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# The Influence of Yaozhou Celadon Production Techniques on the Texture and Color of Silk Fabrics

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## Article

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## ABSTRACT

*The pursuit of sustainable development in the modern textile industry has renewed interest in historical manufacturing using natural fibers. While extensive research exists for staple fibers like wool and cotton, this study investigates high-value silk textile production in the Song Dynasty, analyzing how Yaozhou celadon ceramics influenced the processing of silk yarn and the final properties of woven fabrics. Adopting an interdisciplinary culture approach, the study examines agricultural practices, dyeing technologies, and weaving processes of the period. It compares the inorganic chemistry of ceramic color with the dyeing of textiles using organic compounds, and analyzes how artisans utilized looms to produce surface textures comparable to those of carved ceramics. Findings suggest notable aesthetic correspondences: celadon's color palette appears to have functioned as a valued reference within dyeing traditions, while its carved surfaces find comparable expression in additive weaving structures. This cross-media relationship between ceramic and textile crafts offers critical insights for the contemporary textile industry's approach to creating sustainable, high-value goods from renewable materials like silk, contrasting with other materials such as leather.*

## KEYWORDS

*yaozhou celadon, textile technology, sustainable development, weaving, natural fibers*

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## INTRODUCTION

The Song Dynasty (960–1279 CE) is widely regarded as a period of extraordinary artistic and technological efflorescence in Chinese history. It was an era defined by a sophisticated and introspective aesthetic, deeply shaped by Neo-Confucian philosophy and a literati culture that prized subtlety, naturalism, and understated elegance[1]. This prevailing taste found its ultimate expression in the material culture of the elite, most notably in the parallel zenith achieved in the crafts of ceramics and silk textiles[2]. The imperial court and scholar-official class, as the primary patrons and consumers, cultivated a unified aesthetic that permeated the

production of luxury goods[3, 4]. Within this context, Yaozhou ware, a type of celadon from kilns in modern-day Shaanxi province, emerged as the definitive Northern Celadon, celebrated for its resonant olive-green glaze and masterfully carved decorative patterns[5]. Simultaneously, silk production, an ancient Chinese technology, was revolutionized, perfecting intricate weaving techniques such as kesi (silk tapestry) and complex multi-colored brocades (jin), which allowed for unprecedented pictorial and textural complexity[6-8].

While art historians have long acknowledged the shared motifs and elegant sensibilities of Song decorative arts, the specific technical relationship and pathways of influence between these two distinct material disciplines remain underexplored. The question of how the tangible, three-dimensional qualities of a fired ceramic object—its specific color generated by high-temperature chemistry and its texture created by carving into clay—could inform the design and production of a soft, woven textile presents a fascinating problem in the history of technology and design. To clarify the precise nature of this relationship, this paper argues that the ‘influence’ in question was not a coincidental adaptation to a prevailing aesthetic trend. Rather, it can be understood as a process of cross-media aesthetic and technological correspondence. We posit that master weavers and dyers may have engaged with comparable visual and tactile qualities associated with silk artisans pursuing related effects within the material logic and technical constraints of textile production. Therefore, terms like ‘simulation’ and ‘translation’ are used herein to denote a conscious effort to replicate a desired sensory outcome, rather than an unconscious stylistic alignment. This influence is not one of direct material transfer, but of aesthetic translation, where the aesthetic achievements of one craft may contribute to a broader cultural environment in which related visual and technical aspirations emerge across different media. The very term “celadon,” referring to the desirable soft green color, became part of the global lexicon for a specific hue, attesting to the power of the ceramic to define a color standard[9, 10].

This paper posits that a close aesthetic and technological correspondence between Yaozhou celadon and Song silk can be observed. It argues that the visual and tactile properties of Yaozhou ware were not merely appreciated and abstractly imitated, but were systematically analyzed and translated by master weavers and dyers using the unique technical affordances of the silk medium. This investigation moves beyond a simple comparison of decorative motifs and instead focuses on the “how”: how was the cool, jade-like luster and specific color gamut of a celadon glaze re-created with organic dyestuffs? And how were the sharp, fluid lines and layered reliefs of ceramic carving—a subtractive process—simulated through the additive process of weaving threads?

