



Product-Design-Enabled Innovation of Song Dynasty Tea ICH: A Talent Development Framework

Qiu-Yuan Lin^{1,}, Asmidah Alwi²*

^{1,2} School of Creative Industry Management and Performing Arts, Universiti Utara Malaysia, Sintok, Kedah, Malaysia

Keywords

Song Dynasty Tea Culture, Intangible Cultural Heritage, Youth Engagement, Talent Development

Abstract

This study explores Song Dynasty tea culture as an intangible cultural heritage (ICH) resource and its role in cultural and creative talent development. Through literature review and observation, supplemented by empirical insights, it examines how design-enabled innovation and multi-sensory experiences may enhance youth engagement. A conceptual framework is proposed linking ICH, cultural innovation, youth participation, and talent outcomes.

1. Introduction

Intangible cultural heritage (ICH) is increasingly approached not only as a significant cultural resource to be safeguarded but also as a generative asset for cultural and creative industries. Translating ICH into contemporary cultural and creative products and experiences requires design-enabled innovation as well as sustained participation from capable practitioners. In this sense, heritage revitalization is closely linked to talent cultivation and human resource development (HRD) for a viable cultural and creative workforce (Tsai, 2024; Lu, 2011). This linkage to talent cultivation as a strategic priority is also reflected in recent policy documents and related discussions in China, which emphasize building a robust cultural talent pool and diversifying cultivation pathways aligned with sectoral needs (Ministry of Human Resources and Social Security of the People’s Republic of China [MOHRSS], 2024; Ouyang, 2025).

However, traditional Chinese culture is experiencing numerous challenges from both external and internal pressures in contemporary society over an extended period, particularly among the younger generation who have insufficient engagement and underdeveloped cultural-heritage-related creative competencies. Concurrently, local ICH such as ancient tea culture is also in decline, with some practices partially lost; yet ICH resources can also present opportunities for competency development and potential cultural and creative talent development (Min, 2021; Li et al., 2023).

The Chinese academic community is identifying practical and effective creative

*corresponding author. Email: linqiuyuan88@hotmail.com

transformation strategies for traditional cultures that can captivate the attention of young people, thereby creating an initial pathway for cultural and creative talent development, especially concerning the limitations in the application of storytelling techniques (Huang, 2018; Ma, 2023). At present, the scholarly exploration into the creative application of ICH that embodies traditional Chinese characteristics remains underexplored. Nonetheless, this field continues to be an active and valuable area of academic inquiry, with close relevance to workforce and talent development in the cultural and creative sector and support from policy initiatives (Xu & Ma, 2020).

This study focuses on the perspective of Song Dynasty tea culture revitalization through product-design-enabled creative innovation, thereby engaging young Chinese participants and, by extension, supporting the development of potential cultural and creative talent. It is essential to thoroughly excavate the underlying cultural materials and develop solutions that resonate with audience preferences and demands (Huang, 2018), while remaining sensitive to actual market conditions. Such market-aligned product design can function as an initial attraction mechanism that encourages youth engagement as the entry point of a talent pipeline. Furthermore, effective practices from developed nations and current domestic trends should be critically examined and adapted to the local context (Yang, 2018), ensuring that external insights are not simply replicated but transformed to suit indigenous cultural and social dynamics.

Adopting product-design-enabled approaches can yield a dual contribution: elevating the contemporary profile of the Song Dynasty tea ceremony and attracting the interest of the younger Chinese demographic. As a result, this has the potential to strengthen youth engagement as the entry point of a talent pipeline, thereby fostering a mutually reinforcing cycle of heritage-based innovation and human resource development in the cultural and creative sector. The study is also expected to serve as a reference for scholars in other developing countries seeking product-design-enabled approaches to revitalize their own distinctive heritage within an international context, with implications for building a sustainable cultural and creative workforce.

2. Literature Review

2.1 Contextual Background

China's cultural soft power remains relatively weak on the international stage, particularly in its cultural exchanges with the West (Xu, 2019). In the context of globalization, many Chinese studies have recognized that Chinese traditional cultural engagement patterns and value-related preferences have long been affected by Western cultural influence, which has further impacted Chinese youth's engagement with local heritage and enthusiasm for heritage-related cultural and creative practices (Xu, 2019; An, 2020; Xiong, 2022; Li, 2022). Since China's reform and opening up in 1978, more opportunities have emerged for the younger demographic to access and engage with Western cultures through the fully developed cultural and creative industries of the West. Young people's cultural preferences and consumption orientations have increasingly shifted compared with their own cultural heritage, with Western lifestyles and interests often perceived as more appealing, fashionable, advanced, and internationalized (Ma, 2023).

Meanwhile, the cultural and creative industries of Japan and South Korea have achieved significant global reach through the continuous export of their popular cultures over the past three decades, with China being among the countries deeply influenced by their strategic approaches (Kwon & Kim, 2014; Chen & Sheng, 2015; Iwabuchi, 2018; Matosian, 2025). These countries have actively promoted their cultural products on a global scale to project a positive national image and gradually strengthen their cultural discourse power (Ministry of Foreign Affairs of Japan, 2017; Tamaki, 2019; Gautam, 2024; Matosian, 2025). Supported by developed cultural and creative industries, such policy-driven cultural promotion has generated substantial influence among younger audiences.

In the current Chinese context, the development of cultural and creative talent therefore needs to be grounded in more balanced and reciprocal cultural engagement, selectively drawing on beneficial external cultural experiences while reinforcing indigenous cultural foundations. Such an approach may help sustain youth engagement with local heritage under conditions of globalization, while also supporting cultural continuity and the longer-term development of a sustainable cultural and creative talent base.

2.2 Cultural Transmission and Talent Pipeline Formation

China's governance framework reflects the nation's socioeconomic structure, political institutions, and cultural model. The continuous reinforcement of national cultural development initiatives is regarded by the Chinese government as one of its most vital national responsibilities and a major area of concern, with the promotion of cultural inheritance serving as a key component within this process (Wang, 2019). From the theoretical perspective of national governance and the practical dimension of educational scholarship, Wang (2019), Li (2017), and Shi et al. (2024) have each highlighted a strong link between cultural heritage revitalization and the cultivation of cultural literacy and confidence in cultural participation. Within China's broader talent and capability development agenda, these capability-related outcomes help explain how youth engagement can be sustained, thereby supporting cultural and creative talent pipeline formation.

