

Critical Humanistic Social Theory

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Strategies for Selecting Materials in the Creation of Mixed-Material Paintings

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Abstract: Mixed-material painting occupies an important position in art creation with its diversified use of materials and cross-border integration of creative features. Taking the significance of mixed-materials painting in contemporary art creation as the starting point, this paper puts forward the strategies of clarifying the theme of the works, emphasizing originality and digging deep into cultural resources in response to the problems of disjointed expression of the theme, insufficient artistic authenticity and innovation, and the lack of a sense of belonging to the culture and its depth, which provide some references to promote the diversified and innovative development of contemporary art creation.

Keywords: Mixed-Material Painting; Painting Creation; Material Selection

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Introduction

As an interdisciplinary and cross-media art form, mixed media painting has become one of the important directions of modern art creation since its emergence in the 20th century^[1]. Its distinctive feature is the combination of diversified materials, breaking the singularity of traditional painting media, combining the diversity of material with the plurality of artistic expressions, and realizing the innovation of artistic language^[2]. As the basis of artistic creation, the selection of materials is a technical issue, but also an important link related to the expression of the theme of the work, the construction of cultural connotation and artistic innovation. In composite material painting, the type, texture, symbolic meaning and combination of materials directly determine the visual effect and artistic value of the work^[3]. An in-depth discussion on the selection of materials is of great theoretical and practical significance for improving the overall quality of works and promoting the development of mixed-material painting.

Composite material painting is a creative form with openness and inclusiveness, and its core value lies in realizing the innovation and deepening of artistic language through the diversity of materials. The selection of materials is a physical operation, but also a complex process involving aesthetics, culture and philosophy^[4]. In this process, artists not only need to understand the material properties of the material itself, but also need to deeply explore its symbolic meaning and cultural connotation. The selection of materials based on cultural resources can form distinctive regional and national characteristics in the works, which is of great significance to the localized expression of contemporary art in the context of globalization. At the same time, the combination of technological innovation and material experimentation also provides an opportunity for artists to explore more possibilities, and through the experimentation and transformation of new materials, they can show

unique aesthetic values and artistic perspectives in their works. Although mixed-material painting has made remarkable achievements in the field of contemporary art, the selection of materials still faces many challenges in creative practice.

This paper is based on the significance of material painting in contemporary art creation, combined with the current status of material selection for composite material painting, and aims to propose a material selection strategy that provides more innovative possibilities for composite material painting, with a view to promoting the sustainable development of this art form in the contemporary context.

1.The significance of mixed-material painting in contemporary art creation

1.1 Expanding the expressive power of art works

Mixed-material painting provides a broader space for artistic expression through the diversity of materials. In traditional painting, the limitations of the medium usually determine the scope of the artistic language, with oil painting mainly relying on the expression of pigment and canvas, and watercolor focusing on the interaction between water and paper. Composite material painting breaks this limitation, integrating natural, industrial and digital materials into artistic creation. The diversity of material properties gives the works a richer textural expression, and also expands the artist's possibilities in form shaping and color matching^[5]. The interactions between materials and their coexistence in the works present the viewer with a visual experience that transcends a single medium. The physical properties of materials, such as the hardness and luster of metals, the softness and translucency of fibers, and the coarseness and vicissitude of wastes, can be important mediums for artists to convey emotions or themes.

Mixed-materials painting enables artworks to express themselves on a multi-dimensional sensory level, rather than being limited to a single visual perception. The characteristics of mixed media can stimulate the viewer's tactile association, and through the combination of materials of different textures, trigger a deep feeling of the material characteristics in the real world. The tactile experience of roughness and smoothness, hardness and softness, coldness and warmth, etc. enables the audience to feel the narrative and emotional tension inherent in the work through the contrast of materials. The sensory interaction based on the diversity of materials enriches the form of expression of the artworks, and also enables the artworks to establish a deeper emotional connection with the audience.

1.2 Deepening the cultural connotation of art works

Different materials contain rich historical and cultural imagery, and their use is a material choice, but also a kind of excavation and remodeling of cultural symbols. Traditional materials such as rice paper, clay, silk, etc. carry specific national history and cultural memories. By incorporating these materials into contemporary artworks, artists are able to bridge the gap between traditional culture and modern contexts, so that the works are both distinctive of the times and contain deep cultural deposits. The introduction of modern industrial, technological and natural materials can also expand the dimension of cultural expression with their unique texture and symbolism. The diversity of materials and the multiplicity of cultural contexts combine to make mixed media painting a form of art with great cultural depth.

With the acceleration of globalization, cultural exchange and integration has become one of the core features of contemporary art. By absorbing and reorganizing the elements of different cultures, mixed-material painting can realize the coexistence and dialogue of multiple cultures in the works. Combining Western industrial materials with Eastern traditional crafts can create artworks with international perspectives while retaining regional characteristics. Cross-cultural artistic expression highlights the symbiosis of multiple cultures and injects more complex cultural connotations into the works. As a result, mixed-material painting is no longer just a formal innovation, but an extension of cultural semantics, enabling the works to display higher tension and inclusiveness on the cultural level.

1.3 Promote innovation in contemporary art creation

Through the combination and application of new technologies, mixed-materials painting further promotes the innovation of art creation at the technical level. Under the rapid development of modern science and technology, art creation has gradually expanded from handmade techniques to multi-dimensional expression that includes high-tech means. Mixed-materials painting has embodied strong adaptability and integration ability in this process, and the introduction of advanced technologies such as 3D printing technology, laser cutting, digital imaging and so on has made the form and content of art

creation more diversified. The combination of technology and material makes the art works have a stronger sense of the times and the future, and also provides artists with more diversified creative tools to help them realize more complex artistic ideas. Technological innovation has made mixed-materials painting a very dynamic field in contemporary art creation.

The spatial and temporal extensibility of mixed-materials painting also provides creative possibilities for art creation. Through the use of three-dimensional construction, stacking and spatial layout of materials, mixed-material paintings extend the works from flat to three-dimensional space. The spatialization of the creation form makes the artwork more adaptable to the environment and interactive with the audience, and at the same time enhances the sense of immersion and expressiveness of the artwork. In the dimension of time, mixed-material paintings combine the skillful use of material characteristics, so that the works can show different states and changes in the passage of time. The interactive innovation of space and time provides a new way of expression for artistic creation, making the works more vivid and full of tension.

2.Problems in the selection of materials for current mixed-material paintings

2.1 There is a disconnect between the material and the theme being expressed

Some works pay too much attention to the external formal characteristics of materials in the process of selecting materials, ignoring their internal symbolic meaning and cultural relevance. Although the formal aesthetics of materials such as texture, texture and color can enhance the visual impact of the work, the lack of internal logical connection with the theme leads to the separation of form and content. The resulting works may have a certain degree of visual novelty, but it is difficult to form an effective resonance with the audience on the emotional and ideological levels.

Some creators have blindness and arbitrariness in material selection, failing to fully consider the match between material properties and theme expression. Some artists tend to choose trendy or novel materials in the hope of attracting the audience's attention by means of novel material forms, but they fail to match the physical properties of the materials with the theme expression in their actual creations. If hard and colorful materials are used to express soft, serene or introverted themes, the contradiction between the materials and the themes will weaken the overall expression of the work. The fact that the technical processing of the material does not match the expression of the theme is also a sign of disconnection. When the artist fails to process or treat the material effectively, the material may steal the audience's attention because its original form is too strong, making the expression of the theme take a backseat and weakening the ideological connotation of the work.

2.2 Deficiencies in artistic authenticity and innovation

The problem of insufficient artistic authenticity and innovation in the selection of materials for current mixed-material paintings is becoming increasingly obvious. This phenomenon is manifested in creative practice as simplistic treatment of material characteristics and shallow imitation of formal innovation, making it difficult for works to reach the desired height in terms of depth of thought and artistic expression. Artistic authenticity, as one of the core elements of art creation, is closely related to the original properties of materials and artists' unique interpretation of them. However, some creators fail to deeply understand the nature of materials and the cultural or social significance they carry when choosing composite materials, and instead focus purely on the visual effects or surface features of the materials. This approach weakens the uniqueness of the material in the work, making the work hollow in terms of authenticity and unable to form a powerful visual and ideological experience.

When expressing artistic themes, some mixed-material paintings rely too much on the use of ready-made materials, which limits the originality and uniqueness of the works. Although ready-made materials can directly provide visual impact, if they are not creatively transformed, the works will easily appear superficial and homogenized. The over-reliance on ready-made materials not only fails to fully utilize the expressive potential of the materials, but also makes the works lack the inner depth of thought and artistic soul. When the audience enjoys such works, they are prone to feel the repetitiveness of the form and the paucity of the content, making it difficult for them to gain a deeper level of understanding in the aesthetic experience.

2.3 Insufficient sense and depth of cultural belonging

In the process of material selection, some creators tend to use internationalized or universalized materials, while neglecting the excavation and application of local cultural resources. Modern industrial materials, digital media and ready-made products are widely used because of their novelty or ease of use, but this choice often ignores the cultural symbolism carried

by the materials, resulting in the weakening of the sense of cultural belonging in the works and making it difficult to form an effective expression of regionality and ethnicity. Many traditional materials with deep cultural connotations, such as silk, clay or bamboo, are discarded by some artists due to their complicated processing or lack of visual impact, making the works lose their deep connection with specific cultural backgrounds. As a result, the choice of materials serves more for the visual effect rather than the expression of cultural connotation, and the works lack deep cultural roots.

The shallow treatment of cultural symbols and historical connotations in the selection of materials is also an important manifestation of the lack of a sense of cultural belonging. When some creators use materials with cultural symbols, they only pay attention to their superficial symbolic features and fail to explore their historical background and cultural connotations in depth. When expressing the theme of traditional culture, although they choose materials with local characteristics, they fail to integrate them into the overall context of the work, and the use of materials seems isolated and formalized. The lack of internal logical connection makes the work visually have certain cultural elements, but spiritually it is difficult to trigger deep resonance with the audience.

3.Strategies for Material Selection in the Creation of New Era Composite Material Painting

3.1 Clarify the theme of the work and select suitable materials

Starting from the core concept of creation, the connotation and extension of the theme should be comprehensively analyzed, and the theme should be broken down into a number of specific emotions, symbols or cultural imagery, so as to provide a clear direction for the selection of materials. In the process of analyzing the theme, the contemporary background, social significance and cultural characteristics of the theme should be studied in depth, and these elements should be transformed into specific material requirements. When expressing the theme of environmental protection, we need to focus on the core concepts of resource utilization and environmental protection, and choose materials that can directly reflect sustainability or have ecological symbolism. Selecting materials based on an in-depth analysis of the theme helps to ensure that there is an inherent logical connection between the choice of materials and the theme.

On the basis of a clear theme, the physical properties, cultural attributes and symbolic meanings of the materials should be fully considered to ensure that the selected materials can effectively convey the emotional core and conceptual expression of the work. Creators need to understand the expressive power of materials in terms of color, texture, form and optical properties, and reasonably select materials that can support the emotional narrative of the theme. Soft, warm natural fibers can be used to express soft or nostalgic emotions, while hard, cold metals are suitable for expressing themes of strength or industrialization. Attention also needs to be paid to the cultural properties of the material, examining its symbolism in a particular geographical, historical or social context. Clay symbolizes the continuity of nature and life in many cultures, and its selection can add a sense of historical weight and cultural depth to works that express traditional themes. The selection of materials based on the matching of material properties and themes can enhance the infectious power of the work both visually and spiritually at the same time.

In the process of choosing suitable materials, it is also necessary to pay attention to the coordination between material processing and theme expression. The processing methods of different materials have a direct impact on their expression in the work, so creators need to choose the appropriate processing means according to the needs of the theme. For example, carving, cutting, welding and other methods can highlight the hardness and linearity of the material, while dipping, softening or restructuring can give the material a soft and natural texture. In addition, the requirements of thematic narratives on the expressiveness of materials may also involve the process of physical changes in the materials, such as oxidation, corrosion or fading and other dynamic properties, the presentation of these effects need to be planned in advance and experimentally verified during the selection of materials to ensure that the materials in the process of creation of controllability and plasticity. In the whole process of selecting materials, the consistency of the language of the materials and the coherence of the theme narrative should be emphasized, so as to avoid weakening the concentration of the theme expression due to the diversity of materials. Creators need to comprehensively sort out the structure and hierarchy of the theme in the conceptualization stage, allocate materials according to the functional requirements of different parts of the work, and ensure that the use of each

material can effectively serve the overall theme. For example, in a work that expresses a layered narrative, materials with specific symbolic meanings can be chosen for each layer, so as to strengthen the logic and hierarchy of the theme through the progressive relationship between materials. At the same time, it is also necessary to ensure that different materials can form an overall visual effect in the work through the unity of color tone, texture and form, so as to avoid the dispersion and fragmentation of the theme expression.

3.2 Focus on originality to enhance authenticity and innovation of works

Emphasis should be placed on discovering under-utilized or traditionally neglected materials from diverse resources, and using them as the core medium in their creations. This requires the artist to conduct extensive and in-depth research on the material itself, as well as to examine its potential artistic value and expressive power. Discarded objects or unprocessed materials in nature may be ideal carriers for expressing authenticity due to their original texture and traces of time. Based on re-giving these materials a new artistic context, the uniqueness of the materials can be realized in the works, and at the same time, the connection between the works and the real world can be enhanced.

Experimentation and exploration should be fully integrated into the creation of artworks, so as to promote the enhancement of creativity. When choosing and using materials, artists should not limit themselves to utilizing existing materials, but should actively try to combine traditional materials with emerging technologies to explore the potential of material expression in new contexts. New material forms can be generated by combining 3D printing technology and natural materials, injecting more possibilities into the expressive language of composite material painting. Experimental exploration can also be realized through the innovative combination of hybrid materials, combining materials with very different physical properties. The superposition of soft fabrics and metal structures creates visual and tactile conflicts through texture contrasts, enhancing the creativity of the works.

The enhancement of authenticity requires respect for the original state of materials and refined excavation. Creators should pay attention to the natural characteristics and generation process of materials, and regard them as an important part of artistic expression. For materials originating from nature, on the basis of maintaining their original texture and color, they can strengthen their association with the natural theme, thus enhancing the authenticity and artistic influence of the materials. At the same time, artists also need to pay attention to the origin and background information of the materials, dig deep into the social, historical or cultural significance behind the materials, and convey this information to the audience through the works. This kind of full use of the background of the material can not only enhance the authenticity of the work, but also give the work a deeper cultural connotation and social value.

While focusing on originality, a mechanism for deconstructing and reconstructing the established artistic language should be established. This mechanism requires creators to respect the traditional artistic language and give it new forms of expression by reinterpreting and extending its material characteristics. For example, the use of modern technology to make a new visual treatment of traditional handicraft materials, so as to give them a unique artistic vitality in form. At the same time, through the transformation of the symbolic language of traditional materials, they can be placed in the context of contemporary art, so that the works retain the traditional historical traces, but also have a strong sense of modernity. In this way, artists can not only show originality in their works, but also give traditional culture a new way of interpretation through the transformation and recreation of materials.

3.3 Tapping cultural resources to enhance the sense of cultural belonging and depth of works

Regional cultural resources should be studied in depth, and traditional crafts, local materials and local cultural symbols should be fully utilized and integrated into the creation. The characteristics of materials in different cultural contexts should be examined, and materials that can intuitively convey regional cultural or historical imagery should be selected, such as fabrics, ceramics, or wood that contain regional characteristics. Combining materials with cultural identifiers can create a stronger sense of cultural belonging in the work. Creators should also pay attention to analyzing the symbolic meaning and historical context of these materials to ensure that their use in the work echoes the needs of the cultural narrative.

In the process of mining cultural resources, attention also needs to be paid to the possibility of cross-cultural integration in order to reflect innovative expression in a multicultural context. Artists can combine the material characteristics of

different cultural systems and integrate them organically. They can combine the traditional craft materials of the East with the industrialized materials of the West to create a form of work that is both historically rich and modern. The integration of cultural resources needs to be carried out on the basis of a full understanding of the two cultural contexts, and the use of materials should not only respect their original cultural significance, but also realize the re-creation of their connotations through creation.

In the practice of enhancing the sense of cultural belonging, creators should also emphasize the discovery and narration of the stories behind the materials. Each material may carry a specific historical memory or social background, and incorporating this information into the work can effectively enhance its cultural impact. The discarded bricks and tiles of old buildings and the remnants of traditional handicrafts can not only create special visual effects at the material level, but also connect history with contemporary cultural contexts through narrative expression. This material-mediated cultural narrative can deepen the cultural connotation of the work and make it more persuasive in expressing specific cultural themes.

