach is employed through observation, documentation, comparative analysis, and material experimentation, with Kasongan as the primary case for more measurable testing. The study focuses on translating artisans' sensory, material, and experiential knowledge into more explicit, transferable, and measurable forms without reducing local identity. The findings are directed toward documenting traditional knowledge, supporting material and process innovation, encouraging contemporary design development, and creating added value. A Tacit Knowledge–Science–Innovation–Creative Entrepreneurship–Global Value framework is proposed to connect cultural heritage, scientific development, market relevance, and the sustainable welfare of artisan communities.

**KEYWORDS**
Tacit Knowledge, Indonesian Pottery, Traditional Knowledge, Innovation, Creative Entrepreneurship, Sustainability

## Introduction

Pottery constitutes an important heritage of material knowledge and traditional skill developed across generations in Indonesian communities. This knowledge is embodied not only in finished artifacts but also in artisans' competence to identify clay characteristics, regulate moisture and plasticity, select forming and decoration techniques, and control drying and firing processes [1]. Such competence emerges through direct experience, repeated practice, intergenerational transmission, and sustained interaction with materials and the surrounding environment. Kamal and Granicia emphasize that traditional pottery practices are closely connected to local

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resources and community needs, meaning that pottery form and function can be understood as a synthesis of material knowledge, empirical skill, environmental conditions, and cultural values [2]. In this study, three pottery centers Kasongan, Bayat, and Banyumulek Lombok are examined as representations of the diversity of Indonesian traditional pottery knowledge. These centers were selected because of their distinctive technical characteristics and local identities: Kasongan for material recognition and appliqué decoration, Bayat for slanted-wheel throwing and *ngireng* reduction firing, and Banyumulek for tamarind-based finishing and combinations with local materials.

The knowledge embedded in these practices can be categorized as *tacit knowledge* because it is developed through experience, sensory acuity, intuition, and embodied skill that cannot be fully articulated through written instruction. Describes this condition through the proposition that “we can know more than we can tell,” indicating that much skilled performance operates below the level of explicit verbal explanation. In pottery-making, artisans assess clay moisture through touch, regulate wall thickness through hand pressure, and anticipate firing progress through changes in flame color and material response [3]. Reinforces this perspective through the concept of “material thinking,” in which making is understood as an active correspondence between maker and material [4], argues that mature craftsmanship involves the hand as an autonomous organ of knowledge [5]. Further demonstrate that tacit craft knowledge, embedded within individual and communal experience, creates a major challenge for knowledge transfer and cultural sustainability; however, this challenge can be addressed through processes of knowledge accumulation, expression, diffusion, and reflection supported by collaboration between artisans and academics [6].

The continuity of pottery knowledge is increasingly challenged by social change, technological development, shifting market preferences, changing economic conditions, and the declining participation of younger generations in artisan professions. Knowledge traditionally transferred through direct involvement in production may gradually disappear when documentation and deliberate transmission mechanisms are absent. Ethnographic study of women pottery artisans in Pundong, Kasongan, and Bayat provides empirical evidence that throwing techniques, clay sensitivity, and firing judgment are transmitted intergenerationally, particularly from mother to daughter, functioning simultaneously as strategies of cultural preservation and economic survival [7]. This finding demonstrates that tacit knowledge in pottery is inseparable from kinship structures, gendered labor, and community-based learning. A parallel study of the Dinoyo ceramics industry also identifies limited artisan regeneration as an important factor affecting the continuity of ceramic centers and the inheritance of traditional skills [8].

The transformation of Indonesian pottery knowledge therefore needs to be developed through an encounter between traditional knowledge and scientific approaches rather than through the replacement of artisanal experience by modern technology. Empirical knowledge of clay and firing can be strengthened through testing of material composition, firing temperature, shrinkage, porosity, strength, color change, and dimensional stability, while traditional forming and decoration techniques can be documented, analyzed, and developed into new design possibilities. Research on Banyumulek pottery shows that the shift from traditional to semi-modern processes has transformed both form and function, moving from predominantly

utilitarian products toward greater aesthetic value [9]. Programs for environmentally friendly pottery development in Indonesia likewise demonstrate that alternative materials and waste utilization can expand artisans' understanding and encourage product diversification. At the same time, innovation should not be understood as the erasure of traditional identity. Harsanto's research on Indonesian craft-based MSMEs shows that cultural values shape the adoption of technology and innovation, with business actors actively using digital technologies for marketing while remaining cautious toward production technologies that may reduce authenticity and handmade character [10]. Community and association support also play an important role in encouraging sustainable innovation, while sustainability awareness has not always been consistently implemented throughout the value chain. These findings underline that pottery innovation should maintain the connection between product, skill, cultural identity, and producing communities, while also strengthening design, cultural narratives, marketing, and business models relevant to changing markets [11].

