

The Impact of Higher Modern Education on Jingdezhen Ceramic Industry

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Received: 13 February 2026 | Accepted: 30 March 2026 | Published: 20 April 2026

DOI: <https://doi.org/10.55057/ajress.2026.8.3.28>

Abstract: *The development of higher modern education exerts a profound and multifaceted influence on people's lives and society. This paper investigates the impact of higher modern education on industrial development; with Jingdezhen whose pillar industry is ceramics as the research case. It analyzes how higher modern education institutions contribute to the transformation and sustainable growth of the Jingdezhen ceramic industry through talent cultivation, technological innovation, cultural heritage and innovation and industrial integration, which is closely aligned with SDG 4 (Quality Education). SDG 4 emphasizes inclusive, equitable quality, higher modern education, and skills for sustainable development. This study examines how higher modern education enhances talent, innovation, and industrial upgrading in Jingdezhen's ceramic sector, demonstrating how high-quality education, a core objective of SDG 4, drives sustainable cultural and economic development for traditional industries. This paper adopts a qualitative research design, which mainly combines literature review and semi-structured interview methods, with 15 respondents including 5 senior managers from local ceramic enterprises, 10 professors and associate professors specializing in ceramics from 5 local colleges and universities. The collected interview data are analyzed using Braun and Clarke (2006) qualitative thematic analysis. The research reveals the significant role of higher modern education in driving industrial innovation, cultural heritage, technological progress, and market expansion. The findings indicate that higher modern education promotes the technological upgrading of the ceramic industry through talent cultivation and achievement transformation, inherits and innovates ceramic culture via professional education and academic research and provides support for the sustainable development of the industry by optimizing the industrial chain and shaping core competitiveness. Finally, targeted suggestions are put forward to strengthening the integration of industry and education, so as to realize the mutual promotion and win-win development of higher modern education and the Jingdezhen ceramic industry.*

Keywords: Higher Modern Education; Jingdezhen Ceramic Industry; Technological Innovation; Cultural Heritage; Sustainable Development Goal 4(SDG4)

1. Introduction

Jingdezhen, a city closely bound to porcelain, has thrived and gained fame for porcelain for thousands of years. As a world-renowned porcelain capital, it boasts a porcelain-making history of over two thousand years, a official kiln history of more than a thousand years, and an imperial kiln history of more than seven hundred years (Xie SY, 2023). With the city's development, Jingdezhen is home to five colleges and universities until now. These colleges

and universities are deeply rooted in Jingdezhen, leveraging their geographical advantages to offer ceramics-related courses, which play a crucial role in the development of the local ceramic industry. Endowed with unique resources and conditions, Jingdezhen has long been an important ceramic production area in China. During the Northern Song Dynasty, the emperor highly praised the exquisite bluish-white porcelain produced here and bestowed the reign name "Jingde" upon the city, which is still in use today. The kilns in Jingdezhen have operated for thousands of years, producing numerous exquisite porcelains for the world. On December 1, 2014, Jingdezhen was named the "World Capital of Handicrafts and Folk Art" by UNESCO. Today, Jingdezhen is not only a city preserving complete traditional handmade porcelain techniques but also a vibrant "Internet celebrity city". Jingdezhen's transformation from an ancient industrial city known as "one city of porcelain and half a city of kilns" to a popular new Internet celebrity destination is inseparable from all kinds of support. Moreover, the driving role of local universities in Jingdezhen is indispensable. These five colleges and universities have made significant contributions to the local ceramic industry's development by offering ceramics-related programs.

1.1 Research Background

As a traditional advantageous industry with a long history, the Jingdezhen Ceramic Industry is an important carrier of Chinese traditional culture and a key pillar of local economic development (Wu & Feng, 2024). In the context of industrial transformation and upgrading, the industry faces dual challenges: backward technology in some links and difficulties in inheriting traditional craftsmanship (Zhang & Li, 2025). Meanwhile, modern higher modern education, as a vital source of talent, technology and innovation, plays an increasingly prominent role in promoting the development of local industries (Chen & Wang, 2025). The integration of ceramic-related higher modern education institutions, such as Jingdezhen Ceramic University, with the local ceramic industry, has become a key breakthrough for the revitalization of the Jingdezhen Ceramic Industry (Shu & Wu, 2021).