Wang (2019), writing in the *People's Daily Online – Theory Channel*, further emphasized the importance of cultural confidence as a form of social cohesion and participation readiness. He discussed that it is essential to explore the profound cultural traditions of the Chinese nation and to draw from them the spiritual essence that inspires social cohesion and vitality, while effectively integrating these cultural resources with contemporary human civilization. According to Wang, maintaining the unity of cultural inheritance and innovation constitutes a scientific and effective approach to advancing China's cultural development agenda and strengthening the cultural literacy and participation confidence of the general public.

From the higher education sector, Li (2017) echoed Wang's (2019) argument by emphasizing that the inheritance of Chinese culture should serve as the foundation of cultural capability development. Li (2017) further suggested that enhancing students' understanding of China's diverse ethnic cultures can strengthen their sense of national pride. Shi et al. (2024) extended this discussion by focusing on ICH, expressing that the integration of institutional education and cultural initiatives with ICH can facilitate the transmission of traditional cultural heritage. At the same time, ICH can enrich the content of engagement-oriented cultural programs by

providing vivid and contextually relevant cultural resources for participation and practice. Both Li (2017) and Shi et al. (2024) demonstrated the mutually reinforcing and symbiotic relationship between institutional support mechanisms and cultural heritage transmission that can contribute to sustained youth engagement and subsequent talent pipeline formation.

2.3 Policy Trends and Drivers

The establishment of a stronger cultural and creative talent base has become increasingly urgent (Ma, 2023). The Chinese government has enacted multiple policies to support the integration of the cultural and creative industries with the ICH domain. For example, in August 2021, the General Office of the Central Committee of the Communist Party of China (CPC) and the General Office of the State Council issued *Guiding Opinions on Further Strengthening the Protection of Intangible Cultural Heritage* (Xinhua News Agency, 2021). The document encourages the appropriate utilization of ICH resources for creative design initiatives. In August 2022, the government released the *Cultural Development Plan for the 14th Five-Year Period* (Xinhua News Agency, 2022), which calls for strengthened protection and transmission mechanisms to support the integrated development of ICH. The plan also emphasizes policy support for improving cultural and creative industries, design services, and cultural and creative product development.

Exploring more effective pathways for the creative transformation and innovative development of ICH is a research route that is strongly supported by the Chinese government, and it holds great potential for growth. It is currently receiving increasing attention in the collaborative efforts between Industry-University-Research (IUR) in the field of design in China. The Chinese government encourages more individuals who are passionate about culture, skilled in design, and knowledgeable about the market to pay attention to the revitalization of ICH. This emphasis also implies growing demand for talent that combines cultural understanding, design capability, and market awareness. There is a proactive push to integrate ICH into people's lifestyles, facilitating the transition of ICH from a form of spiritual wealth to tangible wealth, thereby better adapting to contemporary social development and rapidly changing market conditions (Hu, 2021).

The emphasis on cultivating interdisciplinary talent equipped with cultural literacy, design expertise, and market acumen has been further institutionalized through recent policy. A pivotal development in July 2024 was the formal inclusion of the occupation Cultural and Creative Product Planning and Operation Specialist within China's national occupational classification system, following its announcement among 19 new occupations by the Ministry of Human Resources and Social Security and related authorities (MOHRSS, 2024). This formal recognition indicates that talent cultivation for the cultural and creative sectors is shifting from broad policy advocacy toward standardized and institutionalized practice. As outlined in the occupational classification documentation, the role encompasses key functions ranging from cultural resource interpretation and creative product planning to market-oriented operation and intellectual property management (MOHRSS, 2024).

This formal policy issued by MOHRSS (2024) effectively establishes a nationally recognized competency framework, providing a policy-driven mechanism for setting a clearer direction for cultural and creative sector talent cultivation. Rather than merely introducing a new job title,

this policy instrument translates the strategic objective of “creative transformation and innovative development” into a standardized, assessable, and career-oriented professional pathway. By doing so, it aims to systematically align educational resources and skill development with sectoral needs, thereby fostering a structured and sustainable talent pipeline to support the deeper integration of intangible cultural heritage with the cultural and creative industries.

2.4 Challenges for Cultural and Creative Talent Development

The decline of Chinese traditions, particularly ICH, as well as the deficiency in youth engagement and heritage-related creative capability development, can be attributed to both external and internal factors. Externally, cultural products from developed countries, supported by earlier-established cultural industries and more mature creative ecosystems, have exerted stronger influence on younger audiences and intensified competition for cultural attention (Xu, 2019; Liu, 2015). This situation may weaken young people’s sustained engagement with local heritage and their confidence in heritage-related cultural creation (Zhang & Wang, 2022; Zhang, 2022).

Internally, the impact of modern and contemporary wars and conflicts disrupted the preservation of China’s rich ICH resources and constrained the long-term development of cultural industries for an extended period (Yang, 2017). Although China has increasingly emphasized the development of cultural and creative industries and introduced policies to revitalize ICH, a considerable gap remains in terms of innovation capability, cultural communication methods, and storytelling skills, especially in forms that effectively attract younger audiences (Huang, 2018; An, 2020; Ma, 2023). These constraints limit the translation of ICH resources into engaging cultural and creative participation and, in turn, weaken the formation of a sustainable talent pipeline.

At the youth level, these broader challenges are reflected in insufficient understanding of traditional culture, weaker awareness of heritage with Chinese characteristics, and lower levels of attention to their own ICH among younger Chinese people (Liu, 2015; Zhang, 2022; Zhang & Wang, 2022). At the same time, the core population engaged in promoting ICH is aging, and Chinese ICH faces both aging practitioner groups and a limited number of inheritors (Min, 2021). These trends indicate not only a cultural transmission challenge but also a talent supply gap for the cultural and creative sector, as aging practitioner groups and low youth involvement weaken the sustainability of cultural and creative human resources. In this respect, the issue is closely related not only to cultural continuity, but also to the strengthening of cultural confidence among younger generations.

The case of Song Dynasty tea culture reflects these broader challenges. Although it was once a distinctive cultural tradition, its historical transmission weakened over time, while the Japanese tea ceremony, drawing on related Chinese tea traditions, achieved stronger continuity, recognition, and resonance among contemporary audiences. Accordingly, China needs more effective pathways for heritage-based cultural innovation that strengthen youth engagement and support capability development for a sustainable cultural and creative talent base under globalization. This also provides a basis for the following discussion of cultural confidence and innovation in relation to heritage revitalization and youth engagement.