Based on these conditions, an important research gap remains: the transformation of tacit knowledge in Indonesian pottery has not yet been sufficiently integrated with scientific inquiry, material and design innovation, and creative entrepreneurship within a single framework oriented toward global value creation and community welfare. The sustainability of artisan livelihoods cannot depend solely on production capacity, but also requires stronger value networks, market access, business management, and supportive ecosystems. Accordingly, the development of Indonesian pottery needs to move beyond an orientation focused only on heritage preservation toward knowledge transformation and value creation through documentation, scientific testing, material and technique exploration, design renewal, and creative entrepreneurship. This study therefore proposes the Tacit Knowledge–Science–Innovation–Creative Entrepreneurship–Global Value framework as a basis for viewing science as a means of reinforcing rather than replacing tradition, innovation as a strategy for increasing relevance without erasing identity, and entrepreneurship as a process of generating sustainable cultural, social, and economic value. Within this framework, the sustainable welfare of artisan communities becomes the ultimate goal of transforming traditional pottery knowledge into a more explicit, adaptive, and globally relevant form.

## Methods

This study employs a practice-based research (PBR) approach combined with a qualitative-participatory method and material experimentation to examine the transformation of traditional pottery knowledge. Define PBR as original investigation undertaken to acquire new knowledge partly through practice and its outcomes; within this paradigm, the research proceeds through several stages: identification of tacit knowledge through observation, interviews, and documentation of artisans' work processes; externalization of knowledge by translating empirical experience into more explicit and documented information; material and technique experimentation to bring traditional knowledge into dialogue with scientific approaches; and design exploration and innovation through the making and evaluation of prototypes. The entire process is conducted reflectively and iteratively through the stages of exploration–making–evaluation–reflection–refinement, so that practice functions not only as a process of creation but also as a source of knowledge formation [13], [14].

More measurable material testing in this study is focused on Kasongan as the primary case, given the greater availability of samples and the more intensive field observation possible at that center. Bayat and Banyumulek are examined descriptively and comparatively, based on observation, documentation, and literature review, as a basis for more measurable material testing in future research. Data were analyzed thematically and through descriptive-comparative analysis. Data from observations, interviews, and documentation were categorized into themes of material knowledge, skill, production process, knowledge transfer, innovation, and value creation, while experimental results were analyzed by comparing the characteristics of the material, technique, and prototype outcomes. Data credibility was strengthened through source and method triangulation, member checking, process documentation, and repeated experimentation. All findings were then synthesized to formulate the Tacit Knowledge–Science–Innovation–Creative Entrepreneurship–Global Value framework, which explains the process of transforming traditional knowledge into knowledge that is more explicit, innovative, value-adding, and potentially supportive of the sustainability of artisan communities [15].