4. Conclusion

The development direction of mixed-material painting lies not only in the breakthrough of the material itself, but also in the deeper dialog between the material and society, culture and nature. Artistic creation will pay more attention to thinking and responding to real problems, and the choice of materials will become an indispensable medium in this process. Refined creative practice and in-depth theoretical research will make mixed media painting a more socially engaged and culturally influential art form, and its future development will not only be a formal innovation, but also an in-depth reshaping of values and artistic ontology. Continuous exploration in this field will inject more far-reaching ideological connotation and cultural significance into contemporary art.

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Conflict of Interests

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

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The Impact of Subjective Well-being on the Fertility Intentions of Women of Childbearing Age

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Abstract: In recent years, China has faced the severe challenge of low fertility rates and negative population growth, which poses threats to social stability, economic growth, and the pension system. The government places high importance on this issue, as population resources are key to the sustainable development of society. This study focuses on the group of women of childbearing age in China, using data from the 2021 China General Social Survey (CGSS) to explore the impact of subjective well-being on fertility intentions and its underlying mechanisms. The findings indicate that the higher the subjective well-being of women of childbearing age, the more children they intend to have. This relationship varies among women with different income levels. Income level amplifies the relationship between subjective well-being and fertility intentions. Moreover, the three sub-dimensions of subjective well-being—development experience, satisfaction experience, and physical and mental health experience—all have significant positive impacts on the desired number of children. Heterogeneity analysis further reveals that the impact of subjective well-being on the fertility intentions of women of different ages and marital statuses is markedly different. Based on these findings, developing targeted strategies to enhance the fertility intentions of women of childbearing age can not only help alleviate the urgency of declining fertility rates but also provide practical references for policymakers to promote sustainable economic and social development.

Keywords: Subjective Well-being; Fertility Intentions; Income Level

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1.Introduction

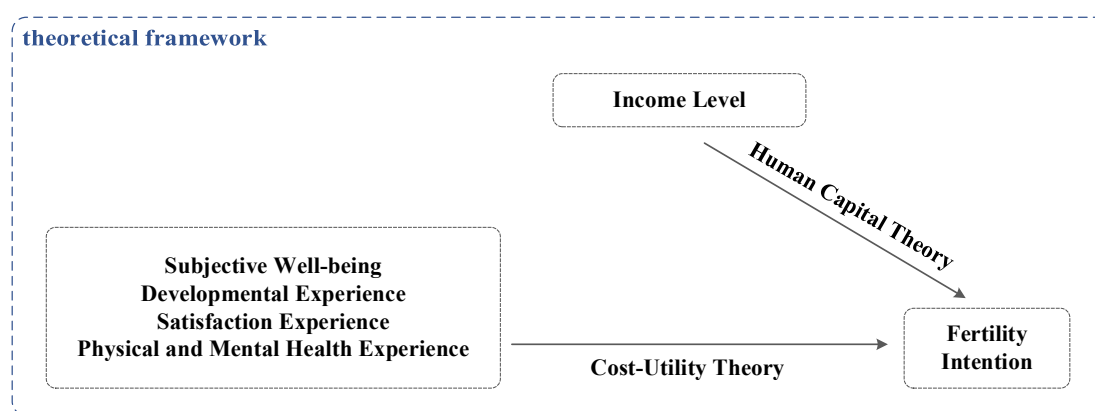
Subjective well-being is a multidimensional concept that encompasses not only an individual's emotional state but also their evaluation of life satisfaction. However, current research on the impact of subjective well-being on fertility intentions mostly focuses on analyzing subjective well-being as a single, unified concept^[1-3]. There is a relative scarcity of studies that break down subjective well-being into multiple dimensions to analyze their individual impacts on individual behavior. Moreover, although existing studies on the factors influencing fertility intentions have provided us with a wealth of data and insights, we have also observed that they tend to overlook the impact of subjective factors, which limits their comprehensiveness. Additionally, income level, as an important indicator of socioeconomic status, plays a significant role in individual fertility decisions. It directly affects the economic conditions of a family, which in turn influences fertility choices, as the cost of raising children is an essential factor that families must consider^[4-6]. Therefore, given the significant impact of income level on fertility intentions, it is worth exploring its potential moderating role in the relationship between subjective well-being and

fertility intentions and analyzing how subjective well-being affects fertility intentions at different income levels. Furthermore, considering the heterogeneity among individuals, this study will also conduct heterogeneity analyses based on gender and marital status to provide a more comprehensive understanding. Given the limitations and gaps in existing research, this study focuses on women of childbearing age, aiming to explore in depth how different dimensions of subjective well-being influence their fertility intentions. It also investigates the potential moderating effect of income level on this relationship. Through this approach, we hope to gain a more precise understanding of the motivations and preferences underlying the fertility intentions of women of childbearing age in China.

2.Literature review and hypothesis development

This study proposes to employ the theories of cost-utility and human capital to explore in depth how subjective well-being influences the fertility intentions of women of childbearing age in China. Based on these theories, a theoretical framework will be established to analyze the mechanisms through which subjective well-being affects fertility intentions. On the one hand, according to the cost-utility theory, individuals weigh the utility and costs associated with childbearing when making fertility decisions^[7, 8]. From the perspective of development experience, Brinton and Jennifer found that career women may lose opportunities for career advancement, job prospects, and potential income due to childbearing^[9, 10]. McDonald discovered that with economic development and rising living costs—particularly increases in housing prices and education expenses—the direct costs of childbearing also rise, which can inhibit fertility intentions^[11]. From the perspective of satisfaction experience, Petts found that good social support, such as childcare services, parental leave, and family-friendly work environments, can reduce the indirect costs of childbearing and enhance fertility intentions^[12]. From the perspective of physical and mental health experience, good physical health can lower the direct costs of childbearing, such as reducing pregnancy complications and childbirth risks, thereby decreasing medical expenses^[13-15]. Meanwhile, mental health issues such as depression and anxiety can increase the psychological costs of childbearing, such as worries and stress about parenting, thereby reducing fertility intentions^[16]. On the other hand, the human capital theory posits that personal income, as an important component of human capital, significantly influences fertility intentions by affecting the opportunity cost of childbearing^[17]. With the increasing educational levels and intensifying career competition among career women, they are more inclined to pursue career achievements, which leads to a higher opportunity cost of childbearing. Career women may lose opportunities for career advancement, job prospects, and potential income due to childbearing, and this increased opportunity cost may suppress their fertility intentions. Income status is an important factor influencing individual fertility intentions, as it directly determines whether women of childbearing age choose to have children or not^[18]. Higher income levels may lead individuals to place greater emphasis on improving their quality of life, focusing more on the quality rather than the quantity of children. The rising costs of raising children and the declining expected utility can result in a decreased demand for children.

Fig 1. Theoretical framework.



In all, this paper argues that different dimensions of subjective well-being may have varying impacts on the fertility choices of women of childbearing age, and that income level, as an important factor influencing fertility intentions, may moderate the relationship between subjective well-being and fertility intentions. Therefore, this study will conduct empirical analyses

to verify the above theoretical deductions, aiming to provide new perspectives and insights into understanding the fertility decisions of women of childbearing age.

This study aims to thoroughly explore the composition of subjective well-being and its various dimensional indicators and to analyze their relationships with fertility intentions. Firstly, the study employs factor analysis to explore the overall indicators of subjective well-being to reveal its underlying structural dimensions. Subsequently, factor analysis is conducted on the indicators of the three distinct dimensions of subjective well-being to identify their respective components. Based on this, descriptive analysis methods are used to provide preliminary statistical descriptions of the relevant variables, laying the foundation for subsequent in-depth analyses. Secondly, the study utilizes Poisson regression and ordered probability models to construct multiple regression models to investigate the impact of subjective well-being on fertility intentions. To test the moderating role of income level, interaction terms between income level and subjective well-being are included in the models. Finally, considering that different groups may have distinct characteristics, the study divides the subjects into two different levels—age and marital status—and conducts heterogeneity analyses. This step aims to reveal differences in the relationship between subjective well-being and fertility intentions across different groups, thereby providing a basis for formulating more targeted policies. Through this series of analytical methods, this study aims to provide a comprehensive and in-depth perspective on understanding the relationship between subjective well-being and fertility intentions.

In current research on fertility intentions, most studies focus on the levels, changes, and influencing factors of fertility intentions, with a greater emphasis on the quantitative dimension of fertility intentions in practical analyses. Based on this, the fertility intentions in this study are measured by the desired number of children. The core explanatory variable selected in this study is subjective well-being. In the China General Social Survey (CGSS)2021 questionnaire, the question related to subjective well-being is: D35, how much do you agree with the following statements regarding your subjective well-being?

To ensure the accuracy and interpretability of the model estimation results, this study introduces relevant moderating variables and multiple control variables. Based on the above analysis, the following hypotheses are proposed:

Hypothesis 1: Subjective well-being significantly affects the fertility intentions of women of childbearing age in China.

Subjective well-being is a composite measurement index composed of three indicators. Given that different groups may have varying experiences of development, satisfaction, and physical and mental health, these differences may lead to different impacts. Therefore, the following sub-hypotheses are proposed:

Hypothesis 1.1: The better the development experience, the stronger the fertility intentions of women of childbearing age in China.

Hypothesis 1.2: The higher the satisfaction experience, the stronger the fertility intentions of women of childbearing age in China.

Hypothesis 1.3: The better the physical and mental health experience, the stronger the fertility intentions of women of childbearing age in China.

Based on the above description, individual income levels have a close impact on the relationship between subjective well-being and fertility intentions. However, whether subjective well-being affects fertility intentions through income levels remains to be explored. Therefore, the following hypothesis is proposed:

Hypothesis 2: The income level of women of childbearing age in China will have a positive moderating effect on the impact of subjective well-being on fertility intentions.

3.Methods

3.1 Sample

The data foundation of this study originates from a long-standing and highly influential social science research project in China—the Chinese General Social Survey(CGSS).As one of the earliest national academic surveys in China, the CGSS has been systematically conducting questionnaire surveys on more than 10,000 households across provinces, municipalities directly under the central government, and autonomous regions of mainland China since 2003, in accordance with international standards. Implemented by the China Survey and Data Center of Renmin University of China, the openness of its data is pioneering in the academic community. According to regulations, all raw data and related materials are fully open

to the public within two years after each survey is completed. The data coverage of the CGSS is extensive, encompassing information at the societal, community, family, and individual levels, and it reflects the characteristics of the changing times. It provides rich materials for research in multiple fields and can accurately reflect the latest dynamics of Chinese society. This paper focuses on the fertility intentions of women of childbearing age in China. The study specifically employs the latest 2021 CGSS dataset, which includes 8,148 samples. After screening for the group of women of childbearing age in China, the sample size is reduced to 1,313.

The study primarily adopts factor analysis to systematically explore the construction of subjective well-being indicators. Not only does it conduct factor analysis on subjective well-being as a whole to identify its core components, but it also performs detailed factor analysis on the three dimensions of subjective well-being: development experience, satisfaction experience, and physical and mental health experience. The process is as follows.

1. KMO Test: The first step is to determine whether factor analysis is appropriate through the results of the KMO test. If the KMO value of all variables is greater than the critical value of 0.6, it indicates that these variables are suitable for factor analysis.
2. Factor Extraction: During the factor extraction process, the number of principal factors is determined based on the factor analysis results by selecting factors with eigenvalues greater than 1.
3. Factor Naming and Interpretation: First, the factor loadings matrix is analyzed. In this study, the varimax rotation method is used to orthogonally rotate the factor loadings matrix to enhance its interpretability. Second, based on the rotated factor analysis, the distribution of variables across different factors can be clearly explained. The rotated factor loadings matrix can further validate the rationality and reliability of the model.
4. Factor Score Calculation: According to the factor score table, principal factors can be expressed as linear combinations of the variables. The composite score of subjective well-being indicators is calculated by multiplying the variance contribution rate and cumulative variance contribution rate with the rotated factor scores.

According to Table 1, among the 1,313 women of childbearing age, the mean fertility intention is 1.8 children, close to two. This indicates that the desired number of children among women of childbearing age in China is currently two. Compared to the persistently low fertility rate, this level of fertility intention is relatively optimistic, suggesting that the actual fertility rate may increase in the future.

In this study, four dummy variables were constructed for subjective well-being and its three dimensions: development experience, satisfaction experience, and physical and mental health experience. Based on the 21 questions from the subjective well-being scale, iterative principal factor analysis was conducted. Factors with eigenvalues greater than 1 were retained, and factor scores were predicted. The composite score of subjective well-being and its three sub-dimensions was calculated by weighting and summing the factor scores using the cumulative variance contribution rate. The higher the resulting values, the stronger the subjective well-being and the better the experiences in development, satisfaction, and physical and mental health. As shown in the table, the level of happiness is relatively average, indicating that the happiness level, development experience, satisfaction experience, and physical and mental health experience of women of childbearing age in China are relatively ordinary, with a moderate sense of happiness.

In the descriptive statistics of personal income levels, the mean is 7.6, corresponding to the specific income level of 5,000 yuan. This suggests that the personal income level of women of childbearing age in China is relatively objective. This may also be due to the increased level of education, which has promoted the rise in personal income. Among the survey respondents, the youngest is 18 years old, and the oldest is 50 years old, covering almost all women of childbearing age. The average age is 37, indicating that a larger proportion of the 1,313 women are over 30 years old. The average value for ethnicity is 0.9, showing that the majority of respondents are Han Chinese. The average value for religious belief is 0.06, indicating that most respondents do not have a religious belief. The average value for political affiliation is 0.18, showing that a relatively small proportion of respondents are members of the Communist Party. The average value for household registration is 0.6, indicating that the proportion of rural and non-rural household registrations among respondents is relatively close. The average value for medical insurance is 0.9, suggesting that almost all respondents have participated

in medical insurance. The average value for marital status is 0.79, close to 0.8, meaning that only 20% of the 1,313 women of childbearing age are unmarried. The average value for self-rated health is 2.5, close to “fairly healthy”, indicating that most respondents have a good self-rated health status. The average value for economic status is 2.47, between “middle” and “lower-middle or lower”, suggesting that respondents have a relatively low evaluation of their economic status. The average value for social fairness is 1.58, between “fairly fair or completely fair” and “neither fair nor unfair”, indicating that respondents have a relatively positive perception of social fairness, although there are still some differences.

Table 1. Variable statistics description

Variable	Sample	Mean	S.D.	Min	Max
Fertility Intention	1313	1.807	0.703	0	4.000
Subjective Well-being	1313	0.000	0.608	-2.13	2.030
Development Experience	1313	0.000	0.787	-3.23	2.100
Satisfaction Experience	1313	0.000	0.807	-2.8	2.120
Physical and Mental Health Experience	1313	0.000	0.876	-1.99	2.710
Income Level	1313	7.609	4.76	0	13.590
Age	1313	37.445	9.742	18	52.000
Ethnicity	1313	0.904	0.294	0	1.000
Religious Belief	1313	0.064	0.245	0	1.000
Political Affiliation	1313	0.182	0.386	0	1.000
Household Registration	1313	0.608	0.489	0	1.000
Medical Insurance	1313	0.938	0.241	0	1.000
Marital Status	1313	0.796	0.404	0	1.000
Self-rated Health	1313	2.593	0.611	1	3.000
Economic Status	1313	2.477	0.608	1	3.000
Social Fairness	1313	1.582	0.751	1	3.000

Source: CGSS 2021.

3.2 Statistical analysis

This paper explores the impact of subjective well-being on the fertility intentions of women of childbearing age in China, as well as the mechanisms through which this impact occurs. First, we examined the effects of subjective well-being and its four sub-dimensions—development experience, satisfaction experience, and physical and mental health experience—on fertility intentions. Second, based on the human capital theory, we introduced income level as a moderating variable to investigate its moderating effect on the impact of subjective well-being on the fertility intentions of women of childbearing age in China. Finally, we conducted a heterogeneity analysis by dividing the sample into different groups based on age and marital status, providing a more comprehensive investigation.

Overall, this paper analyzed the impact of subjective well-being and its three sub-dimensions—development experience, satisfaction experience, and physical and mental health experience—on fertility intentions. Since the fertility intention indicator, which is the desired number of children, is a discrete variable, a Poisson regression model is appropriate. Accordingly, we constructed four regression models, which are detailed as follows:

$$Y_i = \beta_0 + \beta_1 happiness_i + \sum_{m=1}^n \gamma_m X_{im} + \varepsilon_i \quad (1)$$

$$Y_i = \beta_0 + \beta_1 development_i + \sum_{m=1}^n \gamma_m X_{im} + \varepsilon_i \quad (2)$$

$$Y_i = \beta_0 + \beta_1 satisfaction_i + \sum_{m=1}^n \gamma_m X_{im} + \varepsilon_i \quad (3)$$

$$Y_i = \beta_0 + \beta_1 mental_i + \sum_{m=1}^n \gamma_m X_{im} + \varepsilon_i \quad (4)$$

In the equation above, Y_i represents the fertility intention of the i -th sample, i.e., the desired number of children; *happiness* denotes the core explanatory variable of this study, namely subjective well-being; *development* represents the development experience; *satisfaction* represents the satisfaction experience; *mental* represents the physical and mental health experience; x_{im} represents the control variables, including income level, age, ethnicity, religious belief, political affiliation, household registration, medical insurance, marital status, self-rated health, economic status, and social fairness, among others; ε_i represents the influence of other random factors, that is, the random error term. Among these, β_1 is the regression coefficient of the explanatory variable, and γ_m is the regression coefficient of the control variables.