2.5 Cultural Confidence and Innovation: Existing Perspectives

Existing studies in the Chinese academic community generally suggest a close relationship among cultural confidence, cultural innovation, and heritage revitalization. ICH serves as an important carrier of cultural confidence. Zhang (2021) notes that understanding ICH helps build the knowledge base of young people's cultural confidence, and that effective practical application can not only support the protection of ICH, but also enhance cultural confidence in ways that encourage youth-oriented engagement.

Among related perspectives, cultural confidence is commonly understood as an affirmation of cultural values and a belief in the vitality and developmental capacity of culture (Yunshan, 2010; Xu, 2019). Li (2022) further links cultural innovation to the development of cultural confidence, emphasizing its role in generating new cultural vitality and responding to contemporary challenges. Xiong (2022) similarly suggests that cultural innovation functions as an important driving force in strengthening cultural confidence. In this respect, ICH, as a vital component of cultural heritage, can be understood as a practical domain through which cultural confidence may be cultivated and translated into youth engagement and participation.

2.6 Cultural Foundations and Revival Potential

Tea is one of China's important contributions to human civilization and has long functioned as an important cultural medium in Chinese society, embedded in everyday life, social ritual, and communal interaction across different groups, while also contributing to cultural identity and historical continuity (Sigley, 2015; UNESCO, 2021). In 2022, traditional tea processing techniques and associated social practices in China were inscribed on the Representative List of the Intangible Cultural Heritage of Humanity by UNESCO. This recognition has strengthened the contemporary relevance of Chinese tea culture and created further opportunities for its preservation, revitalization, and heritage-based cultural and creative development.

The appreciation of tea culture in China gained momentum during the Tang Dynasty (AD 618-907) and reached its zenith in the subsequent Song Dynasty (AD 960-1279), during which tea became an essential part of daily life. In the Song Dynasty, the primary approach to tea preparation was Dian Cha (点茶, or whisked tea) (Figure 1), which involved whisking powdered tea with hot water using a bamboo tool. Historical records indicate that this technique spread to other parts of East Asia, particularly Japan, where related elements can still be seen in the preparation of Matcha today (Nishimura et al., 2010; Sigley, 2015; Zhang, 2019; Yang, 2022).



Figure 1 *Chinese Dian Cha demonstrated by Han Zheming (China Daily, 2022)*

Song Dynasty Dian Cha once occupied a distinctive position in the history of Chinese tea culture, but the tradition later faced progressive decline (Liu & Song, 2016). After the Song period, the brewing method became increasingly dominant in the Ming Dynasty, gradually replacing Dian Cha (Zhang, 2019; Chen & Xu, 2022). As a result, contemporary tea culture in China bears little resemblance to that of the Song (Zheng, 2022). Although the procedural and stylistic features of Song Dynasty tea ceremonies are recorded in historical texts, direct visual and material evidence remains limited, and the precise appearance of Dian Cha therefore remains open to interpretation.

While the Japanese Matcha ceremony finds its origins in Song Dynasty tea culture, the later trajectories of the two diverged significantly (Nishimura et al., 2010). The Japanese tea ceremony has been more fully preserved, whereas the distinctive aesthetics and lifestyle associated with Song Dynasty tea culture were not transmitted to the same extent in China (Liu & Song, 2016). This contrast highlights the contemporary relevance of exploring innovation pathways centered on Dian Cha as a core practice of Song Dynasty tea culture. Such efforts may provide a meaningful entry point for heritage revitalization, while also generating experiential resources that can be translated into cultural and creative participation and skills development.

At present, with the success of creative entertainment productions such as *A Dream of Splendor* (梦华录), a television drama set against the backdrop of Song Dynasty tea culture, public acceptance of themes related to Song Dynasty tea culture has increased in China since 2022 (China Daily, 2022; Mok, 2025). This growing visibility has created more favorable contemporary conditions for the further development of Song Dynasty tea culture.

The refined aesthetics of the Song Dynasty and the ceremonial essence of its tea culture hold the capacity to motivate the interest of contemporary younger generations, resonating with their sensibilities (Yang, 2022). The slow life philosophy associated with Song Dynasty tea culture also contrasts with the rapid tempo of contemporary living. Under the escalating pressures of contemporary society (Li et al., 2023), there is a growing demand among young people to slow down and savor lived experience. Therefore, integrating the spiritual core, aesthetics, and taste of Song Dynasty tea culture into contemporary youth lifestyles may further enhance its appeal and provide a meaningful entry point for youth engagement and cultural and creative capability building.

Although Dian Cha and its associated tea ceremony are no longer part of everyday life in contemporary China, the limited historical materials available mean that contemporary reconstruction and interpretation remain open to variation in specific forms and details (Huang, 2022). Accordingly, current inheritors and practitioners of the relevant ICH often present their Dian Cha works through varied artistic expressions, reflecting different personal characteristics, interpretive differences, and, in some cases, innovative additions (Table 1). From a conservative standpoint, such variation may generate controversy, but it can also be viewed as a form of cultural innovation that enables Song-style Dian Cha to adapt to contemporary contexts and diversified public demands (Liu & Song, 2016). Such adaptation strengthens dissemination and resonance among younger audiences, while also widening practice-based pathways for cultural and creative talent cultivation.

Table 1 *Some representative contemporary Song-style Dian Cha expressions*

Inheritors and restorers	Dian Cha works	Key distinctions and styles
Zhang Zhifeng	 (Shi, 2022)	Black or green tea; red or green tea base; white-froth patterning; resembles Japanese Matcha latte art.
Han Zheming	 (Han, 2023)	White tea; white-froth base; white-tea-paste patterning; stronger Chinese landscape painting elements.
Sun Yanfang	 (Shanghai Eye, 2023)	White tea; white-froth base; white-tea-paste patterning; three-dimensional froth effect.

As studies about Song Dynasty tea culture particularly Dian Cha and associated tea ceremony progressively unfold within the context of contemporary society, it becomes apparent that individuals' understandings and attitudes towards the safeguarding, perpetuation, and innovation of ICH diverge. There is a requisite to deftly balance a multitude of factors, such as the juxtaposition of tradition with modernity, the interplay between conservatism and innovation, and the reconciliation of cultural values with commercial interests and the cultivation of relevant cultural and creative competencies for sustainable practice.