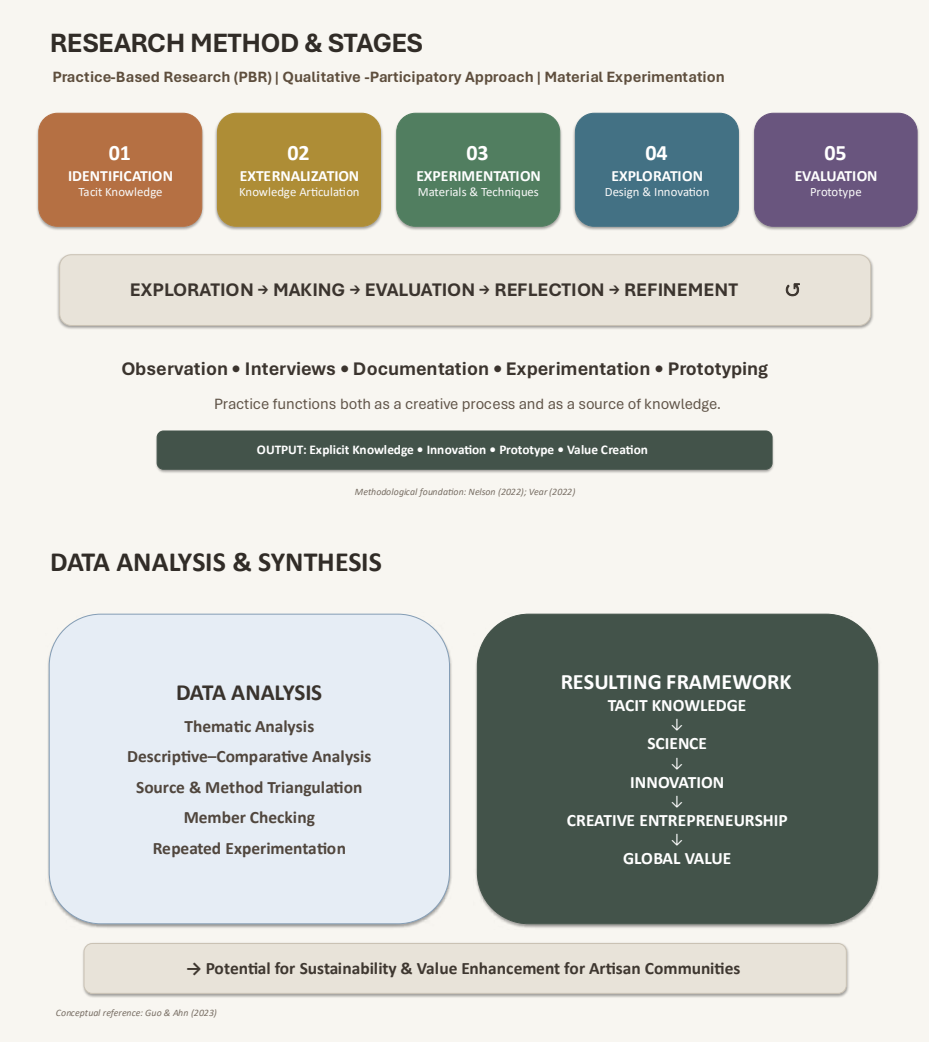



**Table 1.** Research Method and Stages
(Source: Authors' documentation, 2024)

## Literature and Review

### 1. Tacit Knowledge and Traditional Craft Knowledge

Traditional knowledge in craft is formed through direct engagement among artisans, materials, techniques, and the environment, sustained over long periods. Much of this knowledge is tacit in character, since the capacity to make cannot be entirely explained through written rules but is instead stored in experience, intuition, sensory acuity, hand movement, and judgments that arise during the act of working. Frames this as the tacit dimension of knowledge, distinguishing focal awareness, explicit attention directed at the task at hand, from subsidiary awareness, the background knowledge that supports skilled action without being consciously articulated. In traditional craft contexts [16]. Guo and Ahn show that this tacit character can become a challenge to knowledge transmission because such knowledge is often bound to individual practitioners their research finds that its sustainability can be strengthened through four processes: knowledge accumulation, knowledge expression, knowledge diffusion, and knowledge reflection [17].

Building on this line of thought, tacit knowledge in craft creation operates through three interrelated dimensions: perceptual, material, and reflective, corresponding respectively to trained sensory judgment, the dialogical relationship between maker and material articulated by Ingold [18] and the conscious articulation of implicit experience into communicable knowledge [19] This three-dimensional lens is adopted in the present study to organize the identification of tacit knowledge across the three pottery centers, positioning artisans' knowledge not merely as a production skill but as a knowledge asset that can be identified, shared, developed, and inherited.

### 2. Knowledge Transformation and Scientific Development

The transformation of craft knowledge is a process of translating part of this embodied experience into knowledge that is more open, documented, testable, and transferable. This process is not intended to replace artisans' expertise with academic knowledge, but to bring the two together through documentation, experimentation, measurement, interpretation, and reflection. Practice-based research treats practice as an integral part of the research process, such that the act of making, the resulting artifact, experimental failure, and reflection on process can all contribute to the formation of knowledge. Define this paradigm as an original investigation undertaken to acquire new knowledge partly through practice and its outcomes {20}. In pottery craft, this approach allows experiential knowledge of clay, forming technique, decoration, drying, and firing to be developed through material research and creative practice without severing it from the cultural context that produced it [21].

### 3. Innovation and Creative Value

This transformation subsequently opens opportunities for innovation in materials, techniques, processes, design, and products. Innovation in craft need not be understood as the replacement of traditional methods with new technology, but as a process that brings inherited knowledge into dialogue with contemporary needs to produce new functions and value [22]. This view

affirms that sustainable innovation in craft requires a balance among cultural authenticity, technological adaptation, market relevance, and sustainability.

### 4. Creative Entrepreneurship and Global Value

Knowledge and innovation do not automatically generate economic value unless connected to the capacity to create, communicate, and distribute value. Traditional knowledge, viewed through the lens of creative entrepreneurship, can be developed into a source of differentiation through design innovation, craftsmanship quality, cultural narrative, material identity, brand strategy, and market access. Global value in this study is therefore not confined to a product's ability to enter international markets but encompasses the enhancement of cultural, knowledge, creative, and economic value. Transforming local knowledge into global value requires an ecosystem that preserves cultural character while enabling innovation and market development.

### 5. Sustainability and Community Welfare

The sustainability of craft in this study is viewed multidimensionally, encompassing cultural, social, economic, and environmental dimensions. Cultural sustainability concerns the intergenerational continuity of knowledge and skill; the social dimension concerns participation, collaboration, and capacity building within the community; the economic dimension concerns the capacity to create added value and a decent livelihood; while the environmental dimension concerns more responsible use of materials and production processes {23}. Collaboration between artisans and academics can strengthen the sustainability of craft through mechanisms of knowledge sharing and reflection.

### 6. Conceptual Framework

Building on this review, the present study treats tacit knowledge as a primary resource rather than merely an object to be preserved. Following the perceptual–material–reflective framework outlined above, the empirical knowledge embedded in artisans' practice is first identified and documented, allowing part of it to be externalized. This knowledge is then brought into dialogue with scientific inquiry through experimentation with materials, techniques, processes, design, and evaluation. The results of this transformation form the basis for innovation, while creative entrepreneurship connects innovation with value creation. This process is directed toward the formation of value that is not solely economic but also cultural, epistemic, social, and creative. The framework is consistent with the view that the sustainability of craft requires a dynamic knowledge-sharing mechanism together with an innovation ecosystem that continues to respect cultural authenticity. It further guides the organization of the Results and Discussion section, which proceeds by identifying tacit knowledge at each center, its scientific transformation, material and design innovation, and, finally, the direction of creative entrepreneurship and global value.

## Result

Traditional knowledge in the production of Indonesian pottery can be understood as the outcome of communities' creativity in utilizing natural resources while adapting them to social

and cultural needs. This knowledge does not merely concern the skill of shaping clay but encompasses the ability to read material properties, select appropriate materials, develop simple tools, determine work sequences, and produce distinctive visual character. The existence of the Kasongan, Bayat, and Banyumulek pottery centers constitutes a creative territory that demonstrates how craft knowledge grows out of a sustained relationship among people, materials, the environment, techniques, and intergenerational experience.