Foreign research focuses on the mechanism of industry-university-research cooperation and the impact of higher modern education on industrial innovation, having formed a relatively mature theoretical system (Lundvall, 2022). Domestic research mainly centers on the integration path between ceramic higher modern education and the Jingdezhen Ceramic Industry, the contribution of talent cultivation to industrial upgrading and the role of scientific research platforms in technological progress (Shu & Wu, 2021). However, existing studies lack a systematic analysis of the synergistic effect of higher modern education on the technological innovation, cultural heritage, and sustainable development of the Jingdezhen Ceramic Industry. Additionally, research on the integrated development path from a three-dimensional coordination perspective is insufficient, providing a research gap for this paper (Li & Zhang, 2025).

From a global perspective, contemporary ceramic art research has focused on the dynamic relationship between cultural heritage, technological innovation and education, but there is a lack of in-depth case studies combining specific regional industrial development (Liu, 2024). This paper takes the Jingdezhen ceramic industry as the research object, which can fill the gap of combining global theoretical research with local practical development.

From a theoretical perspective, this study enriches the research on the interaction between modern higher modern education and local traditional industries, constructing a theoretical framework for the impact of higher modern education on industrial development from multiple dimensions. From a practical perspective, it provides a practical reference for the Jingdezhen Ceramic Industry to achieve technological innovation, cultural inheritance, and sustainable development by relying on higher modern education. It also offers a reference model for other traditional industries to revitalize through the integration of industry and education.

1.2 Problem Statement

The transformation efficiency of scientific research achievements in colleges and universities is low, and the industry-university-research cooperation mechanism needs to be improved (Zhang Y, 2018). There is a disconnect between the inheritance of traditional craftsmanship and modern market demand, and the innovation of cultural products is insufficient (Zhao M, 2020), with the traditional father-son and master-apprentice inheritance model of ceramic craftsmanship still having a deep-rooted impact. Master's often reserve key skills and family inheritance is limited by willingness to pass on skills, making it difficult for professional education to fully integrate and innovate traditional skills (Wu, 2020; Wu & Feng, 2024). The integration of higher modern education and the ceramic industrial chain is not deep enough, and the role in promoting green development and brand building is limited (Chen L, 2021); there is a lack of stable interest linkage mechanisms between colleges and enterprises, and cooperation is mostly short-term and project-based, failing to form a synergistic development pattern (Pek et al., 2022). The talent training structure of colleges and universities does not fully match the development needs of the ceramic industry and there is a serious shortage of interdisciplinary talents with both professional knowledge and practical skills (Li M, 2022); meanwhile, the ceramic education system is still imperfect: curricula are outdated, industrial field courses are narrow and insufficient. In addition, teachers' insufficient industrial field experience and self-development capabilities, as well as the inadequate connection between teaching content and industrial production processes, also restrict the quality of talent training (Pek et al., 2022; Wu, 2016).

Based on the above research background and existing research gaps, this study focuses on the following core research question:

RQ: What are the specific impact paths of modern higher modern education on the technological innovation, cultural heritage, and sustainable development of the Jingdezhen Ceramic Industry?

2. Literature Review

2.1 Definition of Terms

2.1.1 Modern higher modern education

Modern higher modern education refers to the education provided by colleges and universities, which integrates teaching, scientific research, and social services. In this study, it specifically refers to the education activities carried out by five local colleges and universities in Jingdezhen around ceramic-related fields, including talent cultivation, scientific research, innovation in technological, cultural research and social service functions, such as industry-university research cooperation, international exchange and cultural dissemination.

2.1.2 Technological Innovation of Ceramic Industry

It refers to the improvement and innovation of production technologies, materials, processes and equipment in the Jingdezhen ceramic industry, including the research and development of new materials such as polymer composites that enhance ceramic body strength, toughness, and thermal stability (Hu et al., 2022; Zheng, 2015; Chen, 2021); the application of advanced production technologies like gel injection molding and 3D printing that realize the forming of complex structural porous ceramics and precise modeling (Hu et al., 2022); as well as the innovation of product design and manufacturing processes such as optimizing raw material ratios and firing curves to improve product yield and artistic expression (Hu et al., 2022; Zheng, 2015; Chen, 2021).