By framing this inquiry within a materials and engineering perspective, this paper seeks to elucidate a crucial moment of cross-media innovation. This article argues that the influence of Yaozhou celadon on Song Dynasty silk was twofold, encompassing both color and texture. First, the characteristic olive-green color of Yaozhou ware appears to have functioned as a valued aesthetic reference within the broader color culture of the Song period. This preference for a specific, high-status hue may have encouraged refinement in dyeing chemistry and application techniques, as artisans sought to replicate the prized 'celadon green'. Second, the textural characteristics of celadon decoration find comparable visual and structural expressions in advanced weaving techniques through advanced structures like kesi tapestry and patterned brocade. Of course, we acknowledge that the advancement of silk technology in the Song Dynasty was the result of multiple factors working together, including the stable supply of high-quality silk fibers, the competition brought about by commercial prosperity, and the influence of other art forms (such as painting) on composition. However, this article specifically focuses on the fact that among all the possible driving forces, Yaozhou celadon, as a mature and highly regarded material form, provided a specific and unique technical and aesthetic benchmark for the innovation of silk craftsmanship. This study aims to elucidate that the two top luxury craftsmanship techniques in the Song Dynasty did not develop in isolation but were part of a dynamic dialogue. The article posits that the developments in ceramic aesthetics formed part of a shared cultural environment in which textile artisans also pursued related visual and tactile qualities.

## **MATERIALS AND ANALYTICAL FRAMEWORK**

To examine the proposed cross-media aesthetic correspondence, a structured comparative framework is required. This methodology is predicated on a detailed characterization of the production techniques and resultant material properties of both Yaozhou celadon and Song-era silk fabrics. By establishing a baseline for the technical capabilities and aesthetic outputs of each craft, a comparative examination of color, texture, and pattern morphology can be undertaken.

### **Material Characterization: Yaozhou Celadon**

Yaozhou ware is a high-fired stoneware, the product of specific geological materials and sophisticated kiln technology. Its defining characteristics are derived from the precise control of its body, glaze, and firing atmosphere.

### *Body, Glaze, and Color Formation*

The body of Yaozhou ware is a grey stoneware clay, rich in silica and alumina. The critical component for its identity is the glaze, a lime-rich formulation containing a small, controlled amount of iron oxide ( $Fe_2O_3$ ), typically present at relatively low concentrations in celadon glazes, plays a central role in producing the characteristic green coloration under reducing firing conditions [11, 12]. The signature olive-green color is not a pigment, but the result of a chemical transformation during firing. Wares were fired in coal-fueled mantou kilns at high temperatures, at high temperatures typical of celadon production (approximately 1250–1300°C) under reducing firing conditions [13]. In this environment, iron-bearing glaze chemistry under reducing firing conditions produces the characteristic translucent green hue associated with celadon when dissolved in the molten glaze matrix. The specific shade—ranging from a brighter “sky green” to the more common deep olive-green—is a function of the precise iron concentration, glaze thickness, and the degree of reduction achieved in the kiln. This process gives the color a unique depth and translucency, often likened to jade, that is fundamentally tied to the ceramic medium.

### *Decorative Production Techniques and Textural Effects*

The aesthetic value of Yaozhou ware lies equally in its decoration, which was executed before glazing and firing. The primary techniques were subtractive, involving the removal of clay from the surface to create patterns in relief.

**Carving (刻花):** This was the hallmark of classic Yaozhou ware. Using a sharp, knife-like tool, artisans would skillfully carve away the background clay, leaving primary motifs like peonies, lotuses, and waves in low relief. The tool was often held at an angle, creating beveled edges that would catch the glaze in a distinctive way.

**Incising (划花):** This technique involved using a pointed tool, likely of bamboo or bone, to draw fine, sharp lines directly into the leather-hard clay body. It was used to render details like the veins of leaves or the fluid fins of fish. These incised lines created narrow channels for the glaze to pool.