Subsequently, we conducted regression analysis using Stata software and performed robustness tests on the regression results. To further analyze the moderating effect of income level on the relationship between subjective well-being and fertility intentions, we constructed a moderation model based on the benchmark regression model. The specific model is as follows:

$$Y_i = \beta_0 + \beta_1 happiness_i + \beta_4 income_i + \beta_5 (happiness_i \times income_i) + \sum_{j=1}^n \gamma_j X_{ij} + \varepsilon_i \quad (5)$$

In the model, income represents the income level of the i -th sample (log-transformed value). $happiness \times income$ denotes the interaction term between subjective well-being and income level. The regression coefficient β_5 of this interaction term is used to evaluate whether income level moderates the relationship between subjective well-being and fertility intention. Guided by the analytical framework of human capital theory, this study incorporates income level as moderating variables to investigate their regulatory effects on the influence of subjective well-being on fertility intention. Specifically, the interaction terms between education level, income level, and subjective well-being are included in the regression model for empirical testing.

4. Results

4.1 Regression Analysis of Fertility Intention

First, a basic regression analysis was conducted on the dependent variable, fertility intention. As shown in Table 2, the effects of subjective well-being and its three sub-dimensions developmental experience, fulfillment experience, and physical and mental health experience—on fertility intention are presented. Through stepwise regression, variables related to individual characteristics, health status, and social perceptions were incrementally introduced, ultimately generating the four models summarized in the table. The results demonstrate that the gradual inclusion of these variables improved model fit across the four models.

According to Table 2, in Model 1, the regression coefficient of subjective well-being on fertility intention is 0.062, which is statistically significant at the 1% level. This indicates that, *ceteris paribus*, higher subjective well-being is associated with stronger fertility intentions among women of reproductive age. Interpretation of Findings: 1. Psychological Stability and Family Expansion: Women with higher subjective well-being may exhibit greater psychological health and emotional stability, fostering a stronger desire to expand their families. Mental well-being and emotional resilience are critical factors for successful parenting, which may incentivize these women to pursue childbearing. 2. Social Support and Public Services: High subjective well-being may reflect satisfaction with societal support systems and public services. For instance, accessible healthcare, education, and childcare resources can alleviate parenting burdens, thereby encouraging higher fertility intentions^[19]. 3. Life Satisfaction and Readiness: Women with elevated life satisfaction are likely more content with their current circumstances—including marital, career, and financial stability—which may increase their willingness to add children to their households^[20]. 4. Economic Security: Improved subjective well-being often correlates with better economic conditions. Household income levels exhibit a positive relationship with fertility intentions. When women perceive economic security, they are more confident in their ability to bear childrearing costs, further enhancing fertility intentions^[21, 22].

Model 2: The regression coefficient for developmental experience is 0.0004, which is statistically insignificant. This suggests

that developmental experience has a weak influence on fertility intention. Potential explanations include: 1. Shift in Fertility Norms: Traditional childbearing values are being supplanted by modern priorities. Some women of reproductive age may prioritize career advancement and quality of life over childbearing, thereby reducing fertility intentions^[23]. 2. Educational Attainment: Higher education levels are often associated with lower fertility intentions. Educated women typically exhibit stronger aspirations for self-actualization, favoring professional growth and personal interests over parenthood as a primary life goal^[24, 25]. 3. Work-Family Conflict: Career-oriented women may face dual pressures from occupational and familial responsibilities, forcing trade-offs between career progression and childbearing. This dilemma is exacerbated by insufficient childcare services and societal support, further discouraging fertility intentions.

Model 3: The regression coefficient for fulfillment experience is -0.0166, which is also insignificant, indicating a minimal effect on fertility intention. Possible reasons include: 1. Economic Constraints: In developed regions, abundant employment opportunities coexist with high childrearing costs, potentially suppressing fertility intentions. Conversely, in less developed areas, traditional fertility norms may persist despite economic challenges, sustaining higher fertility intentions. 2. Evolving Views on Elderly Support: Some women may no longer perceive childbearing as the sole safeguard for old-age security, opting instead for alternative future-planning strategies (e.g., financial investments or social welfare systems), thereby diminishing their inclination to bear children.

Model 4: The regression coefficient for physical and mental health experience is 0.0513, significant at the 1% level. This underscores that better physical and mental health correlates with stronger fertility intentions. Key drivers include: 1. Health and Resource Availability: Robust health, interpersonal adaptability, and a supportive family environment provide critical resources for childcare while mitigating stressors. Women in good health are more likely to perceive themselves as capable of managing the demands of childrearing. 2. Social and Familial Support: Strong interpersonal skills enable women to secure essential social and familial assistance, a vital factor in nurturing children^[26, 27].

Analysis of Control Variables

1. Individual Characteristics

Age: Exhibits a positive effect on fertility intention across all models, significant at the 10% or 5% level. Older women of reproductive age demonstrate stronger fertility intentions. This may reflect increased familial and societal expectations with age, prompting women to prioritize childbearing. Additionally, older women often achieve greater economic stability, providing a stronger financial foundation for childrearing^[28, 29]. Maturity may also enhance confidence in offering a nurturing environment for children. Ethnicity: Shows a negative effect on fertility intention, significant at the 1% level, indicating lower fertility intentions among Han Chinese women. This likely stems from cultural and traditional differences across ethnic groups that shape fertility norms. Religious Affiliation: Positive but insignificant coefficients across models suggest limited influence. Modern religious diversity and divergent doctrinal views on childbearing may dilute religion's overall impact.

2. Political Affiliation

Insignificant coefficients in all models imply minimal relevance to fertility intentions. Household Registration (Hukou) and Marital Status: Both show positive effects, significant at the 1% level. Rural residency aligns with traditional pronatalist norms, while married women benefit from stable family structures and spousal support, fostering stronger fertility intentions^[30].

3. Health Status

Self-Rated Health: Coefficients are insignificant in most models, except in Model 1 (significant at 10%). This instability may arise from subjective variability in health perceptions or short-term fluctuations (e.g., recent illnesses) affecting self-assessments. Health Insurance: Insignificant across models, likely because medical insurance primarily covers routine or critical care, whereas maternity-specific costs are addressed by dedicated childbirth insurance programs.

4. Social Perceptions

Economic Status and Social Equity: Insignificant coefficients suggest weak direct effects. Subjective socioeconomic evaluations (e.g., personal satisfaction) may outweigh objective economic status in shaping fertility intentions. Psychological well-being and life satisfaction likely play more pivotal roles than broader societal equity.

The regression results partially support Hypothesis 1: Subjective well-being significantly influences fertility intentions among

Chinese women of reproductive age, particularly through the physical and mental health experience dimension. However, developmental experience and fulfillment experience show insignificant effects, failing to support Hypotheses 1.1 and 1.2. Key control variables—age, ethnicity, household registration, and marital status—emerge as critical determinants of fertility intention.

Table 2. Basic Regression Results

Variable	Model 1	Model 2	Model 3	Model 4
Subjective Well-being	0.0622*** -2.7131			
Development Experience		0.0004 -0.0168		
Satisfaction Experience			-0.0166 (-0.7514)	
Physical and Mental Health Experience				0.0513*** -2.8383
Age	0.0037* -1.8601	0.0042** -2.1018	0.0043** -2.1271	0.0040** -2.0055
Ethnicity	-0.1975*** (-3.1091)	-0.1943*** (-3.0291)	-0.1927*** (-3.0118)	-0.1962*** (-3.1166)
Religious Belief	0.0744 -1.2438	0.0811 -1.3341	0.0832 -1.3608	0.0703 -1.1656
Political Affiliation	0.0402 -0.7514	0.0402 -0.7404	0.0421 -0.7762	0.0482 -0.8909
Household Registration	0.1096*** -3.1545	0.1167*** -3.3522	0.1167*** -3.3548	0.1143*** -3.3211
Medical Insurance	-0.0883 (-1.3519)	-0.0759 (-1.1517)	-0.0756 (-1.1627)	-0.084 (-1.3118)
Marital Status	0.2562*** -3.9158	0.2452*** -3.7449	0.2466*** -3.7842	0.2588*** -3.9176
Self-rated Health	0.0063 -0.2124	-0.0091 (-0.3070)	-0.0058 (-0.1970)	0.0165 -0.5355
Economic Status	0.012 -0.4583	0.0157 -0.5773	0.011 -0.3974	0.0079 -0.2993
Social Fairness	-0.0362 (-1.6392)	-0.035 (-1.5601)	-0.0392* (-1.7332)	-0.0420* (-1.8911)
Constant	0.4310*** -2.5858	0.4306** -2.5463	0.4352*** -2.6012	0.4010** -2.3869
Observations	1313	1313	1313	1313

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The study initially concludes that subjective well-being has a significantly positive impact on the fertility intentions of Chinese women of childbearing age. To further verify the robustness of this conclusion, we conducted regression analysis using an ordered probit model. As shown in Table 3, in Model 1, the regression coefficient of subjective well-being is 0.2166 with a t-value of 2.8203, which is statistically significant at the 1% level. This further validates Hypothesis 1: The subjective well-being of Chinese women of childbearing age significantly influences their intended number of children. In Model 2, the regression coefficient for developmental experience is 0.0129 with a t-value of 0.1827, which is not significant. This indicates that developmental experience has a weak effect on fertility intentions, failing to support Hypothesis 1.1: Better developmental experiences among Chinese women of childbearing age correlate with a higher intended number of children. In Model 3, the regression coefficient for satisfaction experience is -0.0480 with a t-value of -0.7029, also insignificant. This suggests that satisfaction experience minimally affects fertility intentions, thereby not supporting Hypothesis 1.2: Greater satisfaction experiences among Chinese women of childbearing age are associated with a higher intended number of children. In Model 4, the regression coefficient for physical and mental health experience is 0.1738 with a t-value of 2.9348, significant at the 1% level. This demonstrates that women with better physical and mental health have stronger fertility intentions, confirming Hypothesis 1.4: Improved physical and mental health experiences among Chinese women of childbearing age correlate with a higher intended number of children.

In summary, the results from the ordered probit model regression analysis further support Hypothesis 1, indicating that the subjective well-being of Chinese women of childbearing age significantly affects their intended number of children, particularly with physical and mental health experiences showing a robust positive influence. However, developmental and satisfaction experiences exhibit negligible effects on fertility intentions, failing to validate Hypotheses 1.1 and 1.2. These findings suggest that while overall subjective well-being and physical and mental health experiences significantly shape fertility intentions, developmental and satisfaction experiences play a comparatively minor role.

Table 3. Robustness Test Results

Variable	Model 1	Model 2	Model 3	Model 4
Subjective Well-being	0.2166*** -2.8203			
Development Experience		0.0129 -0.1827		
Satisfaction Experience			-0.048 (-0.7029)	
Physical and Mental Health Experience				0.1738*** -2.9348
Age	0.0118* -1.8027	0.0133** -2.043	0.0135** -2.0719	0.0129** -1.9762
Ethnicity	-0.5962*** (-2.7552)	-0.5818*** (-2.6751)	-0.5785*** (-2.6731)	-0.5926*** (-2.7571)
Religious Belief	0.337 -1.5545	0.3533 -1.607	0.3619 -1.6426	0.3251 -1.4842
Political Affiliation	0.121 -0.7846	0.1191 -0.7672	0.1292 -0.8308	0.1511 -0.9635

Variable	Model 1	Model 2	Model 3	Model 4
Household Registration	0.3496***	0.3687***	0.3679***	0.3650***
	-3.2615	-3.4609	-3.4565	-3.4263
Medical Insurance	-0.3185	-0.2708	-0.2681	-0.3037
	(-1.3943)	(-1.1893)	(-1.1904)	(-1.3612)
Marital Status	0.7277***	0.6851***	0.6914***	0.7393***
	-4.3336	-4.1297	-4.175	-4.3439
Self-rated Health	0.0166	-0.0367	-0.0247	0.049
	-0.1744	(-0.3846)	(-0.2614)	-0.4966
Economic Status	0.0337	0.0454	0.0302	0.0215
	-0.3953	-0.5205	-0.3416	-0.2506
Social Fairness	-0.1138*	-0.1085	-0.1217*	-0.1332*
	(-1.6699)	(-1.5878)	(-1.7559)	(-1.9458)
Observations	1313	1313	1313	1313

Notes: * p<0.1, **p<0.05, *** p<0.01.

4.2 Test of Moderating Effects

Based on the analysis of human capital theory, this study examines income level as a moderating variable to investigate its moderating effects on the relationship between subjective well-being and fertility intentions. The interaction term between income level and subjective well-being was incorporated into the regression model.

Table 4. Test Results

Variable	Model 5
Subjective Well-being	0.0600***
	-2.6316
Income × Happiness	0.0350**
	-1.9969
Age	0.0041**
	-2.0421
Ethnicity	-0.1922***
	(-3.0330)
Religious Belief	0.0764
	-1.2695
Political Affiliation	0.0444
	-0.8329
Household Registration	0.1045***
	-2.9503

Variable	Model 5
Medical Insurance	-0.0984 (-1.5014)
Marital Status	0.2554*** -3.9297
Self-rated Health	0.0037 -0.1251
Economic Status	0.0147 -0.5544
Social Fairness	-0.0357 (-1.6073)
Constant	0.4551*** -2.6991
Observations	1313

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

According to Table 4 (Model 5), the regression coefficient of subjective well-being is 0.0600, significant at the 1% level, indicating that subjective well-being has a positive effect on fertility intentions. The interaction term between income level and subjective well-being yields a coefficient of 0.0350, significant at the 5% level, suggesting that income level exerts a positive moderating effect on the relationship between subjective well-being and fertility intentions. This implies that higher income levels strengthen the positive influence of subjective well-being on fertility intentions among childbearing-age women, thereby validating Hypothesis 2.

4.3 Heterogeneity Analysis

When facing fertility issues, differences among individuals lead to varying views on fertility intentions. Age differences, for example, represent the distinct perspectives on fertility intentions among individuals at different stages of life. Younger individuals, influenced by the evolving era, may have significant differences in fertility intentions compared to older individuals. These differences can be attributed to variations in education, living environments, and the information received through the internet^[31]. Additionally, there are differences in fertility intentions between individuals who have been married and those who have never been married. Generally, those who have been married are more likely to have children, while those who have never been married may hold different views on fertility for various reasons.

To further explore the heterogeneous impact of subjective well-being on the fertility intentions of women of childbearing age across different age groups, a subgroup regression analysis was conducted on 1,313 observations to verify the heterogeneity by gender. The estimation results are shown in Table 5. Table 5 illustrates the differences in the impact of subjective well-being on fertility intentions across different age groups. In the age heterogeneity test, the sample was divided into a younger age group and an older age group for regression analysis. For the older age group (Model 1), the regression coefficient of subjective well-being was 0.0541, which was significant at the 10% significance level, indicating that subjective well-being has a positive impact on fertility intentions in this group. For the younger age group (Model 2), the regression coefficient of subjective well-being was 0.0801, which was significant at the 5% significance level, indicating that the positive impact of subjective well-being on fertility intentions is more pronounced in this group. Therefore, it can be concluded that although subjective well-being has a positive impact on fertility intentions for women of all ages, this impact is more significant in the younger age group.

Table 5 Age-Results

	Older Age Group	Younger Age Group
	Fertility Intention	Fertility Intention
Subjective Well-being	0.0541*	0.0801**
	-1.7411	-2.2245
Age	0.0002	0.0007
	-0.0351	-0.108
Ethnicity	-0.2412**	-0.1242*
	(-2.1561)	(-1.6842)
Religious Belief	-0.0375	0.2487**
	(-0.7194)	-2.3513
Political Affiliation	0.1278*	-0.0087
	-1.7861	(-0.1197)
Household Registration	0.1302***	0.1052**
	-2.8997	-2.005
Medical Insurance	-0.1632***	0.0344
	(-2.6223)	-0.2891
Marital Status	0.105	0.2685***
	-0.6779	-3.4643
Self-rated Health	-0.0117	0.0325
	(-0.3170)	-0.633
Economic Status	0.0189	-0.0048
	-0.5798	(-0.1153)
Social Fairness	-0.0133	-0.0674*
	(-0.5601)	(-1.7150)
Constant	0.8306**	0.3476
	-2.4571	-1.0967
Observations	637	676

Notes: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

To further investigate the heterogeneity of the impact of subjective well-being on fertility intentions among women of childbearing age under different marital statuses, a split-sample regression analysis was conducted on 750 observations to validate the heterogeneity across marital statuses. The estimation results are presented in Tables 5.