2.1.3 Cultural Heritage and Innovation of Ceramic Industry

Cultural heritage mainly refers to the inheritance of Jingdezhen's complete traditional ceramic handmade craftsmanship, time-honored porcelain-making historical culture, diverse ceramic artistic traditions as well as the folk customs, folk music and folk literature associated with the porcelain industry (Dong & Wang, 2021; Liu, 2019; Zhao, 2020); cultural innovation refers to the integration of modern design concepts, market demand, and multicultural elements into traditional ceramic culture and the in-depth refinement and innovative integration of regional ceramic cultural symbols in creative practice to form new cultural expressions and product forms (Dong & Wang, 2021; Liu, 2019; Zhao, 2020).

2.1.4 Sustainable Development of Ceramic Industry

It refers to the development model of the ceramic industry that balances economic benefits, social benefits, and environmental benefits, including green production, industrial chain optimization, brand building and long-term stable development (National Bureau of Statistics Jiangxi Investigation Team, 2020). The sustainable development of ceramic industry is consistent with the global development trend of ceramic art, which requires the integration of environmental protection concepts into the whole process of ceramic production, creation and inheritance (Liu, 2024).

2.2 Theoretical Basis

2.2.1 Industry-University-Research Integration Theory

The core connotation of industry-university-research integration theory is that colleges and universities, enterprises and the government form a collaborative network to realize the optimal allocation of resources such as talent, technology, and capital (He & Liu, 2014).

2.2.2 Technological Innovation and Industrial Upgrading Theory

Technological innovation and industrial upgrading theory hold that technological innovation is the core driving force for industrial upgrading. The upgrading of traditional industries cannot be separated from technological progress and the input of innovative talents. (Zheng, 2015)

2.2.3 Cultural Heritage and Innovation Theory

Cultural heritage and innovation theory emphasizes that the inheritance of traditional culture is the foundation of innovation, and innovation is the key to the vitality of traditional culture (Liu, 2019). This theory is consistent with the research conclusion of contemporary global ceramic art development that "tradition is the foundation of innovation, and innovation is the way to inherit tradition" (Liu, 2024).

2.2.4 Sustainable Industrial Development Theory

Sustainable industrial development theory advocates that industrial development should not only pursue economic benefits but also pay attention to environmental protection and social responsibility, and realize the coordinated development of economy, society and environment. (National Bureau of Statistics Jiangxi Investigation Team, 2020)

2.3 Conceptual Framework

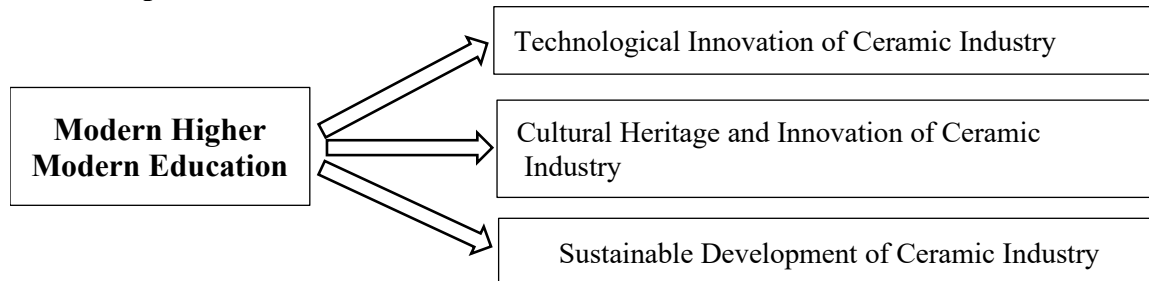


Figure 1: Conceptual Framework

This conceptual framework (Figure 1) illustrates how higher modern education serves as a foundational driver for three key dimensions of development in the ceramic industry: Firstly, modern higher modern education can improve the technological innovation of ceramic industry by providing advanced technical knowledge, research capabilities, and skilled talent in ceramic materials, production processes and digital manufacturing technologies. Secondly, higher modern education institutions preserve, study and reinterpret traditional ceramic art and craftsmanship, while also fostering creative design and contemporary expression, bridging cultural heritage with modern aesthetics. Thirdly, through research in green materials, energy efficiency, circular economy practices and environmental policy, higher modern education guides the ceramic sector toward more sustainable production and business models, thus prompting the sustainable development of ceramic industry. In essence, the framework positions modern higher modern education as a central catalyst, enabling the ceramic industry to evolve technologically, honor its cultural roots, and pursue sustainable growth simultaneously. And this driving effect is also a concrete embodiment of the pivotal role of education in the sustainable development of global ceramic art (Liu, 2024).