**Combing:** A multi-toothed, comb-like tool was used to incise multiple, perfectly parallel lines simultaneously. This was a highly efficient method for creating stylized representations of water, waves, or other linear textures.

**Molding (印花):** In the later Northern Song period, the use of molds became common for decorating the interior of bowls and plates. A clay slab was pressed into a pre-carved mold, allowing for the rapid production

of complex, detailed designs. While efficient, molded decoration is often considered more static than the fluid, spontaneous lines of hand-carved pieces.

The critical outcome of these techniques is a textured surface. When the celadon glaze was applied, it would run thinly over the raised surfaces and pool more deeply in the carved, incised, and combed depressions. During firing, this variation in glaze thickness resulted in a corresponding variation in color: the pooled glaze in the recesses would be a deeper, darker green, while the glaze on the higher planes would be paler and more translucent. This interaction of carved texture and glaze created a subtle, monochromatic play of light and shadow that gave the patterns a remarkable sense of depth and vibrancy without the use of polychrome pigments.

### **Material Characterization: Song Dynasty Silk Fabrics**

Song Dynasty silk manufacturing was a complex, multi-stage process that had achieved an industrial scale of sophistication. The ability to produce visual and textural effects comparable to those of other materials depended on mastery of fiber processing, dyeing, and advanced structures.

#### *Fiber Processing and Dyeing Technology*

The process began with sericulture and the unreeling of silk filaments from the cocoons of the *Bombyx mori* moth. A crucial step was degumming, where the raw silk was washed in a mild alkaline solution to remove the sericin gum. This process reduced the fiber's weight but dramatically increased its softness, luster, and dye affinity, making it ready for coloring. On a molecular level, the degummed silk fiber consists mainly of fibroin protein, whose macromolecular chains are rich in amino acids with active functional groups (e.g., serine, tyrosine). These groups, such as hydroxyls (-OH), provide ideal chemical bonding sites for dye molecules.

Producing subtle muted green hues in silk comparable to celadon tones presented a notable dyeing challenge. Unlike the mineral-based chemistry of ceramics, textile dyeing relied on organic colorants derived from plants, insects, and minerals. There are no common plant sources that produce a stable, single-dye olive green. Therefore, achieving comparable muted green tones required sophisticated double-dyeing or triple-dyeing techniques. For example, a fabric might first be dyed with a light blue from a plant like indigo (*Indigofera tinctoria*) and then over-dyed with a yellow from sources such as pagoda tree buds (*Sophora japonica*) or gardenia pods (*Gardenia jasminoides*)[14]. The final shade would depend on the precise concentration of each dye, the sequence of dyeing, and the use of mordants—metallic salts (like alum or iron sulfates) that fix the dye to the fiber and can significantly alter the final color. The mechanism of a mordant is that the metal ion

(e.g.,  $Al^{3+}$  or  $Fe^{2+}$ ) acts as a Lewis acid, forming a stable coordination complex with functional groups on both the fiber and the dye molecule (such as hydroxyl or carbonyl groups). This complex acts as a ‘bridge,’ securely ‘anchoring’ the dye to the fiber. The pursuit of the fashionable and high-status celadon palette would have driven dyers to refine these complex, multi-step recipes to achieve consistent and subtle results.

#### *Weaving Structures for Pattern and Texture Simulation*

The true translation of celadon’s decorative forms into textile was accomplished through the loom. By the Song Dynasty, weavers had perfected several complex structures capable of creating intricate, pictorial patterns that could simulate carved relief and sharp lines.

Song Brocade (宋锦): This refers to a category of polychrome, warp-faced or weft-faced compound weaves. By using supplementary sets of weft or warp threads in different colors, weavers could create complex, multi-colored patterns. Critically, by allowing these supplementary threads to “float” over several underlying threads before being tied down, raised textural effects could be created on the fabric’s surface. This technique was well suited to producing surface relief effect comparable to carved celadon. The play of light on the lustrous floating silk threads against a ground weave of a different texture or color created a visual depth analogous to the pooling of glaze on a ceramic vessel.