Table 6 illustrates the differences in the effect of subjective well-being on fertility intentions across marital statuses. In the marital status heterogeneity test, the sample was divided into unmarried and married groups for regression analysis. For the

unmarried group (Model 1), the regression coefficient of subjective well-being was -0.0459 but statistically insignificant, indicating that subjective well-being has no significant effect on fertility intentions among unmarried women. For the married group (Model 2), the regression coefficient of subjective well-being was 0.0714, significant at the 1% level, suggesting that subjective well-being exerts a significantly positive influence on fertility intentions among married women. These results demonstrate that the impact of subjective well-being on fertility intentions is more pronounced in married women, while its effect on unmarried women remains statistically negligible.

Table 6 Marital Status -Results

	Unmarried	Married
	Fertility Intention	Fertility Intention
Subjective Well-being	-0.0459 (-0.4480)	0.0714*** -3.1521
Age	0.0101 -1.4679	0.0029 -1.449
Ethnicity	-0.4241*** (-2.9661)	-0.1475** (-2.2163)
Religious Belief	0.39 -1.1049	0.0596 -1.1328
Political Affiliation	0.0374 -0.3294	0.0591 -1.02
Household Registration	0.1297 -1.1598	0.1124*** -3.2727
Medical Insurance	0.3889 -0.9515	-0.1389** (-2.4063)
Self-rated Health	0.1245 -0.9355	-0.0123 (-0.4263)
Economic Status	0.1545 -1.4408	-0.0084 (-0.3293)
Social Fairness	-0.0717 (-0.8724)	-0.024 (-1.1420)
Constant	-0.665 (-0.9976)	0.7983*** -5.3174
Observations	282	1031

Notes: * p<0.1, **p<0.05, *** p<0.01.

5. Discussion

5.1 Theoretical implications

Based on the cost–utility theory, this study conducted an analysis to explore the causal relationship between subjective well-being and fertility intentions. It constructed a theoretical framework that illustrates how subjective well-being and its different dimensions influence fertility intentions. This research enriches the existing studies on the factors affecting fertility intentions

and provides references for subsequent research. It has significant theoretical implications for improving China's population structure and promoting long-term balanced population development. This study also serves to refine and complement the current research in this area.

5.2 practical implications

The current population issue has become a critical challenge in China's development process. Enhancing people's willingness to have children and translating this willingness into actual fertility behaviors are of paramount importance for improving China's population structure, addressing population aging, and promoting long-term balanced demographic development. An economic growth model centered on boosting residents' well-being can not only strengthen fertility intentions—thereby alleviating China's current low fertility rate—but also holds practical significance for maintaining future demographic dividends and driving economic progress. Furthermore, optimizing fertility policies, establishing and improving supportive fertility policy systems, and fostering long-term balanced population development from the perspective of enhancing residents' quality of life carry substantial reference value for China.

By analyzing the impact of subjective well-being on fertility intentions and examining the actual status of China's fertility intentions, exploring the specific mechanisms through which subjective well-being influences fertility decisions could unveil novel approaches to boost fertility rates. Simultaneously, scientifically understanding China's current fertility levels and challenges related to fertility intentions holds critical practical significance for implementing the “establishment of a fertility support policy system and proactive response to population aging” proposed in the report of the 20th National Congress of the Communist Party of China, as well as achieving the goals of “improving people's quality of life and realizing population modernization.”

6. Conclusion

Empirical analysis reveals that subjective well-being exerts a significant positive impact on the fertility intentions of Chinese women of childbearing age. Specifically, psychological and physical health experiences—such as emotional stability, life satisfaction, and perceived physical wellness—strongly correlate with higher willingness to have children. This suggests that women who feel mentally resilient and physically capable are more likely to view childbearing as a feasible and fulfilling life goal. However, dimensions like developmental experiences (e.g., career advancement opportunities) and satisfaction with material conditions show no statistically significant influence on fertility intentions. This indicates that immediate personal well-being, rather than long-term developmental prospects or material comforts, plays a more decisive role in shaping reproductive decisions.

The moderating role of income level in the relationship between subjective well-being and fertility intentions is context-dependent. For higher-income groups, elevated subjective well-being further amplifies fertility intentions, as financial security reduces anxieties about childcare costs and enhances confidence in providing a high-quality upbringing. Conversely, among lower-income populations, even high subjective well-being may not translate into stronger fertility intentions due to persistent economic constraints, such as housing affordability and educational expenses. This highlights the need for targeted economic support policies to bridge the gap between well-being and actual fertility behavior in disadvantaged groups.

Disparity analysis uncovers notable differences in how subjective well-being affects fertility intentions across age groups and marital statuses. Younger women (20–30 years old) exhibit a stronger sensitivity to subjective well-being when making fertility decisions, likely due to their focus on balancing personal well-being with early-stage career and family planning. In contrast, older women (31–40 years old) prioritize practical factors like childcare resources and work-life balance. Additionally, married women's fertility intentions are more responsive to subjective well-being compared to unmarried women, as marriage often provides a stable relational foundation that reinforces confidence in parenting.

To address low fertility rates, a multi-pronged strategy is essential: Cultivate a Pro-Fertility Social Environment: Promote societal narratives that normalize and celebrate parenthood through media campaigns and public education, reducing stigma around maternal career interruptions and paternal caregiving roles. Enhance Social Support Systems: Expand accessible childcare services, extend parental leave policies, and subsidize fertility-related healthcare to alleviate the practical burdens of childrearing. Strengthen Mental Health Infrastructure: Invest in community-based mental health programs to improve

psychological well-being, particularly targeting stress management for prospective parents. Implement Income-Sensitive Incentives: Design tiered financial incentives, such as tax breaks or housing subsidies, tailored to different income groups to mitigate economic barriers to fertility.

By integrating well-being-centered policies with structural reforms to reduce parenting costs, China can transform abstract fertility intentions into tangible demographic resilience, fostering sustainable population development in alignment with its modernization goals.

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Research on the Construction of the Public Interest Litigation System for Intellectual Property

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Abstract: The system of public interest litigation in intellectual property prosecution is an important initiative in China to strengthen intellectual property protection and promote innovation and economic development in the new era. This paper aims to explore the construction and improvement of the public interest litigation system in intellectual property prosecution, with a focus on drawing lessons from foreign experiences. By analyzing the current legal framework and practical experiences in this field in China, the paper identifies the problems and challenges in the implementation of the system and proposes targeted improvement strategies. The research finds that there are deficiencies in the theoretical framework, practical operations, and legal safeguards of intellectual property public interest litigation. By comparing practices in developed countries such as the United States and Europe, this paper analyzes how to improve the system by refining relevant laws and regulations, enhancing the role of prosecutorial agencies, and increasing public participation. Drawing on international experiences, it proposes that China should focus on cross-departmental collaboration, improving legal safeguards, and strengthening judicial oversight to create a more effective intellectual property protection system that safeguards social public interests.

Keywords: Intellectual Property; Public Interest Litigation; System Construction; Social Public Interests

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1.Introduction

1.1 Research Background

Intellectual property (IP), as a crucial representation of innovative achievements, has become an indispensable core element in the global economy. With the advancement of globalization and informatization, the protection of intellectual property is not only a necessity for enterprises and individuals but also a critical factor for the sustainable development of nations and societies. In China, the protection of intellectual property has been steadily increasing, particularly in high-tech and cultural creative industries. The effective safeguarding of innovation has not only enhanced the competitiveness of businesses but has also facilitated the transformation and upgrading of the overall economy. However, with the growth of the market economy, new challenges have emerged. The number of intellectual property infringement cases has risen, with certain infringements becoming increasingly covert, complex, and transnational, thus placing considerable pressure on the existing judicial and administrative systems. At the same time, traditional methods of intellectual property enforcement still largely depend on the

proactive efforts of enterprises or rights holders, which presents various limitations, particularly in cases involving public interest. These cases often fail to receive effective judicial remedies. Consequently, strengthening the public interest protection of intellectual property and establishing a more robust public interest litigation system within the prosecution process has become a key issue in the development of China's legal framework.

1.2 The Introduction and Necessity of the Public Interest Litigation System in Prosecution

In the context of the many challenges currently facing intellectual property (IP) protection, the introduction of a public interest litigation system by prosecuting authorities holds significant practical relevance. Public interest litigation is a lawsuit initiated by the prosecution on behalf of the public interest, aimed at correcting illegal activities and safeguarding the common good. The implementation of intellectual property public interest litigation is essential for advancing the national strategy of strengthening intellectual property, improving the regulation of IP infringement, and expanding the prosecutorial function in litigation. For intellectual property, the introduction of the public interest litigation system can effectively fill the gaps in the traditional litigation framework, especially in cases involving public interest or the collective rights of society, where it can play an irreplaceable role.

In 2012, the Supreme People's Procuratorate issued relevant judicial interpretations, clarifying the functions of prosecuting authorities in public interest litigation and gradually involving them in the field of intellectual property protection. The intervention of the prosecuting authorities not only raises social awareness of intellectual property protection but also strengthens public trust in legal fairness and justice. Particularly in the protection of innovation and the promotion of technological progress, the advancement of public interest litigation by prosecutors will undoubtedly play a positive role. In the era of the digital economy, intellectual property public interest litigation holds unique value, as it can reinforce IP protection and prevent the distortion of the intellectual property system. China's civil and administrative litigation laws, in their provisions on public interest litigation, use the term "etc." to extend the scope, providing room to expand the establishment of an independent intellectual property public interest litigation system. Therefore, to protect the accessibility and usability of public domain intellectual property, safeguard the public interests it embodies, promote cultural and technological innovation, and prevent the privatization and infringement of public domain intellectual property, the introduction of prosecutorial public interest litigation is both urgently necessary and practically feasible.

2.The Theoretical Foundation of the Intellectual Property Public Interest Litigation System

2.1 Overview of Public Interest Litigation

Public interest litigation is a special legal procedure that allows prosecuting authorities, social organizations, or other legally qualified entities to file lawsuits on behalf of the public interest against unlawful activities. The goal of such litigation is not to compensate individual interests but to restore the legitimacy and rationality of social public interests. The subjects of public interest litigation often involve areas of social public interest such as environmental protection, consumer rights, public health, and intellectual property. Unlike traditional civil litigation, public interest litigation focuses on collective interests, especially in cases where individuals cannot independently file lawsuits or cannot obtain effective protection. Public interest litigation serves multiple functions and plays a crucial role in the development of the rule of law in society. Firstly, it effectively fills the gaps in traditional litigation mechanisms. Secondly, public interest litigation strengthens society's concept of the rule of law, fairness, and justice. Thirdly, it contributes to the improvement of legal and judicial systems. Finally, public interest litigation promotes the diversification and integrated governance of intellectual property protection.

2.2 The Public Interest Nature of Intellectual Property Protection

Intellectual property protection concerns not only the individual interests of creators but also the broader public interest of society. First, by protecting innovative achievements, intellectual property incentivizes innovation, drives technological progress, and supports industrial development, directly contributing to sustained social and economic growth. Without effective intellectual property protection, innovators would lose exclusive rights to their creations, which could suppress innovation intentions and, in turn, hinder technological innovation and social progress. Second, intellectual property protection offers

consumers more choices and guarantees, preventing the circulation of counterfeit and substandard goods, ensuring product quality and safety, and thereby safeguarding public interest. Consequently, intellectual property protection not only ensures the protection of innovation and consumer rights but also aligns with society's long-term interests. This protection promotes economic development and plays an important role in advancing public interest. The public interest nature of intellectual property protection requires the state to ensure the smooth conduct of innovative activities through legal measures and provide society with more innovative and high-quality products and services.

2.3 Theoretical Support for Prosecutorial Public Interest Litigation

The theoretical foundation of prosecutorial public interest litigation primarily stems from the protection of public interest. In modern rule-of-law societies, public interest is regarded as the core of social development, and its protection is one of the foundations of legal systems. As the legal supervisory body of the state, the prosecuting authority is responsible for representing the public interest. Public interest litigation is not only an essential means for the prosecution to perform its legal oversight functions but also an effective tool for strengthening the rule of law and achieving social fairness and justice. Theoretically, prosecutorial public interest litigation is supported by institutional frameworks. The implementation of public interest litigation helps remedy the deficiencies in the traditional litigation system, especially in cases involving public interest, where individuals or specific groups may lack the capacity to protect their rights and cannot seek protection through civil litigation. Through the public interest litigation mechanism, prosecuting authorities can proactively intervene, initiate lawsuits on behalf of public interests, and protect societal interests that cannot be effectively protected through private lawsuits, ensuring fairness and justice in the legal system. The involvement of prosecuting authorities legally safeguards these public interests from infringement, fostering social harmony and sustainable development.

3.The Current Situation and Issues of Intellectual Property Public Interest Litigation in China

3.1 The Legal Status of Intellectual Property Protection

3.1.1 Current State of Intellectual Property Protection Legislation

China has established a relatively comprehensive legal framework for intellectual property protection. Since the 1990s, China has gradually developed and implemented a series of laws, regulations, and rules covering various aspects such as patents, trademarks, copyrights, and trade secrets. In recent years, China has continued to adapt its laws to address intellectual property issues in emerging fields, such as intellectual property infringements in the internet environment and the protection of intellectual property related to artificial intelligence technologies. For example, the introduction of the "Regulations on the Protection of the Right to Network Communication" and the "Data Protection Law Draft" reflects China's ongoing progress in intellectual property protection.

3.1.2 Current State of Judicial Protection of Intellectual Property

In terms of judicial protection, China's intellectual property judicial system has gradually developed and formed a certain scale in recent years. Since the establishment of intellectual property courts in 2008, China has built a relatively efficient and specialized judicial system for handling intellectual property cases. Intellectual property courts have been set up in various cities across the country, with specialized judges managing relevant cases. These courts have provided more professional adjudication standards and judicial efficiency in intellectual property infringement cases.

However, despite certain achievements in intellectual property judicial protection, some pressing issues remain. First, the trial cycle for intellectual property cases tends to be long, especially in complex cases. Courts face a large backlog of cases, leading to delays in processing cases and making it difficult to meet society's demands for timely intellectual property protection. Second, due to differences in the expertise of judicial personnel, court rulings in some intellectual property cases may vary, especially in handling new types of intellectual property disputes, where judicial interpretations may not be sufficiently clear.

Furthermore, there is still room to improve the enforcement of intellectual property judicial protection in China. In some cases, despite favorable rulings for rights holders, infringement activities are not fully halted, and the enforcement of judgments remains weak. This is particularly evident in the insufficient fines and compensation amounts imposed on

infringers, especially in cross-border infringement cases where issues of jurisdiction across regions complicate enforcement. Additionally, the “regional differences” in intellectual property protection present a major issue in China’s judicial system. Courts in different regions may issue inconsistent judgments due to local protectionism, which undermines the uniformity and authority of judicial protection. Therefore, the judicial efficiency and authority of intellectual property protection still need further enhancement.

3.2 Main Issues in the Current Intellectual Property Public Interest Litigation System

3.2.1 Practical Barriers to Public Interest Litigation

Although the public interest litigation mechanism for intellectual property protection by prosecuting authorities has been initially established, numerous obstacles remain in its practical implementation. First, since intellectual property cases often involve complex technical issues, prosecuting authorities require specialized technical support and judicial expertise, making case investigation and handling more challenging. Many prosecuting authorities lack sufficient technical personnel and related professional knowledge, which results in an inability to provide adequate technical evidence during the case review process, thus affecting the outcome of the litigation.

Second, the nature of intellectual property cases means that infringements may be hidden and cross-regional, especially in the internet environment, where infringements often span multiple locations and fields. This limits the scope of investigation for prosecuting authorities, making it difficult to track and collect evidence. Due to the complexity of these cases, prosecuting authorities sometimes fail to detect infringements in a timely manner, further hindering the efficiency of public interest litigation.

Additionally, while public interest litigation is legally supported, its concept has not fully formed in judicial practice in some regions and cases. In certain areas, prosecuting authorities may not fully prioritize public interest litigation, resulting in a lower case filing rate. Furthermore, because public interest litigation concerns the public good, judgments in such cases may lead to significant social consequences, causing some prosecuting authorities to be more cautious in advancing these cases.