### 1. Tacit Knowledge of Material Kasongan

Research on the characteristics of Kasongan clay shows that the mineralogical properties of the raw material influence the color and character of pottery products, while a study in Bayat likewise affirms the relationship between local clay quality and the development of the community's distinctive production techniques. This indicates that natural wealth is not merely a source of raw material but also the basis for the formation of a local craft knowledge system. In Kasongan, forms of tacit knowledge can be traced from the stage of clay recognition, through material processing, hand-forming technology, and body decoration, to firing and finishing using natural materials sourced from the artisans' immediate environment.

Artisans develop the ability to recognize the suitability of clay through sensory experience, which they then process into material appropriate for production. The initial stage of clay testing, as traditionally practiced, involves identifying the source location and determining sampling points that potentially contain usable raw material. Site selection must consider the availability of an adequate deposit, the material's suitability for forming, ease of access, and the source's long-term environmental sustainability. Every clay deposit has distinct characteristics arising from differences in mineral composition, organic content, and other constituents. These compositional differences affect plasticity, the degree of maturation during firing, shrinkage, density, body strength, and post-firing color.

Recognizing the source of clay is therefore an essential step in determining its suitability as raw material and forms the basis for the material testing conducted at the next stage. Once a source has been located, a sample can be tested through a simple manual procedure that draws on artisans' empirical knowledge. The clay is kneaded, pressed, and worked with the addition of sufficient water until a plastic condition is reached, after which its stickiness, pliability, homogeneity, and ability to hold form are observed. One straightforward test involves shaping the clay into a ball, coil, or other test form to observe any cracking or deformation. In this basic test, a clay ball is soaked in water; if it does not disintegrate within one to two hours, the clay can be considered suitable for further testing.

Clay that has passed this initial manual test needs to be examined further to obtain more reliable information on its character and suitability as pottery raw material. Subsequent testing can be carried out using a ring test or by preparing controlled-size test pieces to observe plasticity and shrinkage. Forming behavior can also be observed by producing small samples using basic ceramic techniques such as pinching, coiling, and slab-building. These samples are then dried and fired at a specified temperature to assess changes in dimensions, color, strength, the likelihood of cracking or deformation, and the resulting body character. Through this process, the empirical testing rooted in artisans' experience can be developed through more

systematic measurement, so that tacit knowledge concerning material can gradually be transformed into knowledge that is more explicit and measurable.

This empirical testing represents a form of tacit knowledge, since decisions regarding the suitability of clay are largely grounded in the artisan's hand sensitivity and experiential judgment when interacting with the material, precisely the kind of subsidiary, embodied awareness described [24], transmitted through the mechanism of tacit teaching identified [25], in which knowledge is passed on through repeated demonstration and closely guided correction rather than verbal instruction. These traditional observations need to be further developed through more rigorous testing, including plasticity, drying and firing shrinkage, water absorption, porosity, body strength, color change, and response to firing temperature. In this way, traditional knowledge is not discarded but transformed and reinforced through a ceramic-science approach, producing material knowledge that is more explicit, documented, and reproducible.



**Figure 1.** Traditional manual testing of clay at a site presumed to contain suitable material, through kneading and pressing, forming it into a ball, and assessing plasticity by shaping small coils or rings; if no cracking occurs, the clay is deemed suitable as raw material for pottery production.
(Source: Arif Suharson, 2026)

## 2. Tacit Knowledge of Forming Technique Kasongan

Pottery has a long history in the development of human civilization, originally created to meet various needs of daily life, particularly as a container (wadah) for storing, processing, and serving food and drink, as well as for supporting other household activities. The strong connection between form and function meant that early traditional pottery tended toward relatively simple forms with limited variation. A rounded basic form on the body and base was widely used because it suited the character of the manual forming technique and functional need, while the rim or lip, locally termed lambe, was shaped simply according to the intended use of each vessel.

The tatap-lambung technique further illustrates how the body of a vessel is formed by combining an external paddle with an internal anvil stone so that the wall becomes more even and the form can develop in a controlled manner. Traditional wheel techniques employing kerik (scraping) and dalim (smoothing) are still used, for instance, in producing traditional household items in Kasongan [26]. Such techniques exemplify what  calls a correspondence between maker and material, an active dialogue rather than a one-directional imposition of form, and what describes as a negotiation between resistance and accommodation, in which the hand's skill and the material's nature mutually adjust to produce a result that neither could achieve alone

[27]. This shows that artisans' hand-based experience constitutes a form of technological knowledge born through practice rather than through written instruction.