Kesi (缂丝) Tapestry: Kesi, which translates to “cut silk,” is a type of tapestry weave, perfected during the Song Dynasty. Its defining characteristic is the use of discontinuous wefts. For each color area in a design, the weaver uses a separate, small bobbin of colored thread, weaving it back and forth only within the confines of that area. Where two different color areas meet, a small vertical slit is often formed, which is a hallmark of the technique. This method essentially allows the weaver to “paint with thread.” Crucially for this analysis, the technique excels at producing sharp, clear outlines and distinct color blocks, making it the perfect textile analogue for the clean, incised lines (划花) found on Yaozhou celadon.

#### **Analytical Framework**

This study will proceed with a two-pronged comparative analysis based on the material characterizations above:

Color Gamut and Aesthetic Comparison: The characteristic olive-green color space of Yaozhou celadon will be qualitatively compared with the green hues observed in surviving examples of high-status Song silks. The analysis will focus on the similarity in hue, saturation, and value, suggesting that the achieving related muted green tonalities may have been an aesthete objective for dyers.

Textural and Morphological Analysis: A direct visual comparison of Yaozhou decorative techniques with silk weaving structures. This involves a side-by-side analysis of how specific motifs (e.g., florals, waves) are rendered in each medium. The analysis will examine morphological correspondences between ceramic carving/incising and textile weaving/tapestry, suggesting a comparable aesthetic pursuit of line, depth, and texture across the two media.

This framework allows for a systematic investigation into the cross-media relationship, grounding aesthetic observations in the technical realities of production for both ceramics and textiles.

## RESULTS

This section presents the core findings of the comparative analysis, directly examining the technical and aesthetic translation from Yaozhou celadon to Song Dynasty silk fabrics. The analysis is bifurcated into two primary domains of influence: the replication of the celadon color gamut in dyed textiles, and the simulation of celadon's surface textures through advanced weaving structures.

### **Color Correspondence: Comparable Celadon-Like Tones in Silk**

The distinctive hue of Yaozhou celadon was one of its most prized attributes. This was not merely a color, but an aesthetic statement, deeply interwoven with the philosophical and material values of the Song literati. The production of comparable tones in silk, a chemically and structurally distinct medium, represents a notable dyeing accomplishment within a shared aesthetic context.

#### *Defining the Yaozhou Celadon Color Gamut and its Cultural Significance*

The color palette of Yaozhou ware is remarkably consistent and controlled, centered on a specific region of the green spectrum. The predominant color is a deep, muted olive-green, characterized by its low saturation and often possessing subtle yellowish or grayish undertones. This color is fundamentally different from the vibrant, pure greens found in nature, such as the color of leaves or grass. Instead, its aesthetic value was derived from its explicit association with jade (玉), the most revered material in Chinese culture. From the perspective of modern color science, this unique hue can be more precisely quantified. From the perspective of modern color description, the olive-green tone of Yaozhou celadon can be characterized as a muted green with yellowish undertones. Previous studies describe the chromatic qualities of Yaozhou celadon glazes as occupying a muted olive-green tonal range.

The Yaozhou glaze, with its smooth texture, semi-translucent depth, and subtle, low-saturation green, was considered the finest ceramic imitation of jade. Unlike the more bluish-green (fenqing) glazes of Southern Song Longquan celadons, the olive tone of Yaozhou ware was warmer and more understated, aligning perfectly with the Neo-Confucian aesthetic that valued introspection and naturalness over overt opulence. This specific “celadon green” thus became a benchmark for luxury. It was not just a color preference but a codified standard of taste, representing a sophisticated, scholarly elegance. The aesthetic value of this color was inseparable from its material expression and the textural depth provided by its decorative techniques, as seen in quintessential examples of the period (Figure 1). The demand for this color in other luxury goods, particularly in personal attire and home textiles, was therefore a foregone conclusion among the elite consumer base.



Figure 1. Yaozhou celadon bowl with carved peony motif. Source: Private collection (with permission from the original author for use).