3. Methodology

This paper adopts qualitative research design, which mainly combines **literature review** and **qualitative semi-structured interview** methods to systematically explore the transformation of scientific research achievements in ceramic higher modern education and its role in Jingdezhen's industrial upgrading.

3.1 Literature Review Method

First, a comprehensive and systematic literature review is conducted to lay a solid theoretical foundation for the entire study. The literature retrieval is carried out through multiple academic databases, with the key retrieval keywords covering "ceramic development", "higher modern education", "transformation of scientific research achievements", "innovation in ceramic industry", "industrial upgrading", "qualitative research on industry-university cooperation", etc. The retrieved literature includes academic journals, master's and doctoral dissertations, monographs, and policy documents related to the research theme. After sorting out, screening and inductive analysis, the core theories, research status, existing deficiencies and research gaps in the fields of transformation of scientific research achievements in higher modern

education, ceramic industry upgrading and industry-university cooperation were clarified, which provided theoretical guidance for the design of interview outline, the analysis of interview data and the discussion of research conclusions.

3.2 Semi-structured Interview Method

Semi-structured interviews are conducted to collect first-hand data. The respondents include 5 senior managers from local key ceramic enterprises, covering traditional handmade porcelain enterprises, ceramic cultural and creative enterprises and large-scale ceramic production enterprises, 10 professors specializing in ceramics from 5 local colleges and universities engaged in teaching and research in ceramic technology, ceramic design, ceramic culture, etc. The interview outline covers issues such as the impact of higher modern education on ceramic industry talent supply, technological innovation, cultural inheritance, and the existing problems and improvement suggestions in industry-education integration.

3.3 Braun and Clarke Thematic Analysis Method

The collected interview text data are analyzed using Braun and Clarke (2006) thematic analysis. First, the interview transcripts are sorted and cleaned to eliminate irrelevant information. Then, open coding is performed to label and categorize the original data, extracting initial concepts and categories. Next, axial coding is conducted to establish connections between categories, forming core themes such as "talent team enrichment", "technological and cultural innovation", "industrial transformation promotion", and "existing problems in industry-education integration". Finally, selective coding is carried out to integrate the core themes around the research topic, revealing the impact mechanism of modern higher modern education on the Jingdezhen Ceramic Industry and summarizing the existing problems.

3.3.1 Theme1: Technological Innovation of Ceramic Industry

Technological innovation is the core driving force for the high-quality development of the Jingdezhen ceramic industry. Local ceramic higher modern education, with its advantages in professional research and talent reserve, plays a key role in promoting the technological progress of the ceramic industry. This theme explores the specific impact of ceramic higher education on the technological innovation of the Jingdezhen ceramic industry from the perspectives of enterprise managers and college professors.

"Local ceramic colleges provide professional talents in ceramic technology and production optimization, and their research achievements help us upgrade production equipment, improve firing efficiency and reduce product defects."

"We focus on cultivating talents proficient in intelligent ceramic production and new material application, over 60% of whom stay in Jingdezhen to work, providing technical support for enterprises' technological innovation and enriching the local technical talent team."

"Higher modern education injects new technological vitality into traditional ceramics, such as digital modeling and environmentally friendly glazing technology, but there is a gap between some high-tech achievements and the actual application needs of traditional small and medium-sized enterprises."

Ceramic higher education effectively promotes the technological innovation of the Jingdezhen ceramic industry by supplying professional technical talents and research achievements, helping enterprises upgrade production technology and improve production efficiency.

However, there is a mismatch between some high-tech achievements and the actual application needs of traditional small and medium-sized enterprises.

3.3.2 Theme 2: Cultural Heritage and Innovation of Ceramic Industry

Cultural heritage and innovation are the soul of Jingdezhen ceramic industry's sustainable development. Ceramic higher modern education plays a key role in inheriting traditional ceramic culture and promoting cultural innovation. This theme explores its specific impact on ceramic cultural development based on interview responses.

"Colleges sort out and sort out traditional ceramic cultural resources, inherit ancient craftsmanship and cultural connotation, and lay a foundation for the cultural development of the industry."

"We cooperate with colleges to integrate traditional ceramic culture with modern design concepts, develop high-value-added cultural and creative products, realizing cultural inheritance and innovation."