**Figure 2.** Traditional knowledge of forming a cylindrical shape using a coil-and-wheel technique, shaping the body with a bamboo-strip scraper, and finishing the rim with dalim, a soft cloth used to smooth the lip of the piece.
(Source: Arif Suharson, 2026)

## 3. Tacit Knowledge of Decoration, Drying, and Firing (Kasongan)

Kasongan's distinctiveness is further evident in its appliqué decoration technique (dekorasi tempel), in which additional pieces of clay are applied to the surface of the vessel body to form decorative ornament. This technique has developed into one of Kasongan's key visual identities. Positions the appliqué technique as a form of local genius with both aesthetic value and potential for development to suit contemporary design needs. The same study also notes challenges in regeneration, since the appliqué process demands greater manual skill, time, and patience than mold-based production. This finding is significant, as it shows that innovation need not replace traditional techniques; rather, it can be directed toward reinterpreting appliqué decoration into designs better suited to present-day needs, thereby preserving local identity [28].



**Figure 3.** The jaran ukir (carved-horse) form with appliqué decoration, an iconic product of the Kasongan pottery center.
(Source: Authors' documentation, 2024)

Appliqué decoration on the jaran ukir (carved horse) form features distinctive shapes that are a hallmark of Kasongan's local culture. This decoration is composed with measured precision to fill empty fields and reinforce the form of the jaran ukir. The characteristic ornaments produced through this appliqué technique consist of ulir (spiral), cukitan (incising), sisik bulet (round scale), sisik lonjong (oval scale), and ukel (curl) motifs. According to several remaining

jaran ukir artisans able to provide information on this practice, there is no fixed rule governing the placement of appliqué decoration.

The appliqué forms found on jaran ukir tend to look alike from one artisan to another because of an imitative process that has, in effect, become an unwritten rule. Yet if a different decorative style were applied to a field conventionally filled with spiral (ulir) motifs, replacing it, for example, with oval-scale (sisik lonjong) motifs, there would be no prohibition against doing so. It is simply that artisans have grown comfortable and settled with the existing forms and are reluctant to experiment with alternatives or to depart from tradition.

**Table 2.** Names, forms, and descriptions of appliqué decoration as a basis for developing new forms for global markets
(Source: Authors' documentation, 2024)

| No. | Name and Form of Appliqué Decoration | Description of Appliqué Decoration |
|---|---|---|
| 1 |  ***Sisik lonjong (oval scale), sisik manuk (bird scale)*** | Sisik lonjong or sisik manuk is an appliqué decoration applied to bird-feather forms, horse-tail forms, edge decoration, and other suitable details on pottery products. |
| 2 |  ***Sisik bunder (round scale), sisik iwak (fish scale)*** | Sisik bunder or sisik iwak is an appliqué decoration applied to dragon-scale forms, fish-scale forms, goat-hair forms, edge decoration, an interlaced-rope impression, and other suitable details on pottery products. |
| 3 |  ***Ulir, ukel (spiral/curl)*** | Ulir-ukel and spiral motifs are appliqué decorations applied to hair forms on figurines, edge decoration, an impression of coral or rippling water, and other suitable details on pottery products. |
| 4 |  ***Cukitan (incising)*** | The cukitan technique is similar to isen-isen, or the addition of surface emphasis intended to enhance the form. It is produced with a tool called cukit — resembling a knife made of bamboo, wood, or plastic — that leaves marks on the surface in the form of lines, dots, or other patterns depending on the tool used. |

The four most fundamental appliqué decorations, which constitute the hallmark ornamentation of the Kasongan pottery center, are sisik lonjong, sisik bunder, ulir-ukel, and cukitan. Aesthetically, this ornamentation embodies specific meanings and intentions. The refinement of feeling, creation, and intention expressed through these appliqué forms relates to balance, neatness, honesty, patience, delicacy, and communal spirit. These values constitute the local cultural values of Kasongan Village, so that their regeneration also requires a corresponding sensitivity in artistic creation, particularly in becoming a pekundhi — the artisans' fundamental identity in Kasongan Village.

This shared character across various traditional pottery forms indicates that early design development was largely determined by use value, material properties, and production techniques. However, experience passed down across generations has since formed specialized knowledge of the relationship among material, technique, form, and function, which in turn has become an important part of the tacit knowledge held by pottery-artisan communities.

An ethnoscience study of the Kasongan pottery-making process shows that artisans' traditional knowledge concerns not only the skill of processing and shaping clay but also an empirical understanding of drying and firing. At the drying stage, a freshly formed vessel is not placed directly under sunlight but is first air-dried gradually. This is done to allow the moisture content within the vessel body to decrease progressively and evenly, thereby minimizing the risk of cracking or deformation. Artisans recognize the degree of dryness through visual changes in the vessel body, particularly the clay lightening in color. Once a certain condition is met, the piece can be dried in direct sunlight until it reaches an adequate level of dryness before proceeding to firing. This capacity to read changes in color, texture, and the condition of the vessel body is a form of tacit knowledge acquired through practice passed down across generations.

Empirical knowledge is likewise evident in the arrangement of vessels within the kiln and the control of firing. In a traditional firing system without special support shelves, artisans arrange pieces by size, weight, form, and stability. Large and heavy pieces are placed at the bottom, while smaller and lighter products are stacked above in a mutually supporting or interlocking pattern. This arrangement aims to maintain the stack's stability while reducing the risk of damage if cracking or breakage occurs during firing. Firing then proceeds in stages, beginning with a gradual initial heating to expel residual moisture and avoid thermal shock to the vessel body, after which the fire intensity is progressively increased.