3. Discussion

3.1 Limitations and Gaps in Existing Research

Within the context of globalization, Chinese culture is embracing new challenges and opportunities. It is imperative for scholars to consider how to maintain and strengthen the younger generation's cultural engagement and sustained participation in Chinese traditional culture within the framework of contemporary society. Additionally, the exploration of how to leverage innovative cultural educational approaches to support the sustainable transmission of cultural heritage and the cultivation of relevant creative capabilities, while sustaining international dialogue, presents a significant area of academic contemplation.

Although the academic community has conducted research on ICH and the tea culture of the Song Dynasty, the existing literature mostly focuses on aspects of history, agriculture and its techniques, with insufficient exploration of the integration between the Song Dynasty tea culture and the idea of creative design. On the other hand, in the discourse on cultural confidence,

the prevailing papers primarily approach the topic from the perspective of ideology and politics. These studies often exhibit a strongly politicized and didactic orientation, which not only lacks innovative approaches and interdisciplinary integration but also fails to effectively engage the younger demographic through homiletic solutions.

3.2 Cultural Innovation for Talent Development

Enhancing engagement and creative capabilities among young Chinese individuals should not involve a wholesale rejection or resistance to the strong points of Western-centric developed nations. Instead, it is essential to absorb their advanced experiences and make effective adjustments in accordance with local conditions to develop creative and innovative solutions that align with the characteristics of Chinese society and the needs of cultural and creative talent development. Yang (2017) suggests that economic globalization has led to increasingly frequent international cultural exchanges. It is imperative to foster the interplay and mutual enhancement of the essence of various cultures to achieve a symbiosis of multiculturalism. Also, it is crucial to avoid cultural exclusivity in the process.

To promote the sustained prosperity and global competitiveness of Chinese culture, Jiang and Tian (2016) also endorse a balanced approach that emphasizes preserving traditional cultural elements while remaining open-minded toward other cultures. Xu (2019) similarly believes that the cultivation of cultural confidence should be grounded in innovative development, stressing the importance of recognizing both the strengths and limitations of traditional Chinese culture. Xu further suggests adopting a dialectical perspective toward other cultures by selectively integrating their advantageous elements in a critical and reflective manner.

According to the developmental experiences of developed countries, the influence of culture is seen to expand through the feasibility and effectiveness of creative products disseminated in various forms. The support of compelling storytelling and design strategies further aids in propelling the sustainable development of culture. China should also strengthen its capabilities in this domain. By leveraging the trends of popular cultures, a positive impact can initially be made on younger audiences. Subsequently, there lies the opportunity to extend this influence to a broader scope, ultimately allowing a wider audience to experience and appreciate the charm and depth of Chinese cultural essence in the future while also supporting the cultivation of cultural and creative talent through sustained engagement and practice.

3.3 The Potential of Multi-Sensory Design Theory in Cultural Innovation

Multi-sensory design refers to a conceptual approach that stimulates audience engagement and consumption motivation by engaging multiple senses, including visual, olfactory, gustatory, tactile, and auditory dimensions. This theory enhances the quality of audience experience and strengthens emotional resonance, thereby contributing to a more positive overall experience (Wu et al., 2022). Compared with uni-sensory stimulation, multi-sensory stimulation demonstrates greater flexibility and precision in audience behavioral responses, indicating significant potential for industry integration, innovation, and broader development (Wu et al., 2022; Yang & Cai, 2024).

Multi-sensory design theory is prevalent in both China's domestic and international design fields, featuring prominently in various directions of theoretical and applied research. It is not

limited to industrial/product design but also extensively utilized in packaging design, advertising creativity, and landscape architecture, etc. (Yang & Cai, 2024). Relevant design studies have adopted human-centered design philosophies and methods, forming a preliminary system of their own methodologies (Wu et al., 2022).

Based on this theory, renowned international designers such as Kenya Hara, Kohei Sugiura, and Kengo Kuma have emphasized the importance of the five-senses in design applications and integrated this philosophy into their practical projects. Their influence has sparked extensive research and discussion in the design academic community (Zhen, 2022; Wang, 2023). Notably, Kengo Kuma, inspired by Song Dynasty Zen philosophy, has completed architectural design projects in the Song style, such as the Folk Art Museum Hangzhou (Zhang, n.d., *Arquitectura Viva*).

These practices suggest that multi-sensory design extends beyond the enhancement of user experience and can facilitate deeper cultural appreciation and understanding. By engaging multiple sensory dimensions, such approaches enable cultural meanings to be communicated in a more accessible and emotionally resonant manner. In this respect, the application of multi-sensory design theory demonstrates the feasibility of integrating traditional aesthetic principles into contemporary design practice. Within the context of attracting youth engagement and supporting cultural and creative capability formation in China, this perspective offers a viable basis for reinterpreting traditional cultural elements through design innovation, rather than relying solely on visual representation.

Zhang and Ye (2021) highlighted the significance of multi-sensory experiences in product design from a Chinese perspective, which not only demonstrates the applicability of multi-sensory experiences to the design of cultural and creative products in China but also implies a connection between multi-sensory design and emotional perception. They categorize cultural and creative products into three interactive dimensions: the material level, the behavioral level, and the spiritual level. In the meantime, users are enabled to transition from direct sensory perception to underlying emotional experience through interactions across the levels of object environment, situational context, and artistic conception. They believe in the pivotal role that multi-sensory design plays in enhancing users' emotional experiences and cultural perceptions, substantiating its effectiveness for experience-driven cultural innovation and talent development in cultural and creative industries.

3.4 Conceptual Framework

China's tea culture can continue to occupy a significant position in fostering cultural and creative capability formation in emerging fields, potentially evolving to embrace new daily practices that are more aligned with contemporary lifestyles (Sigley, 2015). Among its various historical forms, Song Dynasty tea culture is worthy of attention and revitalization. It can significantly deepen people's understanding of China's ancient history and related traditions. Moreover, the aesthetic principles of the Song period are entirely different from stereotypical perceptions of a monolithic Chinese style, thereby revealing the diversity of Chinese culture and aesthetic appreciation (Zhu, 2008; Benn, 2015; Jolliffe et al., 2023; Zhong & Lü, 2024). The Song Dynasty tea culture, as a representative form of Chinese ICH, can further be regarded as an experiential cultural resource rooted in distinctive aesthetic practices, and therefore offers a

resource base for HRD-oriented cultural and creative talent cultivation.

Figure 2 illustrates the conceptual framework grounded in the current research findings. This framework delineates a pathway from ICH resources to potential cultural and creative talent development in an HRD context and highlights the pivotal role of product-design-enabled cultural innovation as the enabling stage that connects heritage resources to youth engagement. The Song Dynasty tea culture serves as the origin for this paper, as it is a distinctive form of ICH native to China and in need of revival, with its rich historical connotations and exclusive aesthetic atmosphere offering numerous possibilities for storytelling. These characteristics endow it with significant research and development value for building youth-facing engagement pathways and talent pipelines.