"Colleges promote the innovation of ceramic cultural expression, combining traditional culture with modern communication methods to enhance the influence of Jingdezhen ceramic culture."

Ceramic higher modern education effectively promotes the inheritance of traditional ceramic culture and drives cultural innovation, helps enterprises develop cultural and creative products, and enhances the cultural connotation and influence of the ceramic industry.

3.3.3 Theme 3: Sustainable Development of Ceramic Industry

Sustainable development is the core direction of Jingdezhen ceramic industry's high-quality development. Higher modern education guides and promotes the transformation of the Jingdezhen ceramic industry from traditional production to high-quality sustainable development. This theme explores its specific paths and effects.

"With support from colleges and universities, we have adopted environmentally friendly firing technologies and materials, reduced energy consumption and pollution, and realizing green and sustainable production."

"Colleges focus on researching low-carbon, energy-saving ceramic technologies and cultivating green production talents, guiding enterprises towards sustainable development." "Higher modern education promotes the industry to develop high-value-added, low-consumption products, optimizing the industrial structure and laying a foundation for long-term sustainable development."

Higher modern education drives industrial transformation towards intelligence and greenization, promotes cultural and creative industry development, and helps the industry break away from low-end production dependence.

3.3.4 Theme 4: Existing Problems in Industry-Education Integration

Industry-education integration connects ceramic to higher modern education and industrial development, but existing problems restrict their in-depth cooperation. This theme summarizes key issues based on interviews.

"There is an industry-education disconnection; college talents and achievements do not fully meet enterprise needs."

"College-enterprise cooperation is short-term and project-based, lacking a stable mechanism and sufficient investment and motivation."

"Insufficient communication channels lead to information asymmetry, restricting the depth of industry-education integration."

Key problems in industry-education integration include mismatched talent training and enterprise needs, lack of long-term stable cooperation mechanisms, and insufficient information communication.

4. Findings

Higher modern education has a significant driving effect on the technological innovation of Jingdezhen Ceramic Industry, and the integration of industry, university and research is the key path of technological transformation, but there are problems such as low transformation efficiency of scientific research achievements. Higher modern education has realized the inheritance and innovation of Jingdezhen ceramic culture, but there is a disconnect between traditional craftsmanship inheritance and modern market demand. Besides, the innovation of cultural products is not enough. Higher modern education provides important support for the sustainable development of Jingdezhen Ceramic Industry, but the integration with the industrial chain is not deep enough, and the role in promoting green development and brand building needs to be further strengthened. The matching degree between the talent cultivation structure of higher modern education institutions and the demand of Jingdezhen Ceramic Industry is not high, and the shortage of interdisciplinary talents restricts the comprehensive development of the industry.

4.1 Technological Innovation of Ceramic Industry

Technological innovation, a core pillar of Jingdezhen Ceramic Industry's high-quality development, is strongly promoted by modern higher education mainly through talent support, technological research and development and achievement preliminary incubation (Zheng & Wang, 2022). Details are as follows:

4.1.1 Enrichment of the Talent Team

Talent support is fundamental to industrial technological innovation, with the local five colleges and universities as the core talent providers. Around 2014, many artists and graduates from local colleges settled in Jingdezhen, forming the "Jingdezhen drifter" phenomenon. By 2023, the number of "Jingdezhen drifters" had exceeded 60,000, including more than 5,000 foreigners from Japan, South Korea, Europe, America and Arab countries (Zhong DX, Lu Y & Luo QJ, 2023). The settlement of these talents has brought diverse ideas and injected new vitality into the development of Jingdezhen's ceramic industry.

4.1.2 Technological Research and Development

Higher education institutions, with advantages in research resources and talents, serve as key innovation platforms. Through joint laboratories and industry-university-research alliances with local enterprises, they adopt a "university research enterprise demand" model to address industrial technological bottlenecks. Focusing on industrial needs, they conduct targeted research on environmentally friendly glazes, low-carbon firing, and intelligent equipment

(Chen & Liu, 2019). For example, heavy metal-free glazes reduce pollution and costs, while intelligent kilns improve product qualification rates, filling technological gaps, and supporting industrial upgrading.