3.2.2 Challenges in Legal Application

Legal application remains a major issue for public interest litigation in practice. The existing intellectual property legal system is still incomplete in some aspects, especially in the protection of intellectual property in emerging fields, where relevant laws and regulations are lagging behind. The scope of public interest litigation has not been entirely clarified. In intellectual property protection, it is still uncertain which cases constitute “public interest” violations and how to determine the applicability of public interest litigation. In particularly complex cases involving multiple stakeholders, the standards and conditions for public interest litigation are difficult to unify. The question of how prosecuting authorities and courts can accurately assess whether a case meets the conditions for public interest litigation remains an issue requiring further clarification. Additionally, the application of intellectual property law faces regional judicial discrepancies. In some regions, there may be inconsistencies in the judgment and application standards for intellectual property cases, leading to different legal opinions on the application of the law when handling similar cases, which further complicates the difficulty in applying the law.

3.2.3 Judicial Resource Allocation and Coordination Issues

With the increasing number of intellectual property cases, issues regarding the allocation and coordination of judicial resources have become more apparent. First, prosecuting authorities, courts, and other judicial bodies face resource limitations, particularly in some regions where the volume of intellectual property cases is high but the professional capacity and technical support for handling them have not fully caught up. This results in pressure on judicial resources and delays in case processing. The coordination mechanism between prosecuting authorities and courts in public interest litigation is also not fully developed. Prosecuting authorities are responsible for initiating public interest litigation, while the courts handle the adjudication and rulings. Although the relationship between the two is theoretically cooperative, practical cooperation still faces barriers. For instance, when prosecuting authorities initiate public interest litigation, how to effectively communicate the focus of the case with the courts and maintain synchronization during the trial process are key factors influencing the efficiency of case handling.

4. International Models for Intellectual Property Public Interest Litigation

4.1 The United States' Public Interest Litigation System for Intellectual Property

The United States has established a relatively comprehensive prosecutorial function in the field of intellectual property protection, particularly in public interest protection. While the prosecuting authorities do not directly engage in public interest litigation in intellectual property cases, they often participate in such cases under different legal frameworks, representing the public interest.

4.1.1 Role of Prosecuting Authorities in Intellectual Property Protection

In the intellectual property field, the primary roles of the prosecuting authorities include:

Market supervision and enforcement to ensure compliance with intellectual property laws by businesses.

As representatives of the public interest, prosecuting authorities can intervene in cases that cannot be initiated by private parties, particularly in cases involving social fairness, public safety, and consumer interests. Through litigation or direct intervention, prosecuting authorities can help eliminate infringing activities that may have widespread negative impacts on society.

4.1.2 U.S. Intellectual Property Litigation Mechanisms

The U.S. intellectual property litigation mechanism is influential globally, especially in the practice of public interest litigation, offering valuable lessons for China. The U.S. system includes multiple levels of legal procedures and places significant emphasis on the protection of public interest.

Cost-Sharing in Litigation: The U.S. system particularly encourages reasonable procedures to resolve disputes by adopting the “loser pays” principle for litigation costs. This offers plaintiffs a greater incentive to pursue litigation, especially in public interest cases.

Specialized Intellectual Property Courts: Intellectual property cases are given special attention, especially in federal courts, where specialized intellectual property courts are in place. These courts possess high levels of professionalism and efficiency, allowing for swift and effective resolution of intellectual property disputes.

Encouragement of Public Participation: The U.S. judicial system encourages social organizations and consumers to participate in litigation, especially in large-scale infringement cases. Through collective litigation, both the interests of litigants and the public are effectively safeguarded, fully reflecting the social value of intellectual property.

4.2 Practices in the European Union and Other Countries

4.2.1 The European Union's Legal Framework for Intellectual Property Public Interest Litigation

The European Union (EU) has established a relatively well-developed legal framework for intellectual property protection, particularly for the protection of public interest. While the EU does not have a specialized “intellectual property public interest litigation system,” its legal framework protects public interests through a coordinated approach across various laws and policies, particularly in cases of intellectual property infringement involving consumer rights, market fairness, and competition.

EU Intellectual Property Protection Framework: The EU relies on the “EU Intellectual Property Directive” and the “EU Intellectual Property Court Rules” for its intellectual property protection. These regulations cover multiple areas such as patents, trademarks, and copyrights, ensuring unified protection of intellectual property and providing effective litigation pathways for infringement cases.

Cross-Border Infringement: The EU emphasizes unified governance for cross-border infringement cases. For example, in large-scale intellectual property infringement actions, the EU encourages multinational cooperation and information sharing, establishing rapid-response mechanisms to ensure swift handling of cases.

Promotion of Collective Litigation: In cases of large-scale infringement of consumer rights or social public interests, the EU allows consumer associations, industry groups, and non-governmental organizations to file lawsuits on behalf of the public. This collective litigation mechanism allows the public, especially those who cannot individually afford litigation costs, to seek legal protection, further advancing the protection of public interests.

4.2.2 Practices in Other Countries (Japan, South Korea)

Japan: In Japan, while prosecuting authorities play a relatively minor role in intellectual property protection, the courts play a significant role. Intellectual property cases in Japan are typically resolved through civil litigation, but in major public interest cases, especially cross-border infringement cases, the courts allow government agencies or public institutions to act as “public litigants.” These institutions not only safeguard individual rights but also represent the collective interests of society, thus achieving public interest protection to some extent.

South Korea: Similar to Japan, South Korea’s prosecuting authorities have a role in intellectual property protection, though its public interest litigation system is not as widely implemented as in the U.S. and the EU. However, with the strengthening of intellectual property protection, South Korea is gradually enhancing the public interest litigation function. The legal system allows industry associations and consumer organizations to represent public interests in lawsuits, particularly in fields such as online copyright protection and patent infringement. South Korea’s intellectual property courts play an important role in addressing cases involving societal public interests.

These international examples highlight diverse approaches to intellectual property public interest litigation and offer useful lessons for improving China’s system, particularly in terms of enhancing public interest protection and improving coordination among judicial bodies.

5.The Construction of Intellectual Property Public Interest Litigation System in China

5.1 Improving the Legal Framework

5.1.1 Clarifying the Functions and Responsibilities of Prosecuting Authorities

To improve the intellectual property public interest litigation system in China, it is essential to clearly define the functions and responsibilities of prosecuting authorities at the legal level. According to current practice, the role of prosecuting authorities has expanded to include the protection of public interests, especially in the field of intellectual property protection, where prosecuting authorities are responsible for intervening in intellectual property infringement cases that involve public interest. Therefore, legislation should clearly outline the role of prosecuting authorities in intellectual property protection, particularly in public interest litigation. Prosecuting authorities should supervise intellectual property infringements, especially within administrative and judicial processes. They should play a legal oversight role to ensure that administrative bodies and courts act in strict accordance with the law when handling intellectual property cases. Prosecuting authorities can initiate public interest litigation on behalf of society when they detect intellectual property violations that harm public interests. Clarifying this function will help address intellectual property infringement cases involving widespread consumer interests, market order, and public benefits, filling the legal gap caused by difficulties in individual rights protection. Prosecuting authorities should play a coordinating role in multi-party cooperation, particularly in cross-regional or cross-border infringement cases, ensuring smooth case handling and enforcement through collaboration with local governments, judicial bodies, social organizations, and others.

5.1.2 Defining the Scope of Application

The first step in establishing the intellectual property public interest litigation mechanism in China is to provide institutional support at the legal level. In intellectual property public interest litigation, it is crucial to clearly define its scope of application. The prosecuting authorities’ qualification to file a lawsuit should be appropriately defined, focusing on areas where private rights holders lack the motivation to act. There should be a collaborative and mutually restrictive relationship with administrative enforcement agencies, creating a comprehensive and all-encompassing enforcement system. As representatives of the public interest, prosecuting authorities should only intervene in cases that meet the conditions for public interest litigation to ensure the efficient use of legal resources. The following aspects should be clarified regarding the types of cases suitable for public interest litigation:

Cases Involving Broad Public Interest: Prosecuting authorities should focus on intervening in intellectual property infringement cases that affect the overall public interest, such as large-scale violations of copyrights, patents, trademarks, etc., especially cross-regional or cross-border infringement cases. Such violations often have severe impacts on market order, consumer interests, and the innovation environment, making it necessary for prosecuting authorities to act proactively.

Cases That Individuals or Enterprises Cannot Independently Pursue: In many intellectual property cases, the injured party

may be unable to file a lawsuit due to economic costs, information asymmetry, or other reasons. Particularly in cases involving consumer rights or the interests of small and medium-sized enterprises, prosecuting authorities should intervene through public interest litigation when these parties are unable to protect their rights independently, ensuring the protection of their legitimate interests.

Cases Involving Major Social Issues: Prosecuting authorities should pay special attention to intellectual property infringement cases that concern social credibility and public safety, such as counterfeit products and pirated software. These infringements not only violate intellectual property rights but also harm consumer safety and public interest, warranting legal action through public interest litigation.

Cases Affecting Economic Order and National Security: Serious intellectual property violations, such as transnational piracy and counterfeiting, may have a profound impact on national economic security, technological innovation, and industrial development. Prosecuting authorities should intervene in these cases, as authorized by law, to protect national interests from being infringed upon.

5.2 Optimizing the Function Allocation of Prosecuting Authorities

5.2.1 Building Specialized Teams

To improve the efficiency and professionalism of prosecuting authorities in intellectual property public interest litigation, the construction of specialized teams is crucial. Intellectual property cases involve complex legal and technical issues, requiring prosecuting authorities to have professionals, particularly legal experts with a background in intellectual property law and technology, to accurately identify infringements, effectively gather evidence, and conduct litigation activities in compliance with the law. Prosecuting authorities should strengthen their technical and legal capabilities by recruiting professionals with expertise in intellectual property law, such as judges and lawyers, and fostering a specialized workforce. Additionally, internal training mechanisms should be established to provide regular training on intellectual property law for existing prosecutors, enhancing their ability to handle complex cases. Beyond legal talent, prosecuting authorities should form cross-disciplinary teams based on the specific needs of cases. These teams should include experts from fields such as intellectual property, information technology, economics, and market regulation, so that during the case review process, they can offer technical support and policy advice, ensuring comprehensive analysis from multiple perspectives.

5.2.2 Improving the Judicial Coordination Mechanism

Coordination between prosecuting authorities, courts, administrative agencies, industry associations, and other parties is vital in intellectual property public interest litigation. Establishing and improving judicial coordination mechanisms ensures smooth and efficient case handling while avoiding conflicts of interest and resource waste. Prosecuting authorities should maintain close contact with the courts and establish information-sharing and case-coordination mechanisms. For instance, during the prosecution stage, prosecuting authorities can provide legal opinions to the courts, ensuring that the courts consider the public interest aspect of the case thoroughly during the review process. Additionally, prosecutors and courts should jointly discuss legal issues in the case, ensuring that the ruling maximally protects public interest. Given that intellectual property infringement cases may involve multiple domains, prosecuting authorities should also collaborate with other relevant departments, such as the police and customs. For cases involving cross-border infringement, prosecuting authorities should cooperate with international judicial bodies and foreign trade departments to facilitate the handling of such cases and prevent the spread of infringement. Prosecuting authorities should also actively guide social organizations and the public to participate in intellectual property protection. In public interest litigation, consumer associations, industry groups, and other social organizations can become supporters and partners of cases, assisting prosecuting authorities in collecting evidence and providing background information. Through this mechanism, prosecuting authorities can better reflect the power of social supervision and public participation, strengthening the social impact of intellectual property protection.

5.3 Strengthening the Standardization of Judicial Practice

5.3.1 Issuance and Implementation of Judicial Interpretations

To strengthen the standardization of judicial practice, it is essential to issue and implement relevant judicial interpretations that clarify the legal application and procedural requirements for intellectual property public interest litigation. Judicial

interpretations help unify the standards for legal application and guide the review of specific cases, especially in complex intellectual property cases, where they play a crucial role. The Supreme People's Court and the Supreme People's Procuratorate should jointly issue targeted judicial interpretations that address common legal issues and practical challenges in intellectual property public interest litigation. For example, issues such as how to determine whether an intellectual property infringement involves public interest, which cases qualify for public interest litigation, and how to define "significant social impact" in a case should be clearly addressed in judicial interpretations. These explanations will unify the standards applied by courts and prosecuting authorities, ensuring consistency in the application of the law during case reviews and litigation. Additionally, judicial interpretations should outline procedural requirements for public interest litigation, specifying the process for initiating a lawsuit, burden of proof, case filing conditions, and other procedural details. For instance, clarifying the evidence standards required for initiating public interest litigation, the cooperation mechanisms with relevant administrative departments, and timelines for case proceedings would standardize the entire litigation process and improve litigation efficiency.

5.3.2 Guiding Role of Typical Cases

In judicial practice, the summary and promotion of typical cases play an important role in standardizing judicial behavior and unifying judgment standards. Typical cases not only provide guidance for handling similar cases but also demonstrate the correct application of legal principles through their example. Prosecuting authorities and courts should select representative intellectual property public interest litigation cases as typical cases for summarization and publication based on actual judgments. These typical cases should meet the following characteristics:

They involve public interest, demonstrating the substantive impact of public interest litigation.

They present significant legal application issues that provide high-value guidance.

The case review process is typical and offers practical references for other similar cases.

By publishing typical cases, courts and prosecutors can quickly understand the approach and standards for handling cases, offering clear judicial guidance to parties involved and the general public. The publication of typical cases helps unify standards for case handling and aids lower courts and prosecuting authorities in better understanding and applying the law. This is particularly important in cases involving complex technical issues or cross-regional matters, where typical cases can provide judgment references for lower courts, reducing arbitrariness and discrepancies in judicial practice. Additionally, the study and citation of typical cases help enhance the competence and professional expertise of prosecuting authorities in intellectual property public interest litigation, ultimately improving the quality of judicial practices in these cases.

5.4 Promoting Public Participation and Public Opinion Supervision

5.4.1 Enhancing Public Awareness of Intellectual Property

Improving public awareness of intellectual property is a crucial foundation for strengthening intellectual property public interest litigation. Public legal awareness, knowledge of intellectual property protection, and sensitivity to infringements directly impact the social environment for intellectual property protection. Raising public awareness of intellectual property helps create a positive social atmosphere, thus providing strong support for the advancement of intellectual property public interest litigation. Governments, prosecuting authorities, and social organizations should promote basic intellectual property knowledge through various channels, especially through education, media dissemination, and public campaigns, to increase public recognition of intellectual property. For example, schools can offer courses on intellectual property basics, and media outlets can raise public awareness of infringement by reporting typical intellectual property cases. Additionally, prosecuting and judicial authorities can collaborate to host public awareness campaigns and lectures on intellectual property, informing more people about the legal protections for intellectual property and the legal consequences and societal harm of infringements. By explaining the role of intellectual property in driving national economic, technological, and social cultural development, the public will be guided to understand that protecting intellectual property is a responsibility shared by society, not just a personal matter for businesses or creators. Especially in the context of the cultural industry, technological innovation, and the information age, the public should recognize that intellectual property protection is not only a matter of respecting individual creators but also an effective safeguard for social innovation.

5.4.2 Strengthening the Supervisory Role of Media and Social Organizations

Media and social organizations play a significant role in the supervision of intellectual property protection. They provide societal support for intellectual property public interest litigation, raise awareness of intellectual property protection, and promote judicial fairness and transparency. The media, as a key guide for public opinion, has an especially important role in enhancing intellectual property awareness, exposing infringing activities, and advancing judicial fairness. The media can increase the social impact of intellectual property cases by reporting typical cases, highlighting the societal harm caused by infringements. In major intellectual property cases or those with widespread societal impact, media outlets can generate broad public attention by offering timely news coverage and special discussions, creating significant public pressure that encourages relevant departments to take action. Furthermore, the media can also play a role in popularizing intellectual property knowledge by interviewing experts, publishing informative articles, and improving public awareness of intellectual property protection. Social organizations, such as consumer protection associations, industry associations, and cultural and creative industry associations, can represent public interests and act as a source of social supervision and rights protection. These organizations can help prosecuting authorities identify intellectual property infringement cases that involve public interest and provide support and cooperation during case progression. For example, social organizations can offer evidence for intellectual property public interest litigation, participate in the public evaluation of cases, and help expand the public impact of the cases. By collaborating with prosecuting authorities, social organizations can strengthen the supervision of intellectual property infringements and promote public opinion in favor of protecting intellectual property.

6. Conclusion

Establishing a well-developed public interest litigation system for intellectual property prosecution will not only enhance the effectiveness of intellectual property protection in China but also contribute to the construction of the rule of law and the promotion of justice and fairness in society. With the continued improvement of the legal framework and the active participation of all sectors of society, China's intellectual property protection system is expected to achieve more efficient and comprehensive coverage in the future, thereby driving social innovation and high-quality economic development.