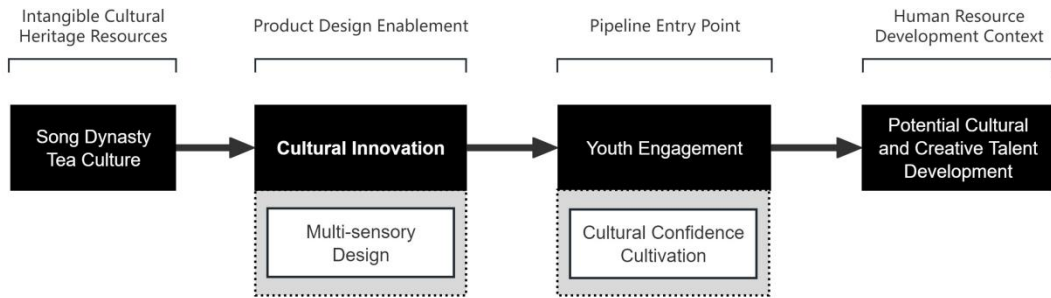


Figure 2 *Conceptual Framework (Source: Authors)*

From a design practice perspective, the application of multi-sensory design theory in the product-design-enabled cultural innovation field of ICH holds great potential. Compared to a singular visual experience, the stimulation of multiple senses is more likely to attract the attention of young people and motivate their interest. Youth engagement is therefore conceptualized as the pipeline entry point, through which sustained participation supports the accumulation of cultural knowledge and the formation of creative capabilities. In turn, such capability formation provides the basis for potential cultural and creative talent development within a human resource development context.

Within the pipeline entry point, youth engagement represents more than a transient response to heritage-related cultural and creative experiences. Based on the discussion in the previous sections, cultural confidence cultivation is incorporated as an important supporting element within this stage. Once product-design-led innovation captures youth attention, the subsequent integration of institutional support and participation-oriented activities in both higher education and the broader cultural and creative environment can help strengthen cultural confidence and foster sustained engagement. By providing a more structured context for cultural immersion, this process may help transform an initial point of attraction into a more sustainable pathway of participation. Consequently, youth engagement supported by cultural confidence cultivation can contribute to cultural knowledge accumulation, creative capability formation, and the development of a potential cultural and creative talent pool.

In addition, as noted in Section 2.3, MOHRSS (2024) provides a policy-based reference for considering more practice-oriented directions in cultural and creative talent development. In the present study, it may be further interpreted as a structural bridge linking heritage-based cultural participation with competency development in cultural and creative practice. Among the newly announced occupations, the one most directly relevant to this study is Cultural and Creative Product Planning and Operation Specialist (4-08-08-30), which is officially defined as an occupation engaged in planning cultural and creative products, designing products with cultural elements in response to market demand, and conducting marketing and operational activities for such products. The official attachment further outlines eight major work tasks, thereby clarifying the functional scope of this occupation.

In line with the core logic of the present conceptual framework, Table 2 further illustrates the structural bridge role that MOHRSS (2024) may play in linking heritage-based cultural participation with competency development in cultural and creative practice. More specifically, Song Dynasty tea ICH practices, when translated through product-design-enabled and multi-sensory innovative approaches, may support a gradual shift from relatively passive cultural reception toward more active participation, and in some cases toward self-directed involvement in product design and project development. In this sense, participants may progressively develop into potential talent and even initiators.

Table 2 *Mapping of Song Dynasty Tea ICH to Skills for Occupation 4-08-08-30 in MOHRSS (2024)*

Song Dynasty Tea ICH practice	Related Multi-sensory / design translation	Selected professional competency	Related task(s) based on the MOHRSS (2024) attachment
Dian Cha element interpretation	Multi-sensory translation of heritage elements to support initial youth engagement	Cultural awareness, cultural confidence, cultural interpretation, aesthetic understanding	Task 1: Cultural material extraction; resource refinement; cultural element selection
Song-style creative concept development	Translation of aesthetic and sensory experience into product concepts, styles, and audience-oriented directions	Design translation, storytelling, planning, concept development	Task 2: Product positioning; style definition Task 3: Product concept definition; material and process planning
Dian Cha product design and production	Transforming participatory cultural experience into tangible product design and production practice	Creative application, integration, product realization	Task 4: Product design solution; design implementation; quality control
Workshops, exhibitions, and promotion	Sustaining participation through multi-sensory, interactive, and audience-oriented experiences	Cultural confidence cultivation, presentation, interaction, communication, market operation	Task 5: Product launch; publicity; promotion; marketing activities

Song Dynasty Tea ICH practice	Related Multi-sensory / design translation	Selected professional competency	Related task(s) based on the MOHRSS (2024) attachment
Derivative product development and brand extension	Shifting from participation to application through multi-sensory cultural translation into marketable products	Intellectual property awareness, market responsiveness, development orientation	Task 6: Intellectual property registration; rights protection Task 7: Market feedback collection; sales analysis; public opinion analysis
Project documentation and follow-up	Supporting the transition from participant to practitioner through project-based development and operational continuity	Project development, operational continuity, professional growth	Task 8: Project archiving; contract management; traceability assurance

Note. This table provides an illustrative mapping only.

The transition from youth engagement to talent development may also be interpreted from an HRD perspective through the KSA (Knowledge, Skills, and Abilities) framework. In this pathway, engagement with Song Dynasty tea culture through product-design-enabled innovation, particularly through multi-sensory experiences, may first contribute to the accumulation of relevant cultural knowledge, including a stronger understanding of ICH, Song Dynasty tea culture, aesthetic principles, and related cultural contexts. With further participation, such engagement may also support the development of creative and communicative skills, such as cultural expression, design translation, storytelling, planning, presentation, and interaction. Over a longer period of sustained participation and practice, these forms of knowledge and skill may be further consolidated into broader abilities related to cultural and creative application, integration, and future professional development. Accordingly, youth engagement does not directly lead to talent development, but may instead function as a pipeline through which knowledge, skills, and abilities are gradually formed and strengthened toward that longer-term outcome.

3.5 Empirical Support

To further examine the relationships proposed in the conceptual framework, this study incorporated a quantitative survey among Chinese youth participants aged 18 to 30. The four constructs in this section were operationalized from the key dimensions of the framework for empirical examination. Using a five-point Likert scale, the questionnaire measured these constructs, as summarized in Table 3.