#### *Technical Challenges and Methodologies for Replicating the Celadon Palette in Silk*

Translating the celadon color gamut into silk presented a formidable challenge for Song Dynasty dyers. The green coloration of Yaozhou celadon arises from iron ions dissolved in a silicate glaze matrix under reducing firing conditions. Silk dyeing, conversely, relied almost exclusively on water-soluble organic molecules extracted from plants.

Achieving a stable, muted olive-green using natural dyes is notoriously difficult. Olive-green hues were rarely produced from a single plant dye source and were more commonly achieved through the combination of blue and yellow dyes. Therefore, dyers were required to develop complex, multi-stage dyeing processes based on the principles of subtractive and additive color mixing directly on the fiber. This was not just color mixing,

but a sequential application of different chemical classes of dyes. For instance, indigo is a vat dye, whose application involves complex oxidation-reduction reactions, whereas the yellow dyes were often flavonoids, whose bonding to the fiber was highly dependent on the chemical bridging of a mordant. The most probable methodology involved a two-part or three-part sequence:

**Foundation Dyeing:** The silk yarn or fabric would first be immersed in a vat of blue dye, most likely derived from the indigo plant (*Indigofera tinctoria*) or woad (*Isatis tinctoria*). A very light, controlled immersion would be necessary to achieve a pale blue foundation.

**Over-Dyeing:** The blue-dyed textile would then be subjected to a second dyeing process using a yellow dye. Primary candidates from the Song period include gardenia pods (*Gardenia jasminoides*), pagoda tree buds (*Sophora japonica*), and amur cork tree bark (*Phellodendron amurense*). The yellow dye, when applied over the light blue, would combine to create green.

**Color Modification with Mordants:** The final, critical step would be the use of mordants. Mordants are metallic salts that bind the dye molecules to the textile fibers, significantly improving colorfastness. More importantly, mordants can drastically alter the final hue. In the case of an iron-based mordant like ferrous sulfate (qingfan), the ferrous ions ( $Fe^{2+}$ ) form a complex with the yellow dye (typically a polyhydroxy flavonoid) and the silk fibroin. This creates a new metal-organic chromophoric system. This complexation alters the electron density and conjugated system of the dye's chromophore, causing its absorption spectrum to shift to longer wavelengths (a bathochromic shift) and potentially broaden. Visually, this 'saddens' or mutes a bright yellow, pushing it towards a duller, more grayish or brownish olive tone.

The precise control of dye concentrations, immersion times, and mordant application required to consistently produce a color that mimicked the subtle tones of Yaozhou celadon demonstrates an advanced level of empirical chemistry. The aesthetic standard set by the ceramicists forced the textile artisans to push the boundaries of their craft, transforming dyeing from a simple coloring process into a sophisticated, multi-variable technical procedure.

#### *Case Study Evidence*

A comparative visual analysis between extant Yaozhou vessels and surviving Song Dynasty silk fragments validates this thesis of color mimicry. For instance, a classic Yaozhou carved peony bowl, housed in the Palace Museum, Beijing, exhibits a characteristic deep olive glaze. When placed alongside surviving fragment of a Song Dynasty green silk gauze documented in archaeological reports, the color correspondence is striking.

The silk, while lacking the ceramic's glassy luster, successfully captures the specific hue and low saturation of the celadon. Although we cannot conduct direct tests on these two specific artifacts, the existing studies of celadon glaze color and iron-mordanted dyes suggest comparable chromatic characteristics. Colorimetric studies of silk dyed with traditional yellow dyes (e.g., from *Sophora japonica*) and modified with an iron mordant confirm that this process produces a muted, olive-toned green with tonal characteristics consistent with a muted olive-green range. Importantly, the use of iron mordants significantly reduces lightness and tends to diminish the yellow tonal component, resulting in a darker and duller green hue, thereby transforming the originally bright yellow-green color into a darker, less saturated olive green tone. Therefore, by comparing the color space data of the published Yaozhou celadon and related iron-mordanted silk, it can be reasonably suggested that the two materials may display visually comparable muted green tonalities. It is not a leaf-green or an emerald green, but a distinctly muted, yellowish-green that speaks to a shared aesthetic target. This evidence suggests that the celadon-like green tone may have functioned as a valued aesthetic reference within dyeing practice.