4.1.3 Achievement Preliminary Incubation

Achievement of preliminary incubation connects research and transformation. Higher education institutions use their platforms to verify, improve and optimize initial research results into feasible technological schemes or prototypes, laying the groundwork for industrial transformation. Industry-university-research integration is key to incubation: universities link achievements with enterprise needs, while enterprises provide funding and feedback to ensure practicality and shorten transformation cycles. Successful projects have upgraded enterprise processes and enhanced product competitiveness. However, prominent problems remain, particularly low achievement transformation efficiency, caused by: misalignment between university research and industrial demand; imperfect industry-university-research cooperation mechanisms; inadequate transformation service systems; and low enterprise innovation awareness (Chen & Liu, 2019). Additional constraints include insufficient R&D investment and shortages of high-end interdisciplinary talents (Li & Zhang, 2021).

4.2 Inheritance and Innovation of Ceramic industry

4.2.1 Skills Inheritance

Jingdezhen has a long history of porcelain making with a complete 72-step process. Teachers majoring in ceramics in local colleges and universities possess rich theoretical knowledge and are proficient in one or more crafts such as drawing, printing, cutting, engraving, glazing and painting. Through professional courses and practical training, students can not only master a solid theoretical foundation but also understand and grasp traditional ceramic firing skills. Higher art education serves as a bridge for the protection and inheritance of intangible cultural heritage, and the combination of inheritance and education is an important way to protect and revitalize traditional crafts (Qiu T, 2023).

4.2.2 Innovative Development of Ceramic

Art inheritance and innovation are the core of ceramic art development. Modern ceramic art innovation requires breaking away from traditional constraints, boldly trying new techniques, and using more diverse materials, tools and styles for expression (Guo X, 2022). It also needs to keep pace with the times to adapt to modern aesthetic demands and lifestyle changes, integrating high-tech means and cross-cultural elements to realize the upgrading of traditional crafts (Wu, 2016; Wu & Feng, 2024). Local colleges and universities in Jingdezhen combine traditional ceramic skills with modern design concepts, such as integrating Oriental cultural connotations with Western aesthetic elements, and blending fashion, personalization and environmental protection concepts into creative practice, cultivating a large number of ceramic art talents with innovative thinking (Wu, 2016). Besides, due to the continuous exploration and researches conducted by colleges and universities, there are innovations in materials, techniques and artistic expressions: in terms of materials, they explore the application of polymer composites to enhance the mechanical properties of ceramic works (Hu et al., 2022); in terms of techniques, they introduce 3D printing, computer modeling, and high-precision screen printing technologies to break the limitations of traditional molding and decoration (Wu, 2016); in terms of artistic expressions, they expand from single practical functions to the integration of cultural expression, space interaction and ecological aesthetics, enriching the diversity and cultural connotation of ceramic works (Wu, 2016; Wu & Feng, 2024).

4.2.2.1 Breaking the Traditional Inheritance Model

For thousands of years, the inheritance of ceramic skills in Jingdezhen is mainly based on master-apprentice teaching or family inheritance, which is narrow and conservative (Xie SY, 2023). The establishment of local colleges and universities has changed the inheritance of objects, expanding from the descendants of craftsmen and gang members to college students from across the country. The systematic teaching model and national enrollment have expanded the scale and scope of inheritance, enhancing the influence of skill inheritance. After graduation, many graduates engage in ceramic-related work in various regions, promoting the development of the ceramic industry nationwide.

4.2.2.2 Interdisciplinary Integration

Local universities in Jingdezhen not only offer majors such as ceramic painting and art design but also set up supporting courses such as materials science and ancient ceramic research. For example, Professor Chen Yuqian of Jingdezhen Ceramic University founded "Jingdezhen Studies" based on local ceramic culture and regional culture, covering multiple disciplines such as science and technology history, historical geography, archaeology and mineralogy (Jingdezhen Ceramic University Research Group, 2022). This interdisciplinary education model broadens students' horizons and knowledge, enabling them to integrate modern design concepts while retaining traditional characteristics.