Table 3 *Construct Definitions*

Construct	Definition
Chinese ICH Awareness	Understanding of and interest in Chinese intangible cultural heritage, with Song Dynasty tea culture regarded as one significant heritage resource in this study.
Design-Enabled Innovation Appeal	Perceived attractiveness of multi-sensory and design-driven cultural products.
Youth Engagement Intention	Willingness to participate in tea-culture-related or heritage-based cultural activities, with potential relevance to the strengthening of cultural confidence.
Talent Development Inclination	Intention to develop related skills or pursue relevant career pathways.

A total of 156 valid responses were collected in May to June 2025 in Fuzhou, Fujian Province. Descriptive results indicated a moderate level of Chinese ICH Awareness, while Design-Enabled Innovation Appeal, Youth Engagement Intention, and Talent Development Inclination showed comparatively higher mean scores. This pattern suggests that the respondents demonstrated relatively stronger responsiveness to design-enhanced cultural experiences and relatively positive inclinations toward participation and related developmental pathways. Reliability analysis further showed satisfactory internal consistency across all four constructs, with Cronbach's α values ranging from 0.82 to 0.91, suggesting that the measurement scales were appropriate for the subsequent analyses (Table 4).

Table 4 *Reliability Scale*

Construct	Mean	<i>SD</i>	Cronbach's α
Chinese ICH Awareness	3.42	0.71	0.82
Design-Enabled Innovation Appeal	3.88	0.65	0.88
Youth Engagement Intention	3.95	0.69	0.91
Talent Development Inclination	3.76	0.73	0.87

Correlation analysis further showed positive associations among the four constructs, as presented in the lower triangle of Table 5. Chinese ICH Awareness was positively associated with Design-Enabled Innovation Appeal ($r = 0.45$, $p < .01$), Youth Engagement Intention ($r = 0.40$, $p < .01$), and Talent Development Inclination ($r = 0.38$, $p < .01$). Design-Enabled Innovation Appeal was also positively associated with Youth Engagement Intention ($r = 0.68$, $p < .001$) and Talent Development Inclination ($r = 0.60$, $p < .01$). In addition, Youth Engagement Intention was positively associated with Talent Development Inclination ($r = 0.72$, $p < .001$).

Table 5 *Correlation Analysis*

Constructs	1	2	3	4
1. Chinese ICH Awareness				
2. Design-Enabled Innovation Appeal	.45**			
3. Youth Engagement Intention	.40**	.68***		
4. Talent Development Inclination	.38**	.60**	.72***	

Note. ** $p < .01$, *** $p < .001$.

Overall, the quantitative findings show positive associations among the four constructs and are broadly consistent with the proposed framework. In particular, Design-Enabled Innovation Appeal was positively associated with Youth Engagement Intention and Talent Development Inclination, supporting the relevance of design-enabled cultural innovation and multi-sensory design approaches to heritage revitalization and potential cultural and creative talent development.

4. Conclusion

With the ascendance of China's overall economic strength, the material conditions and living standards of its citizens have improved. Nonetheless, despite the satisfaction of material needs, a disparity persists between the cultural and spiritual dimensions of the people. At present, there is a lack of effective integration between Chinese cultural heritage and the creative expressions of contemporary society, necessitating the identification of a point of connection between these two domains. By understanding the approaches used by developed countries, such as Japan, which effectively develop the soft power of the relevant cultures, scholars and creative practitioners need to explore some effective and viable innovative strategies based on local realities and sectoral talent needs.

Focusing on the cultural and creative industries, this study highlights the importance of combining ICH creativity and innovation with HRD-oriented talent cultivation, developing practical creative design, and building a bridge between Song Dynasty tea culture and the sub-cultural interests of young people. This can not only effectively attract the attention of young people and play a role in reviving the culture, but also help to foster youth engagement as the entry point of a talent pipeline through culturally resonant experiences, thereby supporting capability formation and the development of potential cultural and creative talent. The interdisciplinary combination of innovative thinking is likely to remain an important direction in this field, particularly in linking ICH resources, design-enabled cultural innovation, youth engagement, and HRD outcomes.

In conclusion, this study provides a conceptual basis for understanding how Song Dynasty tea culture, as a representative ICH resource, can be linked with contemporary development through product-design-led innovation. The discussion suggests that heritage revitalization should be understood not merely as cultural preservation, but as a viable pathway for youth engagement and creative capability formation. In this sense, the proposed framework offers a useful reference for future research on heritage-based design innovation and talent development. Further studies may continue to refine these relationships through case studies, expert evaluations, youth surveys, or comparative analyses.