### **The Translation of Texture: From Carved Clay to Woven Thread**

Beyond color, the defining feature of Yaozhou celadon is its rich surface decoration. The subtractive techniques of carving and incising created a dynamic interplay of light and shadow that gave the monochrome ware a sense of depth and dimensionality. Weavers of the Song Dynasty developed and refined loom technologies capable of producing surface effects comparable to those of carved ceramic.

#### *Morphological Equivalence I: Incised Lines and Kesi Tapestry*

The technique of incising on Yaozhou ware produced sharp, fluid, and clearly demarcated lines, used to delineate motifs and add fine details. Comparable linear articulation can be observed in kesi silk tapestry. As described in the methodology, kesi employs discontinuous wefts, where each color is woven with a separate bobbin. The point where two color fields meet creates a minute vertical slit, which forms a crisp, precise outline.

This technical feature enable kesi weavers to create effects comparable to incised ceramic decoration. For example, a Yaozhou dish decorated with incised, swimming fish would feature sharp lines defining the contours of the fish, their fins, and the surrounding water. An examination of a contemporary kesi panel depicting a similar scene reveals an identical artistic approach. The weaver uses the kesi technique to essentially "draw" the outlines of the fish with the edges of the color blocks, creating a visual effect that is morphologically

equivalent to the ceramicist's incised line. The sharp, clean separation of colors in the textile performs the same artistic function as the glaze-filled channel in the ceramic: it defines the form. This parallel in achieving sharp, descriptive outlines across two vastly different media is a powerful indicator of shared aesthetic goals, producing a visual articulation analogous to carved ceramic line work (Figure 2).



Figure 2. A detail from Kesi (silk tapestry) with Camellia and Butterflies. Source: Private collection (with permission from the original author for use).

### *Morphological Equivalence II: Carved Relief and Patterned Brocade*

The premier decorative style of Yaozhou ware was carving, where the background was cut away to leave the primary motifs in low relief. This created a subtle three-dimensionality, which was enhanced by the behavior of the glaze. This effect of a raised pattern against a flatter ground was masterfully simulated in silk through patterned brocades.

Song brocades utilized supplementary wefts—extra sets of threads that were not part of the ground structure—to create patterns. By controlling the weave structure, these supplementary wefts could be made to “float” over multiple underlying warp threads before being bound down. These long floats, especially when made of lustrous, untwisted silk filaments, would sit proud of the fabric surface, creating a tangible relief effect. They would catch the light differently from the more tightly woven ground structure, creating a sophisticated play of light and shadow.

A side-by-side analysis is illustrative. A Yaozhou bowl with a carved peony motif shows the petals in relief against the recessed background. The glaze pools in the carved-out areas, making them appear darker, while it is thinner and lighter on the raised surfaces of the petals. A Song brocade featuring a similar peony medallion achieves an analogous effect. The petals of the flower are rendered in long, lustrous satin floats, which are raised and highly reflective. The background might be woven in a plain or twill weave, which is flatter and less lustrous. The result is a purely textile-based simulation of bas-relief. The weaver, using the additive process of introducing extra threads, produces surface structures analogous to those created through ceramic carving. The result is a sophisticated textile surface that expertly manages light and shadow to create a sense of depth directly comparable to that of its ceramic counterpart (Figure 3).



Figure 3. Silk brocade with floral medallions (tuanke style).

### *Morphological Equivalence III: Combed Patterns and Weave Structure Variation*

A secondary, yet common, decorative technique on Yaozhou ware was the use of combs to create fine, parallel lines, often used to depict stylized water or linear background textures. This effect could be readily simulated in textiles not by pattern, but by the fundamental weave structure itself. Weaves such as twill (斜纹) or rib weaves are characterized by diagonal or horizontal ribs formed by the regular interlacing of warp and weft. A weaver could select or design a specific weave structure with pronounced, closely-spaced ribs to create a fine, linear surface texture that mimicked the appearance of a combed ceramic surface. This represents the

most subtle level of influence, where the very engineering of the fabric structure is chosen to evoke a textural quality established in another medium.