4.2.2.3 Combination of Theory and Practice

Universities in Jingdezhen attach great importance to practical teaching, establishing practical training bases such as ceramic manufacturing workshops to improve students' practical abilities. They also hire domestic and foreign experts to teach and carry out in-depth school-enterprise cooperation, integrating students' learning with practical applications, encouraging students to discover and solve problems in practice, and stimulating innovative ideas (Qiu T, 2023). To further bridge the gap between academic teaching and industrial practice, these institutions invite renowned ceramic experts and artisans from home and abroad to deliver lectures and conduct on-site guidance, while carrying out in-depth industry-university cooperation with local ceramic enterprises. This integrated model seamlessly connects students' theoretical learning with real-world industrial applications, guiding them to identify, analyze and solve practical problems in the process of hands-on creation and thus effectively stimulating their innovative thinking and creative potential in ceramic art and technology (Nortey et al., 2023; Qiu T, 2023).

4.2.2.4 Integration of Culture and Business

The ceramic art talents cultivated by local universities not only have excellent creative abilities but also have a keen insight into the market. They combine Jingdezhen ceramic culture with modern business needs, designing and developing ceramic products with cultural connotation and market value. The Taoxichuan Creative Market and Sculpture Porcelain Factory have become important platforms for students to display and sell their works, promoting the commercialization of ceramic art (Zhong DX, Lu Y & Luo QJ, 2023).

4.2.2.5 International Exchange and Cooperation

Local universities actively participate in international ceramic cultural exchanges. During the China Jingdezhen International Ceramics Expo held every October, they organize teachers and students to participate in academic exchanges and exhibitions. Jingdezhen Ceramic University has established the "Belt and Road" International Ceramics Education Alliance and created the "Jingdezhen International Ceramic Art Biennale", which has enhanced the international influence of Jingdezhen ceramics (Gao CQ, 2024). It has also jointly applied with the

Jingdezhen Municipal Government to host the 52nd International Ceramics Conference in 2026, contributing to the reconstruction of China's ceramic art discourse system in the global context.

4.3 Sustainable Development of Ceramic Industry

4.3.1 Industrial Transformation and Urban Positioning

Jingdezhen has transformed from a traditional ceramic production center into a cultural and creative tourist destination. Before the 2000s, the development of Jingdezhen's ceramic industry is limited to the inheritance of traditional craftsmanship and internal knowledge circulation. With the intervention of "academic" artists and the support of local universities, modern art theories and innovative ideas have been introduced, forming a dual circulation mechanism of knowledge production combining local and external knowledge (Zhong DX, Lu Y & Luo QJ, 2023). The Taoxichuan Ceramics Cultural and Creative Park, transformed from an abandoned old factory, and the China Ceramics Museum have become important carriers of industrial transformation, attracting a large number of tourists. During major events and holidays, college students volunteer to provide services for tourists, enhancing the city's image.

4.3.2 Social Responsibility and Sustainable Development

In response to environmental problems, local universities in Jingdezhen have stepped up research on environmentally friendly materials and green production technologies. Professors from Jingdezhen Ceramic University have proposed the development concept of "zero-carbon ceramics", advocating clean production, low-carbon development, and green manufacturing to promote the sustainable development of the ceramic industry (Gao CQ, 2024).

5. Discussion

5.1 Consistency with Existing Research

This study confirms the driving effect of higher modern education on industrial transformation, which is consistent with Zheng's (2015) research. Zheng (2015) pointed out that higher modern education promotes the transformation of the Jingdezhen ceramic industry from traditional to modern through talent cultivation and technological support. This study further verifies this conclusion through interview data and expands it to three dimensions: technological innovation, cultural heritage, and sustainable development. The reason for this consistency is that higher modern education, as a core source of talent and technology, plays an irreplaceable role in promoting industrial transformation. In the context of the times, the demand for talent and technology in traditional industries is increasing and higher modern education support for industries has become a universal law. In addition, this study finds that the imperfect cooperation mechanism between colleges and enterprises and the inadequate adjustment of professional settings are important factors restricting the integration of industry and education, which is consistent with the research results of Zhang (2018) and Li (2022). Zhang (2018) pointed out that the lack of effective interest in linkage mechanisms in industry-university-research cooperation in the Jingdezhen ceramic industry leads to low cooperation efficiency. Li (2022) believed that the professional settings of colleges and universities are not timely adjusted according to industrial development needs, resulting in a mismatch between talent supply and demand. The consistency of these research results is due to the fact that in the process of integrating industry and education in traditional industries, the interest appeal of all parties is not fully balanced, and colleges and universities have certain lag in adjusting their professional settings, which is a common problem in the development of traditional industries.