References

- An, L. (2020). *Research on Culture Confidence Education of College Students*(Doctoral dissertation, Harbin Normal University, Harbin, China).<https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CDFDLAST2021&filename=1021503094.nh>
- Benn, J. A. (2015). *Tea in China: A religious and cultural history*. University of Hawaii Press.
- Chen, Y. H., & Xu, J. J. (2022). Research on the historical contribution and contemporary value of tea culture in Song dynasty. *Zhejiang Social Sciences* (08), 146-155+161. <https://doi.org/10.14167/j.zjss.2022.08.008>
- Chen, Y. P., & Sheng, H. (2015, February 1). The “Cultural Nation” strategy of South Korea. *People’s Digest*. http://paper.people.com.cn/rmwz/html/2015-02/01/content_1541452.htm
- China Daily. (2022, December 30). Mega-popular TV drama series from 2022. *China Daily*. https://www.chinadaily.com.cn/a/202212/30/WS63ae5a2ca31057c47eba6fe1_3.html
- Gautam, U. (2024). The role of culture power: Examining the influence of popular culture in shaping global power dynamics. *Unity Journal*, 5(1), 41-56. <https://doi.org/10.3126/unityj.v5i1.63158>
- Han, Z. M. (2023, September 22). *The Interview on Dian Cha Culture in “Elegant Song Dynasty.”* Bilibili. <https://www.bilibili.com/video/BV1ez4y1V7bp>
- Hu, W. (2021, October 8). *Cultural Confidence Can Make Intangible Cultural Heritage Full of New Vitality*. Guangming Net. https://feiyi.gmw.cn/2021-10/08/content_35215158.htm
- Huang, J. W. (2022, March 24). *New Chinese Trend: Showing the Beauty of the Song Rhyme of Tea Culture*. cul.china.com.cn. http://cul.china.com.cn/2022-03/24/content_41915975.htm
- Huang, Y. J. (2018). *Research on Influence Mechanism of Intangible Cultural Heritage Products’ Purchase Intention Influenced by Cultural Identity*(Doctoral dissertation, Huaqiao University, Fujian, China). <https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CDFDLAST2023&filename=1023404051.nh>
- Iwabuchi, K. (2018). Pop-culture diplomacy in Japan Soft power, nation branding and the question of ‘international cultural exchange’. In *Cultural Diplomacy Beyond the National Interest* (pp. 65-78). Routledge. <https://doi.org/10.1080/10286632.2015.1042469>
- Jiang, X., & Tian, Y. (2016). Cultural Confidence of Chinese People: Reflection on The Spirit of the Chinese People. *Higher Education of Social Science*, 11(4), 8-13. <http://dx.doi.org/10.3968/9022>
- Jolliffe, L., Aslam, M. S. M., Khaokhrueamuang, A., & Chen, L. H. (2023). *Handbook of Tea Tourism*. Routledge.
- Kwon, S. H., & Kim, J. (2014). The cultural industry policies of the Korean government and the Korean Wave. *International Journal of Cultural Policy*, 20(4), 422-439. <https://doi.org/10.1080/10286632.2013.829052>
- Li, F. L. (2022). Cultural Contributions in the CPC’s 100-year History:From Cultural Self-consciousness, Cultural Self-confidence to Civilization Innovation. *Social Sciences in Chinese*. *Social Sciences in Chinese Higher Education Institution*(04), 53-61+158.
- Li, J., Zheng, Z., Chai, Y., Su, S., Wei, X., Shi, H., & Xin, X. (2023, September). DianTea: Designing and Evaluating an Immersive Virtual Reality Game to Enhance Youth Tea Culture Learning. *Proceedings of the 25th International Conference on Mobile Human-Computer Interaction* (pp. 1-8). <https://doi.org/10.1145/3565066.3608707>

- Li, L. (2017). Teaching of ideological and political education for college students from the perspective of culture. *DEStech Transactions on Social Science Education and Human Science*, 1, 656-661. <https://doi.org/10.12783/dtssehs/ssme2017/13040>
- Liu, H. H. (2015). The Influence of Japanese and Korean Pop Cultures on Chinese College Students. *Asia Pacific Education*, (24), 256-257. <https://doi.org/10.16550/j.cnki.2095-9214.2015.24.201>
- Liu, L. T., & Song, S. L. (2016). Protection and Inheritance Mechanism of Chinese Tea Skills from the Demand Perspective. *Wuhan University Journal (Humanity Sciences)*(02), 90-99. <https://doi.org/10.14086/j.cnki.wujhs.2016.02.016>
- Lu, C. C. (2011, September). Cultural industry innovation and talent cultivation. *National Academy for Educational Research E-paper*, (24). https://epaper.naer.edu.tw/edm?edm_no=24&content_no=609
- Ma, L. P. (2023). Analysis of the Challenges to Cultural Confidence in the New Era of the Internet. *The Journal of Elegance and Classic*(10), 60-63.
- Matosian, A.E. (2025). Soft Power and Cool Japan: Shaping Japan's National Image. *International Relations*, 1, 45-56. <https://doi.org/10.7256/2454-0641.2025.1.73325>
- Min, X. L. (2021). *A Study on Intangible Cultural Heritage Handicraft Innovation Design Ecology in Social Transformation*(Doctoral dissertation, Hunan University, Hunan, China). <https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CDFDLAST2023&filename=1022433623.nh>
- Ministry of Human Resources and Social Security of the People's Republic of China. (2024, July 31). *The Ministry of Human Resources and Social Security, the State Administration for Market Regulation, and the National Bureau of Statistics jointly release 19 new occupations including bioengineering technicians*. http://www.mohrss.gov.cn/SYrlzyhshbzb/dongtaixinwen/buneiyaowen/rsxw/202407/t20240731_523281.html
- Ministry of Foreign Affairs of Japan. (2017). *Diplomatic Bluebook 2017: Chapter 3, Section 4.2, Cultural Diplomacy*. <https://www.mofa.go.jp/policy/other/bluebook/2017/html/chapter3/c030402.html>
- Mok, C. (2025, January 19). How the lost art of the Song dynasty tea ceremony is being revived by a new generation. *South China Morning Post*. <https://www.scmp.com/lifestyle/food-drink/article/3293100/how-lost-art-song-dynasty-tea-ceremony-being-revived-new-generation>
- Nishimura, M., Otsuki, Y., Shinohara, H., Okamoto, H., Miyake, M., Miyajima, J., ... & Sato, M. (2010). Tea in the historical context of East Asia: cultural interactions across borders. *Cultural Reproduction on its Interface: From the Perspectives of Text, Diplomacy, Otherness, and Tea in East Asia*, 195-226.
- Ouyang, J. (2025, December 4). *Studying and implementing the spirit of the Fourth Plenary Session of the 20th CPC Central Committee: Reflections on accelerating the cultivation pathways of cultural talents*. China CPPCC Net. <http://www.cppcc.gov.cn/zxww/2025/12/04/ARTI1764809053582140.shtml>
- Shanghai Eye. (2023, May 22). *Revive Chinese tea latte (no milk) of Song dynasty (960-1279) after 7 rounds of tea-whisking*. YouTube. https://www.youtube.com/watch?v=mu64KuMR6_c&t=7s
- Shi, J. H. (2022, June 14). "A Dream of Splendor" Sparks Interest in the Intangible Cultural Heritage "Cha Bai Xi": Writing Poetry and Painting on Tea with Clear Water. Thepaper.cn. https://www.thepaper.cn/newsDetail_forward_18565270