## DISCUSSION

The comparative analysis suggests that Yaozhou celadon and Song Dynasty silk display notable correspondences in aesthetics and technical principles. These cross-media correspondences can be understood within a shared cultural and technological environment shaped by cultural and social factors. The primary impetus was the dominant Song Dynasty aesthetic, a sensibility deeply shaped by Neo-Confucianism and Daoist philosophy, which revered naturalness, subtlety, and an understated elegance over overt luxury. Yaozhou celadon, with its jade-like luster and reserved olive-green hue, became the archetypal embodiment of this scholarly ethos. This established aesthetic was then amplified and disseminated through the era's social structure, where the imperial court and the literati class acted as the primary patrons and arbiters of taste for high-value goods, including both ceramics and textiles. Their unified preferences created a powerful market demand for a consistent "brand" of luxury, compelling artisans across different media to work towards a common visual and philosophical objective. Consequently, the pursuit of celadon-like qualities in textiles can be viewed as part of a broader aesthetic orientation within textile production. The valued status of celadon like color tones may have encouraged silk dyers to refine complex multi-stage dyeing recipes and mordant techniques. The pursuit of surface textures comparable to carved decoration may have contributed to the refinement of advanced weaving structures such as patterned brocade and kesi tapestry. This relationship illustrates how related aesthetic goals may emerge across different crafts within a shared cultural environment. Although it is impossible to completely rule out the possibility that there were other concurrent factors that also contributed to the development of silk technology at that time, the significance of Yaozhou celadon lies in its role as a highly materialized aesthetic reference within elite material culture. Unlike the abstract composition provided by paintings, the color, luster, and relief texture of Yaozhou celadon are concrete, stable, and physical entities that can be repeatedly observed and compared. For the Song Dynasty craftsmen who pursued precise replication and technological breakthroughs, such a widely recognized aesthetic model may have provided a valued reference point. It focused the broad aesthetic pursuit into a series of specific technical problems (such as how to blend an olive green color? How to weave a relief effect?), thereby contributing to the broader development of related craft techniques. It is important, however, to acknowledge the limitations of this analysis, as the link remains primarily interpretive. Future research could provide more concrete data through

quantitative spectral analysis of both celadon glazes and extant silk dyes to objectively map their color spaces, as well as microscopic examination of weave structures to better quantify the simulation of ceramic textures. Such work would further illuminate the deeply integrated system of craft, aesthetics, and technology that defined the material culture of the Song Dynasty.

## CONCLUSION

In conclusion, this article proposes and illustrates correspondences between Yaozhou celadon production and silk manufacturing in the Song Dynasty. It goes far beyond merely sharing decorative motifs; it represents a notable cross-media aesthetic and technological correspondence. The research establishes two primary pathways of this influence. Firstly, the unique olive-green palette of celadon, produced through specific kiln chemistry, appears to have functioned as a valued aesthetic reference associated with refined dyeing practices in silk textiles. Secondly, the textural and morphological characteristics of celadon carving and incising find comparable expression in additive weaving structures. Ultimately, this analysis reveals a deeply integrated system of craft, aesthetics, and technology, where related aesthetic and technical aspirations appear across different artistic media within a shared cultural context. This dynamic interplay underscores the sophisticated and interconnected nature of the material culture of the Song Dynasty, showcasing how innovation was spurred by a shared and highly refined vision of beauty.

The historical model of value creation and technological innovation detailed in this study also provides several key insights for the modern textile industry's pursuit of sustainable development. In an era dominated by petrochemical fibers, fast fashion, and complex global supply chains, this integrated manufacturing system from the Song Dynasty offers a compelling example of how to utilize renewable resources to create high-value, durable products. This historical model reveals that the enhancement of the value of renewable materials like silk is not only due to the superiority of the materials themselves, but also achieved through complex, interdisciplinary design and processing procedures. The implication for the modern sustainable textile industry is that the path away from synthetic fibers lies not only in developing new bio-based materials but also in investing in innovative design and processing technologies to imbue these materials with unique aesthetic qualities and cultural resonance, thereby enhancing their appeal and value. The dialogue between ceramics and silk demonstrates how inspiration from an unrelated field can unlock new aesthetic possibilities for a renewable material.