5.2 Differences from Existing Research

Unlike Wu's (2016) single-dimensional research on talent flow, this study constructs a three-dimensional theoretical framework of technological innovation, cultural heritage, and sustainable development, revealing the synergistic effect of higher modern education on the development of the Jingdezhen ceramic industry. The reason for this difference is that with the in-depth development of industrial transformation and upgrading, the impact of higher modern education on traditional industries is no longer limited to a single aspect such as talent supply. It also involves technological progress, cultural inheritance and green development. This study comprehensively considers the multi-faceted needs of industrial development and conducts a more systematic analysis. In addition, compared with Liu and Huang's (2019) research on the role of scientific research platforms, this study pays more attention to the integration of culture and business and international exchange and cooperation, emphasizing the role of higher modern education in expanding the market and enhancing international influence. This difference is mainly due to the changes in the development environment of the Jingdezhen ceramic industry. In recent years, with the rise of the cultural and creative industry and the development of the digital economy, the ceramic industry has put forward higher requirements for cultural innovation and internationalization. This study closely follows the latest development trends of the industry and expands the research perspective.

5.3 Interaction between Technological Innovation, Cultural Heritage, and Sustainable Development

Technological innovation, cultural heritage, and sustainable development are mutually promoting and coordinated. Technological innovation provides technical support for the inheritance of traditional craftsmanship, such as the application of 3D printing and laser engraving technologies, which not only improves production efficiency but also enriches the expression forms of traditional ceramics. Cultural heritage provides a cultural foundation for technological innovation and the innovative development of ceramic culture cannot be separated from the inheritance of traditional craftsmanship. Sustainable development restricts and guides technological innovation and cultural heritage, requiring technological innovation and cultural development to comply with the concept of green environmental protection. This interactive relationship supplements the existing single-dimensional research and provides a more comprehensive theoretical perspective for the research on the integration of industry and education in traditional industries (Zhang & Li, 2021).

6. Conclusion

This study takes the Jingdezhen ceramic industry as a case, adopts semi-structured interviews and Braun and Clarke (2006) qualitative thematic analysis and explores the impact of higher modern education on local traditional industries. The research finds that higher modern education promotes the technological upgrading of the Jingdezhen ceramic industry through talent cultivation and achievement transformation, inherits and innovates ceramic culture through professional education and academic research, enriches the industrial talent team, promotes industrial transformation and urban positioning upgrading and shoulders social responsibility for sustainable development. However, there are still problems such as low transformation efficiency of scientific research achievements, disconnect between traditional craftsmanship inheritance and market demand, insufficient integration with the industrial chain and mismatch between talent training and industrial needs.

6.1 Countermeasures and Suggestions

To promote the in-depth integration of higher modern education and the Jingdezhen ceramic industry, the following suggestions are put forward: First, optimize the talent training system of colleges and universities, adjust professional settings according to industrial needs, add interdisciplinary majors and strengthen practical teaching (Chen Q, 2021). Second, improve the industry-university-research cooperation mechanism, establish a long-term interest linkage mechanism between colleges and enterprises and strengthen government policy support and guidance (He & Liu, 2014). Third, strengthen the integration of cultural heritage and innovation, integrate modern design concepts and market demand into traditional craftsmanship inheritance and develop high-value-added cultural and creative products (Huang L, 2017). Fourth, promote the green and sustainable development of the industry, increase research on green production technologies and assist enterprises in building independent brands (National Bureau of Statistics Jiangxi Investigation Team, 2020).

6.2 Research Limitations and Future Directions

This study has certain limitations. It mainly adopts literature research and case analysis methods, and the research scope is limited to the Jingdezhen ceramic industry, which may affect the universality of the research results. In addition, due to the lack of detailed quantitative data, the quantitative analysis of the impact of higher modern education on the ceramic industry is insufficient. In the future, the research scope can be expanded to compare the impact of higher modern education on different traditional craft industries to improve the universality of the research results. Quantitative research methods can be adopted to collect relevant data for empirical analysis, further clarifying the impact of degrees and mechanisms. In addition, the impact of the digital transformation of higher modern education on the development of traditional industries can be explored to provide more in-depth research results for the revitalization of traditional industries.

Acknowledgement

First, we would like to give our heartfelt thanks to UNITAR International University for their support. In addition, we are grateful to all participants in the interviews.

Conflict of Interest Statement

The authors declare that there is no conflict of interest regarding the publication of this study.

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