Artisans read changes in the color of the vessel body and the condition of the flame as empirical indicators of temperature development; a shift toward a glowing red color serves as one empirical sign that firing has reached the desired degree of maturity. This knowledge of arrangement, heating stages, flame character, color change, and the determination of maturity indicates that traditional firing embodies a complex system of technical knowledge, even though its temperature parameters were not originally expressed through scientific measurement. This is precisely a form of tacit knowledge that can be documented and further developed through temperature measurements and ceramic testing, thereby becoming more explicit and measurable knowledge.

## 4. Tacit Knowledge of Bayat

Traditional knowledge with a distinctly different character is found in the pottery tradition of Melikan-Bayat, particularly through the use of the slanted-wheel throwing technique. Pakarti's research shows that this technique is an indigenous technology passed down across generations, enabling artisans to produce relatively thin vessel walls, accurate cylindrical forms, and comparatively high productivity. The same study positions the slanted-wheel technique as a form of indigenous knowledge associated with women's roles in Bayat's pottery-making tradition. Available literature describes this technique as a highly distinctive feature uncommon in other Indonesian pottery centers, so it is academically safer to describe it as a rare technology characteristic of Bayat rather than as the sole technique of its kind in the world. Its philosophical meaning is also connected to the position of a woman's body while working, in line with the value of propriety in Javanese culture; the production tool is thus not merely a technical instrument but also a representation of the social and cultural values of the community that uses it [29]. This gendered dimension is corroborated empirically whose ethnographic study of women pottery artisans in Pundong, Kasongan, and Bayat found that throwing technique, clay sensitivity, and firing judgment in these communities are transmitted hereditarily from mother to daughter, underscoring that the tacit knowledge examined in the present study is inseparable from kinship structure and gendered labor [30].

The traditional wheel is typically made of wood, fitted with a bearing, positioned at an angle, and supported by a wooden frame so that it rotates in a stable, sturdy manner. The axle is joined with wood, connected to bamboo, and wound with dadung cord so that it can rotate; foot movement drives the wheel or the axle of the turning table. The potter's own body position is likewise angled to match the slanted wheel. Beyond the slanted wheel itself, the pottery-making process is supported by several simple tools with specific functions, including larik, dingklik, kobe, and natap. Larik and natap are generally made from bamboo, shaped to suit the artisan's needs. Larik is used mainly at the surface-finishing stage, once a piece has reached a leather-hard or sufficiently firm condition for working [31].



**Figure 4.** The slanted wheel and its supporting tools.
(Source: Authors' documentation, 2024)

It is made thin and slightly curved so that it can follow the contour of the vessel's surface. It is used while the piece rotates, with the outer surface gently scraped to remove excess thickness, even out the wall, refine the profile, and produce a smoother, neater surface. Determining the pressure of the tool, hand position, and the degree of dryness of the body is part of the artisan's

empirical knowledge, gained through practical experience. Unlike larik, natap is used while the clay is still plastic and the forming process is still underway on the wheel. This tool is flat and straight, roughly 2 cm wide and 10 cm long, and helps control and even out the outer wall of the vessel, particularly for pieces that require a relatively straight surface without excessive curvature.

The use of natap allows the artisan to maintain the wall's thickness, direction, and stability during the forming process. Kobe, meanwhile, is a flat wooden tool with a hole at its center, used mainly for forming concave-profiled objects such as plates and cowek (mortar bowls). Beyond helping produce a more controlled curvature, kobe also serves to even out the surface of the vessel body, since the pressure of the tool can be directly controlled by the artisan's hand as the piece rotates. These traditional tools are not merely production implements but part of the artisan's technical knowledge system, since their effective use depends heavily on hand sensitivity, experience with the material, and the ability to control the tool's movement throughout the forming process.



**Figure 5.** The method of using the slanted wheel and the process of forming a product on it. (Source: Authors' documentation, 2024)

Bayat's distinctiveness is likewise evident in surface treatment and firing. The ngusik technique is used to produce a body that is denser, smoother, and more lustrous. In ceramic practice more broadly, this technique is generally known as burnishing. The luster of the vessel body is achieved by rubbing it with a smooth object, the back of a spoon, marble stone, or, in Bayat, typically klambu, a plastic material commonly used as a protective mosquito cover for infants, shaped like a small box. The klambu is rubbed onto the body while it is still leather-hard, or greenware. Meanwhile, the reduction-firing technique locally known as ngireng produces the dark coloration that constitutes a distinctive visual character of Bayat pottery. Research on the development of pottery finishing shows that the ngireng process is connected to reduced-oxygen conditions during firing, which affect the color of the ceramic body.



**Figure 6.** Pagerjurang Bayat pottery products resulting from the ngireng reduction-firing technique. (Source: Authors' documentation, 2024)

Organic materials such as trembesi-munggur (rain-tree) leaves and other biomass, drawn from local Bayat practice, can be used to create a reducing atmosphere during or after firing. This kind of knowledge reflects an empirical understanding of the interactions among fire, organic material, firing atmosphere, and color change, even though it was not originally explained in terms of chemistry or materials science.