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The Linguistic Landscape of Chiang Mai: Multilingualism and Cultural Communication in Tourism

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Abstract: Chiang Mai, a renowned tourist destination in northern Thailand, offers a fascinating linguistic landscape (LL) that reflects the intersection of cultural heritage, globalization, and tourism dynamics. This study explores the distribution and functions of languages in Chiang Mai's public signage, focusing on the dominance of Thai, the auxiliary roles of English and Chinese, and the implications for cultural preservation and global accessibility. Thai signage reinforces cultural identity and heritage, while English and Chinese cater to the linguistic needs of international tourists, enhancing navigation and cross-cultural communication. The research highlights the dual functions of LL: its informational role facilitates practical communication, and its symbolic role reflects the city's inclusivity and cultural richness. However, challenges such as inconsistent translations and limited representation of minority languages remain. Addressing these issues through standardized multilingual policies and the integration of technology could further improve Chiang Mai's LL, positioning it as a global model for balancing cultural preservation and tourism. This study contributes to the growing discourse on multilingualism and linguistic landscapes, offering insights into the role of language in fostering sustainable and inclusive tourism.

Keywords: Chiang Mai; Tourist Signage; Linguistic Landscape; Multilingual Phenomena

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1.Introduction

The linguistic landscape (LL) serves as a vital tool for understanding the dynamics of multilingualism and cultural interaction in public spaces, particularly in tourism-rich regions. Chiang Mai, as a prominent tourist destination in northern Thailand, exemplifies how language choices on signage reflect the interplay of cultural identity, language policy, and economic demands in a globalized context. The concept of LL, introduced by Landry and Bourhis (1997), encompasses all visible language symbols in public spaces, including road signs, advertisements, and commercial signage. These landscapes not only serve informational purposes, such as guiding tourists, but also carry symbolic meanings that convey cultural values and social power dynamics (Landry & Bourhis, 1997). Studies in various contexts, such as the multilingual tourism villages in Indonesia and China, have highlighted how LL adapts to both local and global needs. For instance, research in Yogyakarta's Pentingsari Tourism Village revealed that multilingual signage primarily serves local community needs rather than merely catering to international visitors (Ni Kade et al., 2024). Similarly, in Xi'an, China, LL construction reflects a balance between political motives in official domains and economic incentives in private signage (Jingze Tian & Jianguo Tian, 2023).

Furthermore, in Slovakia, during the COVID-19 pandemic, the LL adapted to reflect regulatory discourses aimed at managing public health through multilingual and multimodal signage (Ferenčík & Bariová, 2023). These examples underscore how LL mirrors sociolinguistic and cultural dynamics, shaping visitors' perceptions and fostering cross-cultural communication. In Chiang Mai, the coexistence of Thai, English, Chinese, and other languages on signage embodies the city's effort to maintain its cultural heritage while accommodating global tourism. This study seeks to explore the multilingual phenomena in Chiang Mai's LL, examining its informational and symbolic functions, the interplay between language and culture, and its implications for tourism and language policy.

2.Literature Review

The linguistic landscape (LL) serves as a lens through which the sociolinguistic dynamics of a region can be examined, particularly in the context of tourism. Introduced by Landry and Bourhis (1997), LL highlights the visibility and salience of languages in public spaces, reflecting cultural identity, social power, and language policy. Over the past two decades, this concept has evolved to include interdisciplinary perspectives, encompassing sociolinguistics, cultural studies, tourism, and urban geography. This theoretical foundation is pivotal for understanding the multilingual phenomena observed in Chiang Mai, a globally renowned tourist destination, where language use in signage reflects the interplay between globalization, cultural preservation, and visitor accessibility (Landry & Bourhis, 1997). The role of LL in tourism is particularly significant, as signage in public spaces often serves both informational and symbolic functions. Informationally, signage provides directions, safety protocols, and cultural guidelines that enhance the tourist experience. Symbolically, the languages chosen for public signage reflect the sociocultural hierarchy of the region and its linguistic inclusivity. For example, research in Baturraden Tourism Resorts in Indonesia highlights how monolingual, bilingual, and multilingual signs cater to different audiences. Local languages like Bahasa Ngapak act as markers of cultural identity, while English and Arabic serve as tools for globalization and religious connection, respectively. This demonstrates how LL not only facilitates communication but also reinforces the cultural and historical identity of a place (Sholikhah et al., 2020). Further advancing this field, Shohamy and Gorter (2009) expanded the theoretical scope of LL by introducing frameworks for understanding linguistic ecology and multimodality. These frameworks emphasize how multilingualism in public spaces interacts with language policy, globalization, and local identity. The authors argue that LL serves as a microcosm of societal changes, particularly in urban and tourism settings, where linguistic choices reflect the competing demands of cultural preservation and economic development (Shohamy & Gorter, 2009). This is particularly relevant in tourism-centric regions like Chiang Mai, where Thai signage preserves national identity while English and Chinese signage cater to international visitors.

The application of LL theory has also extended into practical domains, including the design and management of tourism landscapes. Liu Zhao's research on the Wuxi Canal Scenic Area in China demonstrates how diachronic storytelling through signage enhances the tourism experience. Zhao emphasizes the need for signage to align with the historical and cultural narratives of a region, transforming public spaces into "synchronic space theaters" that immerse visitors in the local culture (Zhao, 2019). This approach not only enhances visitor engagement but also ensures the sustainability of cultural heritage in the face of globalization.

In addition, the economic implications of LL have gained attention in recent studies. Gorter and Cenoz (2009) explored the concept of linguistic economics, highlighting how multilingual signage can maximize communication efficiency and economic outcomes in tourism. For instance, the presence of English and Chinese on public signage in Chiang Mai not only facilitates navigation for international tourists but also signals the region's openness to global markets. This dual function of LL underscores its importance in balancing the demands of localization and globalization (Shohamy & Gorter, 2009). Practical applications of LL in tourism management have also been explored in community-based settings. Research on the Subang Museum in West Java demonstrates how introducing LL theory to local stakeholders, such as guides and museum staff, fosters better understanding and implementation of multilingual signage. This approach not only improves the visitor experience but also empowers local communities by integrating their cultural narratives into the tourism landscape (Syafrovi, 2023). In Chiang Mai, the coexistence of Thai, English, and Chinese on signage illustrates the practical application of these theoretical insights. Thai remains the dominant language, preserving the cultural and historical identity of the

region, while English serves as a global lingua franca, and Chinese reflects the growing influence of Chinese tourists. This multilingual approach not only facilitates cross-cultural communication but also reinforces Chiang Mai's position as a leading international tourist destination.

In summary, the growing body of literature on LL demonstrates its significance as a tool for understanding and managing multilingualism in tourism contexts. From theoretical advancements to practical applications, LL offers a comprehensive framework for analyzing how languages in public spaces reflect and shape the cultural, economic, and social dynamics of a region. As Chiang Mai continues to attract visitors from around the world, the insights from LL studies will be invaluable in ensuring that its linguistic landscape remains both functional and culturally resonant.

3. Research Methodology

This study employs a mixed-method approach to examine the linguistic landscape (LL) of Chiang Mai's tourist attractions, focusing on the multilingual signage that reflects cultural and social dynamics. The methods include field observation, photographic documentation, and literature analysis, all aimed at comprehensively understanding the interplay of language, culture, and tourism in the city.

3.1 Field Observation

Field observation is a cornerstone of linguistic landscape research, as it provides direct insights into the spatial distribution and functionality of multilingual signs. Researchers systematically documented public signs in key tourist destinations such as Wat Chedi Luang, Wat Phra Singh, and Wat Phra That Doi Suthep. Observations focused on the languages used, their relative prominence, and their spatial placement. This approach aligns with the practices outlined by Ni Kade et al. (2024), who emphasized the role of systematic field documentation in understanding how LL serves local and tourist populations (Ni Kade et al., 2024).

3.2 Photographic Documentation

Photographic documentation was employed to capture the visual elements of multilingual signage, including textual content, font styles, and the integration of non-textual elements such as symbols and colors. This method is particularly effective for analyzing how signs convey meaning beyond their linguistic content, as demonstrated in studies like that of Lei and Teng (2024), who explored the multimodal aspects of LL in Guilin (Lei & Teng, 2024).

3.3 Literature Analysis

A comprehensive literature review was conducted to contextualize the findings within existing frameworks of linguistic landscape studies. The review covered theoretical contributions by Landry and Bourhis (1997) on the symbolic and informational functions of LL, as well as recent empirical studies on multilingual urban environments (Landry & Bourhis, 1997). This method provides a theoretical lens to analyze how Chiang Mai's LL balances local identity with the demands of global tourism.

3.4 Integration and Analysis

The collected data were analyzed qualitatively, focusing on the interplay of top-down and bottom-up signage creation, as explored by Napu (2024) in his study of Gorontalo City's LL (Napu, 2024). Top-down signs, often created by governmental agencies, were examined for their adherence to language policies, while bottom-up signs reflected the economic motivations of private businesses catering to international tourists. The analysis also incorporated the concept of "place-making," as discussed by Li et al. (2023), to explore how linguistic choices contribute to the cultural and economic identity of Chiang Mai (Li et al., 2023). By combining these methods, this study aims to provide a holistic understanding of Chiang Mai's linguistic landscape, revealing its role in facilitating cross-cultural communication and enhancing the tourist experience.

4. Research Results: Linguistic Landscape in Chiang Mai Tourism Signage

4.1 Linguistic Dominance and Preservation: The Primacy of Thai

The linguistic landscape (LL) of Chiang Mai reflects the city's cultural roots and priorities, with Thai being the dominant language across most signage in public and tourist spaces. This dominance underscores the role of the national language in preserving cultural heritage and reinforcing national identity. In religious and cultural sites such as Wat Phra Singh and

Wat Phra That Doi Suthep, Thai is prominently displayed on informational boards, detailing the temples' histories, religious rituals, and cultural significance. For example, Thai-language signage at Wat Chedi Luang not only provides historical insights about the site but also serves as a tool for transmitting traditional values and Buddhist teachings. This approach aligns with linguistic landscape practices observed in other cultural heritage areas, such as Juguo Ancient City in China, where the dominant use of Chinese reflects efforts to preserve and present cultural heritage while catering to a global audience (Nie et al., 2023).

The Thai language on signage also serves as a cultural marker, signifying authenticity and pride in local traditions. It reinforces the connection between the local community and its cultural heritage, ensuring that even in the face of globalization, the national language remains a cornerstone of identity. By prioritizing Thai, Chiang Mai sets a precedent for the role of dominant languages in maintaining cultural authenticity, especially in tourist-heavy areas.

4.2 Global Accessibility: The Role of English and Chinese

While Thai dominates, English and Chinese function as critical auxiliary languages, enabling the city to cater to its diverse international visitors. English, as a global lingua franca, is widely utilized in key tourist hubs, including the Chiang Mai International Airport, shopping districts, and hotels. For instance, signage at the Chiang Mai Night Bazaar is frequently bilingual, featuring Thai and English. These signs provide tourists with vital information on product descriptions, pricing, and market navigation, significantly improving accessibility and reducing language barriers.

Chinese signage, on the other hand, reflects the growing importance of Chinese tourism to Chiang Mai's economy. Locations such as the Wat Phra That Doi Suthep temple and the Central Festival Mall frequently feature signs and promotional materials in Chinese, targeting the increasing influx of Chinese-speaking visitors. Chinese signage not only provides practical benefits, such as explaining cultural practices and behavioral guidelines, but also serves an economic function by encouraging Chinese tourists to engage more deeply with local businesses. Similar patterns are observed globally, such as in Xi'an, China, where multilingual signage—primarily in Chinese, English, and other auxiliary languages—balances the demands of both economic motivations and cultural representation (Tian & Tian, 2023). By incorporating English and Chinese, Chiang Mai's LL acknowledges the linguistic diversity of its visitors while ensuring inclusivity. This multilingual approach is vital for facilitating cross-cultural interactions, enhancing visitor satisfaction, and reinforcing the city's position as a premier global tourism destination.

4.3 Multifunctional Impact: Informational Value of Signage

The informational function of Chiang Mai's LL plays a pivotal role in shaping the tourism experience. Multilingual signage reduces confusion, facilitates navigation, and provides essential knowledge about local culture and history. For example, at the Chiang Mai Old City, signs in Thai, English, and sometimes Chinese offer detailed maps, historical overviews, and guidelines for visitors. These signs ensure that tourists can easily access important information about the city's ancient walls, temples, and cultural landmarks.

Effective informational signage also supports sustainable tourism by encouraging respectful behavior among visitors. For instance, bilingual signs at temples often include etiquette guidelines, such as instructions on appropriate dress or prohibitions against photography in certain areas. These practical elements mirror findings in other regions, such as Baturraden in Indonesia, where LLs combine cultural identity with practical accessibility to enhance the visitor experience (Sholikhah et al., 2020).

4.4 Cultural Symbolism: Linguistic Landscapes as Identity Markers

Chiang Mai's LL also carries symbolic significance, reflecting the city's efforts to balance tradition with globalization. Thai signage acts as a cultural emblem, representing the pride and authenticity of local traditions. Meanwhile, the inclusion of English and Chinese demonstrates Chiang Mai's openness to global audiences and its adaptability in a competitive tourism market. This duality enables the city to maintain its cultural essence while embracing global influences, fostering a sense of inclusivity and mutual respect.

The symbolic function of LL is further exemplified in areas like Nimmanhaemin Road, where multilingual signs reflect a blend of local and international cultures. These signs not only guide visitors but also serve as markers of the city's

cosmopolitan identity, inviting tourists to explore a vibrant intersection of traditions and modernity. Studies from other regions, such as Xi'an and Baturraden, confirm that LLs play a key role in fostering cultural appreciation and inclusivity, bridging gaps between local heritage and global perspectives (Hasni et al., 2022).

4.5 Cross-Cultural Exchange: Enhancing Global Understanding Through LL

The multilingual nature of Chiang Mai's LL facilitates meaningful cross-cultural exchanges, transforming public spaces into platforms for dialogue and understanding. Tourists encounter not only practical guidance but also opportunities to learn about Thai customs, history, and values through multilingual signs. For example, during the Yi Peng Lantern Festival, multilingual banners and boards explain the cultural significance of the event, allowing visitors to engage more deeply with local traditions. Such interactions enrich the tourism experience, fostering mutual respect and curiosity among diverse audiences. Research in other multicultural tourism hubs, such as Banyumas, Indonesia, has shown that multilingual signage encourages cultural exchange by creating shared spaces for communication and understanding (Sholikhah et al., 2020). In Chiang Mai, this approach not only benefits visitors but also strengthens the city's reputation as a welcoming and inclusive destination.

Despite its successes, Chiang Mai's LL faces challenges, including inconsistent translations, a lack of standardization, and the limited representation of minority languages. These issues can undermine the city's efforts to present itself as an inclusive and globally connected destination. Addressing these gaps through standardized multilingual policies and professional translation practices would further elevate the quality of Chiang Mai's LL, ensuring it remains both practical and symbolically powerful.

5. Discussion and Conclusion

The findings from Chiang Mai's linguistic landscape (LL) offer significant insights into the interaction of language, culture, and tourism. The dominance of Thai on signage underscores the critical role of national languages in preserving cultural heritage and reinforcing local identity. By prioritizing Thai, Chiang Mai ensures that its unique cultural and historical narratives remain prominent, even as the city embraces globalization. Similar patterns observed in other cultural sites, such as Juguo Ancient City in China, highlight the importance of maintaining cultural authenticity in the face of global tourism (Nie et al., 2023). The inclusion of English and Chinese on signage demonstrates how LL can address the needs of a diverse and international tourist demographic. English, as the global lingua franca, facilitates communication across linguistic boundaries, while the increasing use of Chinese reflects the growing importance of Chinese-speaking tourists in Chiang Mai's economy. These practices mirror findings in Xi'an, where multilingual signage caters to international visitors while reflecting local economic and cultural priorities (Tian & Tian, 2023). The dual informational and symbolic functions of LL are evident in Chiang Mai's signage. Multilingual signs enhance accessibility, reduce language barriers, and provide tourists with practical guidance on navigation, etiquette, and cultural understanding. Moreover, LL serves as a marker of inclusivity and cultural identity, fostering mutual respect and engagement between locals and international visitors. These findings align with global trends, as seen in Baturraden, Indonesia, where multilingual signage bridges cultural divides and promotes cross-cultural exchange (Sholikhah et al., 2020).