- Shi, S. K., Zhang, Q. X. Y., & Jiang, N. (2024). An analysis of the three-dimensional integration of intangible cultural heritage into ideological and political education in colleges and universities. *Academic Journal of Humanities & Social Sciences*, 7(5), 94-101. <https://doi.org/10.25236/ajhss.2024.070516>
- Sigley, G. (2015). Tea and China's Rise: Tea, Nationalism and Culture in the 21st century. *International Communication of Chinese Culture*, 2, 319-341. <https://doi.org/10.1007/s40636-015-0037-7>
- Tamaki, T. (2019). Repackaging national identity Cool Japan and the resilience of Japanese identity narratives. *Asian Journal of Political Science*, 27(1), 108-126. <https://doi.org/10.1080/02185377.2019.1594323>
- Tsai, J. (2024, April 29). *Cultural and creative industry and human resource management*. InfoShare Tech Law Office. <https://www.is-law.com/cultural-and-creative-industry-and-human-resource-management/>
- UNESCO. (2021). *Traditional tea processing techniques and associated social practices in China*. UNESCO Intangible Cultural Heritage. <https://ich.unesco.org/en/RL/traditional-tea-processing-techniques-and-associated-social-practices-in-china-01884>
- Wang, H. B. (2019, March 15). Four Key Focuses for Advancing Ideological Work in the New Era. *People's Daily Online—Theory Channel*. <http://theory.people.com.cn/n1/2019/0315/c40531-30977967.html>
- Wang, L. X. (2023). The Influence of the Design of the Five Senses on the Production Process of Tea Bowls of Yue Kiln in the Tang Dynasty. *Foshan Ceramics*, 2(2), 27-31.
- Wu, L. F., Lu, D. B., Wu, Y., Su, D., Cao, Y. J., Huang, M. J., & Huang, B. D. (2022). Visualization Analysis of Multi-sensory Design: Research Progress, Hotspot and Development Trend. *Packaging Engineering*(22), 205-220. <https://doi.org/10.19554/j.cnki.1001-3563.2022.22.023>
- Xinhua News Agency. (2021, August 12). *General Office of the CPC Central Committee and General Office of the State Council Issued "Guiding Opinions on Further Strengthening the Protection of Intangible Cultural Heritage"*. www.gov.cn - Relevant Documents of the Central Government. https://www.gov.cn/zhengce/2021-08/12/content_5630974.htm
- Xinhua News Agency. (2022, August 16). *General Office of the CPC Central Committee and General Office of the State Council issued "Cultural Development Plan for the 14th Five-Year Period"*. www.gov.cn - State Council Communique No. 24, 2022. https://www.gov.cn/gongbao/content/2022/content_5707278.htm
- Xiong, D. M. (2022). Research on the Value and Path of Firming Up Cultural Confidence in the New Era. *Public Relations World*(18), 153-154.
- Xu, L. J. (2019). *Research on the Issue of Cultural Confidence*(Doctoral dissertation, CPC Central Party School, Beijing, China). <https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CDFDLAST2020&filename=1019208640.nh>
- Xu, M., & Ma, X. Y. (2020). Review of Intangible Cultural Heritage and Cultural Creativity Based on Cultural Confidence. *Industrial and Engineering Design*, 6, 1-11. <https://doi.org/10.19798/j.cnki.2096-6946.2020.06.001>
- Yang, F. (2022, March 22). *Song in a Cup*. China Daily. http://www.chinadaily.com.cn/a/202203/22/WS62391417a310fd2b29e525a8_1.html

- Yang, Y. (2017, May). Discussion on the Ancient and Modern Chinese Cultural Confidence. *2017 International Conference on Culture, Education and Financial Development of Modern Society (ICCSE 2017)* (pp. 251-253). Atlantis Press. <https://doi.org/10.2991/iccse-17.2017.65>
- Yang, Y. K., & Cai, P. J. (2024). Multisensory Experience Design: A Literature Review. *Communications in Humanities Research*, 27, 34-37. <https://doi.org/10.54254/2753-7064/27/20232117>
- Yang, Z. Q. (2018). *Research on cultural identity of nation-states from a global perspective* (Doctoral dissertation, CPC Central Party School, Beijing, China). <https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CDFDLAST2022&filename=1019008546.nh>
- Yunshan. (2010). Cultural self-consciousness, cultural self-confidence, and cultural self-improvement - Reflections on the Prosperity and Development of Socialist Culture with Chinese Characteristics. *Red Flag Manuscript*(16), 4-8.
- Zhang, C. (2019). *A Study on Tea Culture in the View of Song Dynasty Notes*(Doctoral dissertation, Huazhong Normal University, Hubei, China). <https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CDFDLAST2023&filename=1019248822.nh>
- Zhang, C. L., & Wang, Y. Q. (2022). The Analysis on the Cultivation Path of College Students' Firm Cultural Self-confidence in the New Era. *Sinogram Culture*(15), 177-179. <https://doi.org/10.14014/j.cnki.cn11-2597/g2.2022.15.025>
- Zhang, X. C. (n.d.). *Folk Art Museum, Hangzhou - Kengo Kuma*. Arquitectura Viva. <https://arquitecturaviva.com/works/museo-de-arte-popular-hangzhou-8>
- Zhang, Y. X. (2022). The Value Implication and Realization Path of Enhancing College Students' Cultural Self-confidence from the Perspective of Cultural Power. *The Party Building and Ideological Education in Schools*(06), 70-72. <https://doi.org/10.19865/j.cnki.xxdj.2022.06.021>
- Zhang, Z. Y., & Ye, L. Q. (2021). Design of Museum Literary Creation Products Based on Multi-sensory Experience. *Packaging Engineering*(18), 368-373. <https://doi.org/10.19554/j.cnki.1001-3563.2021.18.046>
- Zhen, Y. N. (2022). Exploration of Kenya Hara's design methods and philosophy. *Art Education Research*, (8), 74-75.
- Zheng, M. R. (2022). On the Historical Evolution and Times Value of Tea Ordering Technique. *Journal of Pu'er University*, (04), 40-43.
- Zhong, D., & Lü, J. (2024). Aesthetics of tea porcelain in tea ceremonies during the Song dynasty. *Agricultural Archaeology*, 2024(2), 106-114.
- Zhu, H. Y. (2008). *Studies on Tea Aesthetics in China—Studies on Tea Aesthetics Ideologies during Tang and Song Dynasty and Construction of Modern Tea Aesthetics* (Doctoral dissertation, Hunan Agricultural University, Hunan, China). <https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CDFD0911&filename=2009090867.nh>

Qiu-Yuan Lin

School of Creative Industry Management and Performing Arts, Universiti Utara Malaysia,
Sintok, Kedah, Malaysia

E-mail address: linqiuyuan88@hotmail.com

Major area(s): Industrial Design, Creative Transformation, Cultural Heritage Revitalization.

Asmidah Alwi

School of Creative Industry Management and Performing Arts, Universiti Utara Malaysia,
Sintok, Kedah, Malaysia

E-mail address: asmidah@uum.edu.my

Major area(s): Creative Media, UxD, Creative Industry.

(Received January 2026; accepted May 2026)