## 5. Tacit Knowledge of Banyumulek

Kasongan and Bayat pottery already display significant differences in their rich and distinctive bodies of traditional knowledge. The pottery center of Banyumulek, Lombok, likewise possesses its own character, presenting a different form of innovation at the finishing and decoration stage. Research on Banyumulek pottery shows that artisans employ various incising, weaving, and surface-treatment techniques to enhance the aesthetic value of their products through tamarind finishing. This traditional technique, developed in Banyumulek, Lombok, uses an acid-based solution applied to the vessel body while it is still hot immediately after firing, producing decorative mottled patterns on the surface. Documentation of Banyumulek practice describes using a liquid derived from parts of the tamarind plant to create a speckled or mottled coloration on the body of the heated vessel. From a scientific perspective, this practice is of interest because it demonstrates the use of a local organic material as a surface-effect-forming agent. This technique warrants further study to determine the relationships among solution composition, body temperature at the time of application, the resulting mottled pattern, and colorfastness, so that this empirical knowledge can be developed into more measurable knowledge.



**Figure 7.** Banyumulek Lombok pottery products with tamarind finishing and applied rattan and other natural-fiber elements.
(Source: Authors' documentation, 2024)

Innovation in Banyumulek has also developed through the combination of pottery with other materials, such as rattan weaving, carving, and applied shell-fragment decoration. Studies of Banyumulek craft document the use of rattan-weaving techniques as decorative features that enhance visual appeal and product differentiation. The combination of pottery with rattan shows that craft value is generated not by a single material alone but through artisans' ability to combine skills across materials. This tradition also reflects a broader shift in design development, from utilitarian products toward decorative products aimed at a wider market. Carving or cukil techniques in some practices are likewise combined with additional materials such as eggshell, sand, fabric, or other decorative elements. Conceptually, this process reflects an important shift from material value toward creative value, since the increase in value derives not solely from clay as raw material but from the creativity, technique, identity, and cultural narrative embedded in the product.



**Figure 8.** Product development applying rattan weaving, agel fiber, and other natural fibers.
(Source: Authors' documentation, 2026)



**Figure 9.** Further product development applying rattan weaving, agel fiber, and other natural fibers. (Source: Authors' documentation, 2026)

## 6. Comparative Synthesis Across the Three Centers

These three centers demonstrate that Indonesian pottery knowledge constitutes both a cultural resource and a source of innovation. Kasongan offers strength in appliqué technique and forming skill; Bayat displays excellence in slanted-wheel throwing technology, burnishing, and its distinctive firing technique; while Banyumulek shows creativity through finishing based on local materials, weaving, and material combination. This knowledge needs to be documented not in order to freeze it as a relic of the past, but to open possibilities for knowledge transformation. Affirm that the sustainability of craft requires processes of accumulation, expression, diffusion, and reflection of knowledge, and recent research on craft-based MSME innovation shows that innovation is more sustainable when it preserves cultural value and remains connected to technology, markets, and a supporting ecosystem [32].

Read through the perceptual-material-reflective framework, the identification of tacit knowledge across the three centers in this study corresponds most directly to the perceptual and material dimensions, while the more measurable scientific testing undertaken for Kasongan represents an initial move toward the reflective dimension, the conscious externalization of implicit experience into documented, testable knowledge that Schön (2016) associates with reflection-on-action. Seen this way, artisans' tacit knowledge can be developed into explicit knowledge, design knowledge, material innovation, cultural storytelling, and creative entrepreneurship. This transformation offers Indonesian pottery an opportunity for strong differentiation in the global market, since product value lies not only in function or form but also in the uniqueness of technique, hand skill, local resources, and cultural narrative that mass-produced industrial goods find difficult to replicate. The preservation of traditional knowledge can thus proceed hand in hand with the creation of economic value and the strengthening of community welfare.

## 7. Directions for Innovation, Creative Entrepreneurship, and Global Value

The transformation of tacit knowledge into more explicit knowledge can also become a key force for shifting the perception that traditional pottery is synonymous with an old, simple

product left behind by the times. On the contrary, knowledge of local materials, hand skills, forming techniques, decoration, finishing, and firing, passed down across generations, constitutes creative capital that mass production finds difficult to replicate. The challenge lies in translating this wealth of knowledge into a design and entrepreneurial language relevant to contemporary life.

Through a strategy of creative entrepreneurship, digital marketing, cultural storytelling, appealing photography and visual presentation, and brand-identity strengthening, pottery products can be repositioned as goods of both cultural and high economic value. With this approach, the narrative of who made a piece, where the material originated, how the traditional technique was carried out, and what cultural value it embodies becomes part of the product's value proposition, so that consumers purchase not merely an object but also an experience, knowledge, authenticity, and the cultural story that accompanies it.

This increase in value creates more room for local pottery to enter lifestyle needs and premium markets, for example, as interior and exterior elements in star-rated hotels, restaurants, resorts, and public spaces, as decorative products, and as tableware that supports food-plating experiences, bringing an elegant traditional touch to dining. Orientation toward the global market, therefore, need not push artisans to abandon local identity; on the contrary, that identity should become the primary strength in building differentiation and branding. The form, size, function, quality, and aesthetics of a product can continue to be developed to match the needs of contemporary architecture, interior design, culinary practice, and lifestyle, while material character, traditional technique, ornamentation, and cultural narrative remain preserved as identity.