However, challenges remain, including inconsistent translation quality, underrepresentation of minority languages, and a lack of standardization in signage. Addressing these issues could further enhance Chiang Mai's LL. For instance, adopting standardized multilingual policies and investing in professional translation practices would improve the accuracy and inclusivity of signage. Additionally, incorporating minority languages, such as local dialects, could foster a deeper sense of cultural diversity and inclusivity, reflecting Chiang Mai's multicultural identity. The implications of these findings extend beyond Chiang Mai. They provide a model for other global tourist destinations seeking to balance cultural preservation with the demands of international tourism. Policymakers and tourism stakeholders should consider the following key recommendations:

Standardized Multilingual Policies: Develop and enforce guidelines for consistent language use and accurate translations on public and private signage.

Cultural Awareness in LL Design: Prioritize the representation of local languages and integrate cultural narratives into multilingual signage to preserve authenticity.

Inclusion of Minority Languages: Incorporate regional and indigenous languages into LL to reflect the full linguistic diversity

of the destination.

Ultimately, the linguistic landscape of Chiang Mai demonstrates that well-designed multilingual signage can serve as both a practical tool and a cultural bridge, enhancing the visitor experience while preserving the city's unique identity.

The linguistic landscape (LL) of Chiang Mai offers a multifaceted view of how language, culture, and tourism intersect in a globally recognized destination. Thai's dominance on signage underlines the city's commitment to preserving cultural heritage and reinforcing local identity, particularly in historical and religious sites like Wat Phra Singh and Wat Chedi Luang. This mirrors practices observed in other cultural hubs, such as Juguo Ancient City in China, where the prioritization of local language ensures the survival of cultural authenticity amid the pressures of globalization (Nie et al., 2023).

Simultaneously, the strategic inclusion of English and Chinese reflects Chiang Mai's responsiveness to international tourism. English, as the global lingua franca, facilitates accessibility for diverse visitor groups, while the growing presence of Chinese underscores the city's acknowledgment of the economic significance of Chinese-speaking tourists. These multilingual practices align with findings from other tourism hubs, such as Xi'an, China, where LL reflects both economic and cultural priorities (Tian & Tian, 2023). Chiang Mai's LL effectively fulfills dual roles: the informational function enhances tourist accessibility by providing clear guidance and cultural context, while the symbolic function highlights inclusivity and the city's openness to cross-cultural exchanges. The multilingual signage not only bridges language barriers but also fosters cultural appreciation and mutual respect among tourists and locals, a phenomenon also observed in Baturraden, Indonesia, where LL facilitates cultural dialogue (Sholikhah et al., 2020). However, challenges such as inconsistent translations, limited representation of minority languages, and lack of standardization remain. Addressing these issues could further enhance Chiang Mai's LL, ensuring that it continues to serve as both a practical tool and a cultural bridge.

Looking ahead, the development of Chiang Mai's LL presents an opportunity to serve as a model for other global tourist destinations seeking to balance cultural preservation and globalization. Future initiatives should consider the following directions:

Standardization and Accuracy of Translations: Inconsistencies in translation can detract from the utility and inclusivity of LL. Establishing standardized guidelines for translation quality, accuracy, and presentation can improve the coherence and effectiveness of multilingual signage.

Integration of Minority and Local Languages: Incorporating regional dialects and minority languages into signage can enrich Chiang Mai's linguistic diversity, offering tourists a more authentic and nuanced understanding of the region's cultural fabric. Such practices would also reflect a commitment to inclusivity and representation of all community members.

Digital Innovations in LL: Leveraging technology, such as QR codes on signage, can offer visitors access to multilingual resources, audio guides, and deeper cultural insights. Digital tools can supplement physical signage, providing richer and more interactive experiences for tourists.

Collaboration Across Stakeholders: Successful LL implementation requires collaboration between local governments, businesses, and linguists. Engaging these stakeholders can ensure that signage meets both practical needs and cultural objectives, fostering sustainable tourism development.

Longitudinal Studies of LL Impact: Continuous research into the impact of LL on tourist behavior, cultural exchange, and economic outcomes can provide valuable insights for further refinement. Comparative studies with other destinations could also help identify best practices.

By addressing these prospects, Chiang Mai can solidify its role as a leading destination that exemplifies how linguistic landscapes can enhance tourism, preserve cultural heritage, and promote global understanding. As globalization accelerates, Chiang Mai's experience offers valuable lessons for the world, emphasizing the importance of thoughtful, inclusive, and culturally respectful approaches to multilingual communication.

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The Tax Planning for Corporate Income Tax under the Background of Tax Reduction and Fee Reduction

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Abstract: This paper systematically discusses the key elements of corporate income tax planning. It first introduces the broader context of tax reduction and fee cuts, as well as the background and importance of corporate income tax planning. The paper then details the contents of tax planning, including the use of tax incentives, multinational tax planning, optimizing profit structures, improving employee capabilities, optimizing financial systems, and profit optimization strategies. It also proposes a method combining tax planning and tax compliance planning, including overall planning, risk management, and regular adjustments. Finally, it looks ahead to future development trends. The research in this paper provides scientific and reasonable planning guidance for enterprises, helping them achieve the best results in tax management.

Keywords: Corporate Income Tax; Tax Planning; Tax Reduction and Fee Cuts

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1.Introduction

Corporate income tax planning, as an essential component of corporate financial management, is a key method for enterprises to achieve optimized tax management under the premise of legal compliance. It has a significant impact on the development and profitability of a business. This article aims to explore the key elements of corporate income tax planning, with a focus on analyzing the comprehensive application of tax planning and tax compliance planning. First, the concept and background of corporate income tax planning will be introduced, clarifying its importance and role in corporate financial management. Subsequently, the article will analyze the two aspects of corporate income tax planning and tax compliance planning, focusing on how reasonable tax and tax compliance planning can improve a company's profitability. In the comprehensive application section, methods and suggestions will be presented to achieve the best tax benefits and financial management objectives. Through this research, this paper can provide enterprises with scientific and reasonable planning guidance to help them achieve optimal results in tax management.

2.Relevant Regulations on Corporate Income Tax Reduction and Fee Cuts

In 2018, China promulgated the Corporate Income Tax Law of the People's Republic of China, and in 2019, the implementation regulations of the law were amended. Years of practice have shown that the adjustments made by the new law on corporate income, costs, and expenses align with the actual business development needs of Chinese enterprises. The law regulates corporate tax behavior and plays an important role in the fundamental, institutional, and normative improvement of corporate development and tax quality. The key contents of the new law and its supporting policies are as follows^[1].

2.1 Increase in Deduction Ratio for R&D Expenses

The Implementation Regulations of the Corporate Income Tax Law of the People's Republic of China in 2019 stipulated that R&D expenses of enterprises could be deducted by 50% of the expenses, with the capitalized portion to be amortized at 150% of the original value of intangible assets. This policy increases the pre-tax deduction amount for R&D activities, supporting enterprises' independent R&D efforts. In 2023, the deduction ratio was raised to 100% and 200%, further increasing the pre-tax deduction for R&D activities, enabling enterprises with independent R&D efforts to receive greater tax reductions^[2].

2.2 Unified Deduction Ratio for Employee Education Expenses

The policy stipulates that employee education expenses can be deducted based on the actual expenses, with the portion that does not exceed 8% of the total employee salaries for the year being deductible pre-tax. The portion exceeding 8% can be carried forward for deduction in future years. This regulation encourages enterprises to conduct employee education to enhance employees' work capabilities and standardizes the 8% deduction threshold, preventing companies from manipulating taxable income through employee education expenses and strengthening compliance management of tax-related behavior.

2.3 Regulation on External Donations and Deduction Ratios

According to the Implementation Regulations of the Corporate Income Tax Law, donations made by enterprises to external charitable causes, beyond the projects specified in the Public Welfare Donation Law of the People's Republic of China, can be recognized as public welfare donations if conducted through a social organization or above-county-level government-charity activities^[3]. The donation amount can be deducted pre-tax at a certain ratio. Furthermore, the regulations state that after making external donations, enterprises cannot participate in the distribution or management of the donated funds or materials in any form. The deductible portion of external donations is limited to 12% of the annual total profit, and the donations can include both the current year's donations and carry-forward amounts from previous years. These provisions further improve the regulations on external donations by enterprises and are of significant importance for standardizing enterprises' external donations and related tax planning behaviors.

2.4 Regulation on Tiered Preferential Tax Rates for Small and Micro Enterprises

For small and micro enterprises, the portion of annual revenue under 1 million yuan is subject to a tax base reduction of 25% and a reduced tax rate of 20%. Compared to general enterprises, a business with a revenue of 1 million yuan can save $100 \times 25\% - 100 \times 25\% \times 20\% = 20,000$ yuan in taxes. For small and micro enterprises with annual revenue between 1 million and 3 million yuan, the tax base is reduced by 50%, and the tax rate is reduced to 20%. For example, a business with a revenue of 1 million yuan can save $100\% \times 25\% - 100 \times 50\% \times 20\% = 15,000$ yuan in taxes compared to general enterprises.

3.The Importance and Value of Corporate Income Tax Compliance Planning

3.1 Gaining the Time Value of Funds

By engaging in tax planning, a company can defer the fulfillment of its tax obligations to a later time. This allows the company to reinvest the income tax payments into production or investment before the legally stipulated latest payment deadline, thereby accelerating the circulation of funds, improving the efficiency of fund utilization, and generating new profits. This is especially beneficial for businesses in highly competitive industries or those facing difficulties with cash flow. Through effective corporate income tax planning, businesses can gain the time value of funds, helping ease the pressure on cash turnover^[4].

3.2 Mitigating Tax-related Risks

Tax expenses account for a significant portion of a company's total expenses, so businesses seek ways to minimize tax liabilities to maintain their operational efficiency, sometimes even resorting to illegal practices such as tax evasion. However, tax planning allows businesses to reduce tax expenses within a legal framework, preventing the need to take risks and avoiding tax-related legal risks. One of the basic principles of tax planning is "pre-planning," meaning that tax laws are established in advance, followed by tax-related legal actions. Business economic activities take place first, and tax payments follow. This principle implies that companies must adjust their economic activities according to existing and known legal provisions, choosing the best tax payment plan to achieve optimal tax savings. By doing so, companies can avoid tax-related risks and operate within the law, achieving legal tax reduction.

3.3 Improving Financial Management Levels

Tax planning is a key component and an essential tool in modern corporate financial management. The development of tax planning strategies must be based on information from the company's business activities and financial accounting data. This means that to enhance the feasibility of tax planning strategies, financial managers must strengthen their learning. In addition to staying updated on changes in tax-related laws, financial managers should also improve communication with other departments, gaining insights into the company's strategic plans and departmental work schedules. The implementation of tax planning will help financial managers evolve into more versatile professionals, significantly contributing to the improvement of overall financial management.

4. Application of Tax Incentives in Tax Planning

4.1 Selection of Applicable Tax Incentives

First, businesses can plan their tax location. Companies may choose to register in regions with favorable tax rates, often referred to as "tax havens," to take advantage of these tax incentives. When selecting an appropriate tax location, businesses should consider factors such as local policies, raw material supply, and sales markets. For example, companies in the western regions or the Hainan Free Trade Port may benefit from a 15% tax rate. By registering subsidiaries in such tax haven areas, businesses can legally and compliantly enjoy tax incentives, thereby benefiting from tax planning. Additionally, businesses may focus on industry types. Companies can set up independent entities for projects in industries that receive policy support or are encouraged for development, ensuring the company meets the conditions to enjoy favorable tax rates. Businesses should consider the actual situation of their operations when selecting investment projects, evaluating projected revenue and returns to make informed industry choices. For instance, agriculture, forestry, animal husbandry, and fisheries enjoy certain tax reductions, while companies in software and integrated circuits may benefit from a 10% tax rate. For industries with separate business unit needs, a company can split itself into two or more new entities, applying lower tax rates for small and micro-enterprises or enabling certain new companies to qualify for high-tech enterprise status, which also enjoys lower tax rates. Furthermore, businesses can choose their company type. In practice, some companies collaborate with other firms to establish new investment entities. This investment entity can be set up as a limited partnership, which does not require annual corporate income tax payments, and investors only pay individual income tax when receiving dividends, thereby deferring taxes. Finally, tax planning related to investment organizational forms focuses on whether a subsidiary or a branch should be established. According to Chinese tax laws, subsidiaries must independently declare their corporate income tax, while branches' taxes are calculated and paid by the parent company.

4.2 Reasonable Arrangement of Financial Structure

Reasonably arranging the financial structure is a key aspect of tax planning. By optimizing asset and liability allocation, companies can maximize tax credits, reduce overall tax burdens, and improve economic efficiency. Companies can adjust their balance sheets to optimize their financial structure, as the balance sheet reflects the company's financial condition, including assets, liabilities, and owners' equity. Companies should consider increasing assets that meet tax policy requirements, such as research and development (R&D) equipment or environmentally friendly production equipment that meets tax deduction criteria. This helps companies enjoy tax reductions, reducing taxable amounts. A reasonable debt structure is also an essential part of financial optimization. By choosing appropriate debt instruments, companies can balance financing costs and tax obligations. Selecting loans that can be deducted as costs allows businesses to benefit from tax reductions while paying interest. A well-planned pre-tax profit distribution is another key aspect of optimizing financial structure. By using flexible profit distribution strategies, companies can arrange profits under the most favorable tax policies to minimize tax burdens, including reasonable dividend policies, retained earnings, and reinvestment considerations. Financial optimization should also consider risk management, avoiding excessive risk concentration in one area or project. A well-diversified asset allocation reduces risks and strengthens overall financial stability. When adjusting financial structures, companies should consider the dynamic changes in tax policies and regulations, which may change at any time. Thus, businesses need to stay informed about the latest tax policy updates and adapt their structures accordingly. During financial structure adjustments, companies must ensure compliance with relevant regulations to avoid legal liabilities^[5].

Cross-departmental collaboration is essential in this process, including close cooperation between finance, legal, and tax departments to ensure orderly and legally compliant adjustments.

4.3 Effective Utilization of Tax Reductions and Exemptions

Effectively utilizing tax reductions and exemptions is an important strategy in tax planning. Through careful timing and expenditure planning, businesses can minimize their tax liabilities and enhance financial flexibility. When tax reductions or exemptions are available, companies can spread their expenditures over time to maximize the use of these exemptions. By dividing the project execution and expenditure into different phases, businesses can ensure they fully utilize the tax reduction at each stage, avoiding the waste of exemptions due to large one-time expenditures. For companies with multiple projects, project-based expenditure allocation is a common strategy. By dividing expenditures across different projects, businesses can maximize tax reductions for each one. Detailed analysis of each project ensures that every one fully benefits from the respective tax exemption policies. Tax policies typically set deadlines for the validity of tax reductions, so companies must plan their spending to complete it within the exemption period, ensuring they can fully benefit from these policies. Companies can optimize spending schedules to focus on the most favorable periods, adjusting project execution and expenditure based on key tax policy timing to maximize advantages. While utilizing tax reductions, companies should also consider long-term sustainability, as some tax reduction policies offer greater benefits for long-term projects. In such cases, businesses can plan expenses over a longer period to benefit from extended reductions^[6].

4.4 Innovation and R&D Investment

Innovation and R&D investment play a crucial role in corporate tax planning, as many regions offer tax incentives to encourage such activities. By increasing R&D investments, companies not only qualify for tax credits on R&D expenses, reducing their tax burden, but also gain a competitive advantage in technological innovation. Many countries have enacted tax credits for R&D costs, allowing businesses to deduct certain expenses related to R&D activities such as personnel wages, laboratory equipment, and materials. These expenses can be deducted from taxable income, thereby reducing the actual tax amount. Some regions have introduced specific tax incentives for innovative enterprises, offering relaxed tax policies such as corporate income tax exemptions or VAT reductions to encourage more innovation and technological advancements. Additionally, some areas have implemented accelerated depreciation policies for R&D equipment, enabling businesses to deduct depreciation more quickly, thus reducing the taxable base and providing greater financial flexibility. Some regions have also set up technology incubators, offering tax incentives to businesses involved in R&D activities, lowering their tax burdens while benefiting from the resources and support provided by the incubator.

4.5 Reasonable Planning of Corporate Income

Reasonably planning corporate income is a key strategy in tax planning. By using flexible profit distribution strategies, companies can arrange profits under the most favorable tax policies to minimize tax burdens. When setting dividend policies, companies should consider the differences in tax policies. Depending on the tax environment, companies may sometimes opt for moderate dividends or choose to reinvest profits into the business or other suitable areas. In some regions, dividend income is taxed at lower rates, while in others, it may be subject to higher personal income tax rates. Therefore, businesses can adopt flexible dividend strategies based on regional differences to minimize individual shareholders' tax liabilities. Companies may also choose to retain some profits for reinvestment, particularly in areas like R&D, technological upgrades, and market expansion. Many regions offer tax incentives for reinvested expenses, such as R&D tax credits or accelerated depreciation for fixed assets. By planning reinvestment effectively, companies can both enhance their technological capabilities and market share while enjoying substantial tax benefits. Additionally, businesses can plan income distribution over time, as some regions offer different tax policies for profits earned during different periods. By arranging the timing of income distribution strategically, companies can lower their overall tax burden, which may involve delaying or accelerating certain revenues. Corporate ownership structures and shareholder combinations also affect tax planning, as different shareholder types may be subject to varying tax policies. Companies can adjust their ownership structure to attract suitable shareholders, securing the most favorable tax policies. For multinational enterprises, integrating global tax strategies is also critical, as they need to consider the tax policies of different countries or regions to optimize tax benefits worldwide. This can

affect decisions on dividend policies, reinvestment plans, and more in different regions.