Furthermore, this model offers a powerful historical reference against “fast fashion.” Whether it’s Yaozhou celadon or Song Dynasty silk, the craftsmanship and artistry involved in their production accorded them a high value, elevating them to cherished heirlooms rather than disposable consumer goods. This historical precedent, emphasizing exquisite craftsmanship, complex technology, and timeless design, helps create products with longer lifecycles, reducing waste and promoting a more responsible consumption model.

Finally, the Song Dynasty model reveals a highly integrated system in which material sourcing (sericulture), chemical processing (dyeing), and mechanical manufacturing (weaving) were fully connected to achieve a specific aesthetic goal. This stands in stark contrast to the fragmented supply chains of modern times, where material production is often disconnected from final product design and use. From a sustainability perspective, this historical example advocates for a more holistic, systems-based approach—for example, the development of new sustainable dyes should be intrinsically linked to the design of fabrics that best express their unique color properties, creating a synergy that simultaneously enhances ecological and aesthetic value.

#### *Author Contributions*

Hongyan Zhang designed the study; all authors conducted the study; Hongyan Zhang collected and analyzed the data. Hongyan Zhang participated in drafting the manuscript, and all authors contributed to critical revision of the manuscript for important intellectual content. All authors gave final approval of the version to be published. All authors participated fully in the work, took public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or completeness of any part of the work were appropriately investigated and resolved.

#### *Conflict of Interest*

The author declares no conflict of interest.

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#### *Availability of Data and Materials*

The datasets used and/or analysed during the current study were available from the corresponding author on reasonable request.

**REFERENCES**

- [1] Huang J. An overview of Chinese aesthetics and aesthetic education. *Authentic Chinese educational thought*. 2022:135-50. doi: 10.1163/9789004519473\_016
- [2] Xidong J. The productivity level of the song dynasty. *Social Sciences in China*. 2023; 44(2):74-93. doi: 10.1080/02529203.2023.2192084
- [3] Jang S. The culture of art collecting in imperial China. *A Companion to Chinese Art*. 2015:47-72. doi: 10.1002/9781118885215.ch2
- [4] Zhang D. *Urban Elite Houses in the Song Dynasty*: University of Virginia; 2017.
- [5] Rastelli S. *The Yaozhou Kilns A Re-Evaluation*: University of London, School of Oriental and African Studies (United Kingdom); 2002.
- [6] Li LM. *Chinas Silk Trade: Traditional Industry in the Modern World, 1842-1937*: Harvard Univ Asia Center; 1981. doi: 10.1163/9781684172313
- [7] Qin W, Xiaoming Y. Analysis on the Development of Chinas Modern Silk Industry. *Asian Social Science*. 2022; 18(4). doi: 10.5539/ass.v18n4p27
- [8] Duan X. *An Object of Seduction: Chinese Silk in the Early Modern Transpacific Trade, 1500-1700*: Bloomsbury Publishing PLC; 2022. doi: 10.5771/9781793614919
- [9] Clarke M. *The concise Oxford dictionary of art terms*: Oxford University Press; 2010. doi: 10.1093/acref/9780199569922.001.0001
- [10] Orna MV. *Historic mineral pigments: Colorful benchmarks of ancient civilizations. Chemical technology in antiquity*: ACS Publications; 2015. p. 17-69. doi: 10.1021/bk-2015-1211.ch002
- [11] Kronberg T. *Properties of raw glazes-The impact of composition, firing and functional coatings*. 2020.
- [12] Griffin PS. *Reconstructing the materials and technology of Egyptian faience and frit*. *MRS Online Proceedings Library (OPL)*. 2002; 712:II4. 2. doi: 10.1557/PROC-712-II4.2
- [13] Wood N. *Chinese glazes: their chemistry, origins and re-creation. New and revised edition*. A & C Black. 2007.
- [14] Kuhn BD. *Textile technology : spinning and reeling*. 1988.