Indonesia possesses a highly diverse wealth of natural resources with great potential to inspire creativity and innovation in pottery products. The availability of various local materials, as seen in the combination of rattan and shell fragments applied in Banyumulek, allows artisans not to rely solely on clay as the primary material, but also to explore other materials such as leaves, agel fiber, bark, stone, eggshell, and glass fragments as supporting elements that strengthen visual character and product value. Such combinations can produce an impression that is ethnic, exotic, contemporary, and modern all at once, depending on how the materials are applied and composed within the design. Developing products of this kind requires an understanding of material character, joining techniques, compositional form, color, texture, and suitability for product function, so that repeated experimentation becomes important for building new knowledge of the relationships among material, technique, form, function, and aesthetics.

The use of plant fiber, rattan, bark, stone, eggshell, or other natural materials can be understood as an eco-art approach when the selection, processing, and use of these materials take environmental impact and the sustainability of material sources into account. This approach offers pottery products the opportunity to acquire a new identity through the fusion of traditional skill, local material, ecological awareness, and contemporary aesthetics. However, the term eco-art should not be applied solely on the basis of the use of natural materials; aspects of material sourcing, production processes, waste, durability, and the product life cycle also need to be considered to ensure that sustainability claims rest on a stronger foundation.

The development of information technology further broadens this transformation. The internet, social media, digital platforms, and various visual media allow artisans to access references on design trends, interior needs, lifestyle, and market developments that were previously difficult to reach. Digital technology can also be used to convey the story of the material, traditional techniques, production processes, and cultural identity through compelling visual storytelling. Digitalization, therefore, need not erase traditional character; rather, it can serve as a means of bringing local knowledge into dialogue with contemporary taste and global markets.

The availability of local materials, improved equipment quality, greater openness to information, and the capacity to experiment ultimately enable artisans to create contemporary pottery that retains a strong local identity. Products can be developed as decorative objects, interior and exterior elements, tableware, spatial accessories, or lifestyle goods with a more specific character. The success of such innovation lies not in how far pottery departs from its tradition, but in the capacity to process traditional knowledge, local material wealth, creativity, technology, and market needs into new value. In this way, traditional pottery can move from a purely function-based product toward a creative product of high cultural and economic value, while strengthening the differentiation and branding of Indonesian pottery.

By applying a "local knowledge–contemporary design–global market" strategy, the pottery of Kasongan, Bayat, and Banyumulek has the opportunity to move up from a traditional handicraft to a high-value creative product. At this point, tacit knowledge is no longer regarded merely as a relic of the past but as intellectual and cultural capital with the potential to generate innovation, strengthen local branding, create advantages that are difficult for other products to match, and ultimately open opportunities for greater economic value for artisan communities.

## Conclusion

Based on the background and discussion presented above, it can be concluded that the traditional pottery knowledge of Kasongan, Bayat, and Banyumulek, Lombok, constitutes a form of tacit knowledge that has grown out of artisans' prolonged interaction with materials, tools, the environment, and the production process. This knowledge encompasses not only technical skill but also sensory acuity, intuition, work habits, and cultural values, as well as the capacity to read the character of clay, determine moisture levels, and manage forming, decoration, drying, and firing. Traditional pottery knowledge, therefore, constitutes a complex and valuable system of knowledge, even though most of it has not yet been systematically documented as explicit knowledge.

Each center displays a distinct configuration of tacit knowledge that constitutes its local identity. Kasongan demonstrates strength in material recognition, forming technique, the tatap-lambung technique, ngusik, and appliqué decoration; Bayat displays distinctiveness in slanted-wheel throwing, burnishing, and ngireng reduction firing connected to local technology and Javanese cultural values; while Banyumulek, Lombok, has developed tamarind finishing, rattan-weaving combinations, cukil (carving) technique, and the use of local material to strengthen visual character. These differences show that innovation in Indonesian pottery has, in fact, already grown from within the tradition itself. Read through the perceptual, material,

and reflective dimensions of tacit knowledge, the identification undertaken in this study corresponds primarily to the perceptual and material dimensions embedded in artisans' embodied skill, while the reflective dimension, the conscious translation of this experience into documented, testable knowledge, has been more fully realized only for Kasongan. Science and technology should therefore not replace artisans' knowledge, but should serve to document, explain, test, and expand the potential of this traditional knowledge.

The transformation of tacit knowledge into more explicit knowledge holds strategic potential for sustaining Indonesia's pottery heritage while enhancing its cultural and economic value. Through documentation, material experimentation, design development, technique innovation, and creative entrepreneurship, local knowledge can be developed into a source of product differentiation with a strong character in the global market. In this study, this stage has been carried out in a more measurable way for Kasongan, whereas for Bayat and Banyumulek, it remains at the identification and documentation stage, which forms the basis for further scientific testing. The sustainability of Kasongan, Bayat, and Banyumulek pottery, therefore, cannot rely solely on the preservation of traditional form but requires a process of knowledge transformation that connects tacit knowledge, science, innovation, and creative entrepreneurship toward global value, with the sustainable welfare of artisan communities as its ultimate goal. This process is expected to strengthen knowledge regeneration, enhance product competitiveness, sustain cultural identity, and create opportunities for the sustainable improvement of the welfare of artisan communities.

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