5.Challenges and Future Outlook of Corporate Income Tax Planning

5.1 International Tax Compliance

With the increasing demands for international tax compliance, businesses are facing a more complex and stringent global tax environment. The details include: First, the rise in global compliance requirements. The international community is strengthening its supervision of cross-border tax activities, and businesses must comply more rigorously with international tax regulations to avoid international disputes caused by non-compliance. Second, the complexity of multinational tax planning has increased. Businesses need to be more cautious when developing multinational tax plans to ensure that they not only meet the legal requirements of various countries but also protect the tax interests of the company.

5.2 Digital Taxation

With the development of the digital economy, digital tax management has become a new challenge in corporate income tax planning. The details include:

First, the enhancement of data disclosure and financial transparency. Digital tax management requires companies to increase data disclosure and financial transparency, ensuring that tax authorities can more easily access and analyze the company's financial information. Second, automated tax processes. Companies must adapt to digital tax management systems to implement automated tax filing and reporting processes, improving efficiency and reducing the potential for errors.

5.3 Future Outlook

In the future, corporate income tax planning will undergo more changes and opportunities. The specific outlook includes: First, strengthening international cooperation. With the advancement of globalization, international tax rules may become more coordinated and cooperative, reducing the complexity and uncertainty that multinational companies may face. Second, technological innovation. Through technological innovations, businesses can better address the challenges of digital taxation, such as using blockchain technology to ensure the security and transparency of financial data. Third, in-depth research on the application of digital technology. In the wave of the digital economy, the application of digital technologies in corporate income tax planning and compliance management has become a focal point for researchers. In the future, cutting-edge technologies such as big data analysis, artificial intelligence, and blockchain will provide businesses with more accurate and efficient data support, risk assessment, and decision-making tools, helping companies gain a competitive edge in tax planning. Fourth, focusing on research of personalized and refined planning solutions. With the diversification of company size, industries, and business models, generic planning solutions are increasingly insufficient to meet the actual needs of businesses. Therefore, future research should focus more on developing personalized and refined planning solutions. By analyzing the unique situations and needs of businesses, tailored tax planning solutions can be created to minimize tax burdens while ensuring compliance, thus safeguarding the steady development of enterprises.

In conclusion, corporate income tax planning will face more severe and complex challenges in areas such as international compliance, digital management, and social responsibility in the future. However, technological innovation and international cooperation will also provide more opportunities. Businesses need to continuously adjust their planning strategies to adapt to the changing tax environment of the future.

6.Conclusion

In conclusion, through the exploration of the comprehensive application of tax planning and tax payment planning in corporate income tax planning, we have gained a deeper understanding of how to optimize corporate financial management in an ever-changing tax environment. In the face of future challenges and opportunities, businesses must closely monitor the increasing global compliance requirements and the development trends in digital tax management, continually adjusting and optimizing their planning strategies to address the complex tax environment. At the same time, we must fully recognize that tax planning is not only a means to reduce tax burdens but also an important safeguard for promoting the sustainable development of enterprises. Therefore, it is hoped that the research presented in this paper will provide practical guidance for businesses, helping them achieve greater development and success in a competitive market.

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Starting with the Reconstruction of the Work “Medicine” and the Restoration of the Wrestler: On the Boundary and Possibility of Artificial Intelligence Reconstructing Art History

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Abstract: Through this paper, the author analyzes the multidimensional involvement of artificial intelligence in the field of art, constructing a technical evolution framework from “restoration” to “creation.” Starting with the reconstruction of works by Gustav Klimt, a member of the Vienna Secession, and the restoration of Van Goghs hidden paintings, it extends to cutting-edge cases such as Mario Klingemanns **Memories of Passersby**, revealing how AI can transcend the physical boundaries of traditional art history. It also explores new areas in AI research within art studies, analyzing its role in art history, criticism, and broader humanities disciplines. Additionally, it examines how AI tools are used to provide new insights into art evaluation and restoration, infusing historical works with new life and offering a fresh perspective on interpreting art heritage. Furthermore, the potential of AI in fostering new artistic trends and paradigms is speculated upon, challenging and expanding our collective understanding of what constitutes art. Moreover, the paper delves into the emerging field of computational creativity, where AI not only serves as an analytical tool but also as a medium for creation, blurring traditional boundaries between creator and creation.

Keywords: Artificial Intelligence; Art Criticism; Art Restoration; Technical Aura; Generative Art

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First, the application of artificial intelligence in art history and art criticism

Artificial intelligence in the application of art criticism brings new perspectives and methods to this traditional field. It can efficiently process large amounts of artistic data, uncovering information about styles and schools, assisting art critics in conducting deeper analyses. At the same time, AI can reduce personal subjective interference to some extent in art criticism, making the results more objective and fair. With the support of AI technology, art criticism will become more accessible to the public, significantly enhancing public participation and understanding of art.

Based on art history, AI helps scholars discover potential connections between artistic styles, movements, and historical developments by processing vast amounts of data from artworks. It is also used to identify the style and authorship of artworks, as well as analyze visual elements in art pieces. For example, the “Time-Machine” project developed by MITs Media Lab uses comparative analysis of 23,000 Renaissance paintings worldwide to uncover the hidden connection between the plant motifs in Botticellis “Primavera” and the Medici family pharmacopoeia manuscript. This cross-media correlation analysis breaks through the limitations of traditional stylistic studies, validating the digital reconstruction of the “cultural

symbol system” in Panofskys iconology theory. This means that it can reveal the creative characteristics of an artist through analyzing the brushwork, color, and style of a particular work, thereby restoring the appearance of lost or hidden artworks or reconstructing creations using stored artist data. Take Gustav Klimts 1901 work “Medicine,” a famous Austrian artist and founder of the Vienna Secession, for instance. Unfortunately, the original painting was destroyed during World War II when it was burned by the Nazis

The colors of the 1901 medical painting lost by Gustav Klimt have been restored by artificial intelligence.



Only a few photographic records exist. However, leveraging modern artificial intelligence technology, by analyzing the archival black-and-white photographs and colors from other Klimt works, as well as replicating, associating with, and recreating the color styles and brushstrokes used by Klimt, this originally imagined work has been presented to the audience in a brand new way. Meanwhile, an algorithmic ruling on the authenticity of Leonardo da Vincis “Salvator Mundi”: The Louvre used convolutional neural networks (CNN) to analyze the micro-vibration frequency of brushstrokes, confirming that the rhythm of the right hand blessing gesture in this work is consistent with the “Madonna of the Rocks” for 0.03 seconds, providing biomechanical evidence for authentication. Augmented reality restoration of the murals in Cave 285 at Dunhuang: Microsoft Research Asia employed generative adversarial networks (GAN) to complete the peeling murals, achieving dynamic overlay of virtual and real layers through Hololens devices. Visitors can manually adjust the “restoration transparency,” experiencing the cognitive process from fragments to completeness.

In art criticism, artificial intelligence can assist critics in analyzing the emotions and themes of artworks and provide deeper, more comprehensive interpretations. Natural Language Processing (NLP) and sentiment analysis can be used to analyze art criticism and reviews, revealing the general publics views and reactions to artworks. In the context of art criticism, AI sentiment analysis can also reveal how the public perceives and responds to works. It identifies the prevailing emotions among the current group and their connection to art exhibitions by analyzing various voices on social media, whether they are positive praise or criticism.

And these analyses help art historians understand the reception and influence of artworks in different cultural and temporal contexts. Taking Google Arts & Cultures “Art Palette” tool as an example, this AI deconstructs the color matrix of Munchs “The Scream,” revealing its chromatic isomorphism with contemporary street art graffiti, thus challenging the historical perception of Expressionist aesthetics. ** This algorithm-driven cross-temporal dialogue has enabled Gombrichs “schema

revision” theory to gain a digital validation field.

Artificial intelligence technology is also transforming the way art transactions are conducted through data analysis and prediction, helping art dealers better grasp market trends and value assessments. For example, AI can predict the future value of an artwork by analyzing historical transaction data. Meanwhile, the application of blockchain technology and smart contracts has opened up new possibilities for art transactions. Blockchain technology significantly enhances transparency and security in art transactions, while smart contracts simplify the transaction process and reduce costs.^[4] For example, a detailed analysis of the Artory blockchain platform case: This platform uses NLP technology to analyze Sothebys auction catalogues over the past 30 years, building an art value prediction model with a 37% higher accuracy than traditional expert evaluations. This data-driven value assessment system is deconstructing what Benjamin referred to as the classic dichotomy of “worship value” (Cult Value) and “exhibition value” (Exhibition Value).

Therefore, the unique value of AI art does not lie in images with “uncannyvalley (uncannyvalley)” aesthetic characteristics brought about by machines. Instead, it lies in leveraging human creativity to understand machine-generated results and discovering elements such as human emotions and artistic value within them. The distinctiveness of AI artworks, which is a non-human mode of expression, highlights the positive role of machines in artistic creation. Evaluating the creative value of AI artworks serves as both the driving force and source of inspiration for AI artists.^[3]

Second, the application of machine learning in art evaluation and restoration

As Marshall McLuhan, a Canadian scholar, pointed out in *Understanding Media*: “All media are extensions of man, the transformation of our partial functions into various material materials, so the study of any one medium is helpful to the study of all other media.”^[5] In the field of art evaluation and restoration, the application of machine learning has opened up new possibilities. Machine learning, as an extension of human beings, has played an important role in the evaluation, classification, and restoration of artworks by allowing computer systems to learn from data and make decisions.

Art evaluation is a complex process involving the authentication of artworks, assessment of their historical value, and determination of market value. Machine learning technology can help experts perform these tasks more quickly and accurately by analyzing images of artworks and related data. In the field of art appraisal and restoration, the application of machine learning (ML) technology is becoming a revolutionary force. By deeply analyzing microscopic images of artworks, ML algorithms can reveal unique brushstrokes and styles of artists, thus helping experts make more accurate judgments about authenticity. By comparing the style and brushstrokes of an artists past works, ML models can determine whether a piece was created by that artist. For example, the “Pigment Time Capsule” project at Oxford University trained random forest algorithms using mass spectrometry data to successfully identify the lead-white-antimony yellow mixed technique hidden in 17th-century Dutch still-life paintings, providing chemical evidence that Vermeer may have used camera obscura techniques. Additionally, the “Pattern Universe” database ResNet-152 algorithm from the Palace Museum identified a Rococo pattern on Qianlong famille rose porcelain with a morphological similarity of 68% to traditional Chinese cloud patterns, revealing the micro-pathways of Sino-European artistic exchanges in the 18th century and offering an algorithmic perspective for global art history research. Therefore, the application of this technology not only enhances the identification and evaluation of artworks Accuracy also provides new data support for the study of art history.

Art restoration; aimed at restoring the original appearance of an artwork. ML can be used for virtual restoration, which involves simulating the restoration process on a computer. This method helps restorers evaluate the effectiveness of different restoration options before making physical adjustments, thus avoiding unnecessary damage to the artwork. ML can analyze materials used in artworks, such as paint composition and paper texture, assisting restorers in selecting the most suitable restoration materials for the original materials of the artwork to ensure optimal restoration results.

A prominent example is Van Goghs “Two Wrestlers.” In the reconstruction of “Two Wrestlers,” the team used a U-Net architecture generative model to match X-ray data with a brushstroke database, specifically developing a “strokes disparity attention mechanism” to address the issue of paint interference in the overlay layer. The research was conducted by doctoral researchers Anthony Bourached (Queens Square Institute for Neuroscience, UCL) and George Cann (UCL Institute of Space and Climate Physics), in collaboration with the art

Van Goghs "Two Wrestlers" -X-ray of the underdrawing taken in 2012.

Home Jesper Eriksson used machine learning technology to reconstruct this painting. This work was originally created by Van Gogh in 1886 while he was studying at the Antwerp Academy of Fine Arts. It is likely a practice piece that Van Gogh made, and when he needed to create new works, he directly covered the original with paint. Bourached and Cann successfully used neural networks trained on other Van Goghs works to reconstruct this painting using X-ray images, providing a convincing approximation of the original. The application of this technique is not limited to Van Goghs works; other lost artworks, such as Leonardo da Vincis "Mona Lisa" and Amadeo Modiglianis "Beatrice Hastings," can also be recreated using this method.

It is evident that ML will not only help us better understand and appreciate artworks but also provide strong support for their long-term preservation. AI technology has gradually surpassed basic preservation and display functions in the digital transformation and protection of artworks, making the digitization of paintings, sculptures, and other art pieces a reality, even extending to more complex architectural and large outdoor sculpture fields. Comprehensive digital transformation will break through physical and geographical limitations, allowing cultural heritage to be fully preserved and displayed in virtual environments.^[1]

Third, the contribution of artificial intelligence to the development of new trends and models in art

Artificial intelligence has transcended traditional boundaries in the field of art; it not only transforms how art is created but also spurs the development of new artistic trends and paradigms. As AI continues to intervene, it enables artists to explore unprecedented realms of creativity while providing art critics and historians with new analytical tools.

New trends in artificial intelligence and artistic creation; generative art as one of the primary application areas of AI in artistic creation. The highly complex and diverse visual artworks generated by AI algorithms surpass the creative capabilities of human artists in certain aspects. Not only can deep learning models create new abstract paintings with entirely new visual effects in color, shape, and composition, but AI can also generate various sketches for artists by learning and simulating multiple classic art styles, significantly expanding the possibilities of artistic creation. AI not only supports the processing and generation of materials but also demonstrates strong capabilities in simulating art styles.

For example, AI can learn Monets Impressionist style through deep learning and then apply this style to new materials; or it can study Rembrandts painting techniques to make an artists sketch display a visual effect that combines Rembrandt-style lighting with chiaroscuro. This means that even art enthusiasts without professional training can create works with classic artistic styles with the help of AI.^[2] These works not only offer a fresh visual experience but also provide a new language for artistic expression. In a deep dive into the "Mosaic Virus" series by Anna Ridler, a pioneer in generative art: By training an LSTM network to simulate the relationship between tulip bulb price fluctuations and pattern variations, each pieces parameter changes are recorded using blockchain technology, achieving algorithmic metaphors of financial speculation and biological evolution. This technique is equally applicable to music, where its creative potential is equally impressive. By analyzing historical musical works and learning different styles and rhythms, it can create entirely new melodies and harmonies.

Artificial intelligence technology has also facilitated interaction between artists and audiences in artistic creation. Through AI, artists can create interactive artworks, making audience participation an integral part of the works completion. This

interaction not only enhances the appeal of the artwork but also makes artistic creation more personalized and diverse.

New Paradigms in AI and Art Analysis; The application of artificial intelligence in the field of art analysis has become a new driving force for understanding and critiquing art. The intervention of AI not only changes the way art is created but also provides a new paradigm for analyzing the style, theme, and technique of artworks. These analyses help reveal the artists creative intentions and aid in understanding the cultural background and era-specific characteristics of the works. By analyzing the works of Impressionist painters, it can identify their unique use of color and brushwork, helping artists better understand the creative features of Impressionist art. Similarly, AI can analyze modern artworks, revealing their abstract and expressionist stylistic traits, offering us a new perspective on appreciating and understanding the spiritual core behind these works. For example, the analysis of the collaboration experiment “AI Infinite Painting” between Chinese artist Qiu Zhijie and Microsoft Xiaoice: By setting up a “literati painting brushstroke loss function,” physical simulations of central tip brushstrokes are embedded in the generative adversarial network to create AI-generated works

It presents the layers of ink permeation of Xuan paper and breaks through the predicament of digital art plane.

*Why Performance by Qiu Zhijie, 240cm * 360cm ink on paper, 2016*



In terms of theme recognition, deep learning technology in artificial intelligence can analyze images and texts in artworks to identify the themes and symbolic meanings within them. It can process large amounts of data to uncover metaphors and symbolic elements in works, providing deeper interpretations. For example, AI can analyze paintings from the Renaissance period to determine religious and mythological themes, as well as how these themes are connected to the social and cultural contexts of their time.

New Paths in AI and Art Education; The application of artificial intelligence in art education has opened up new teaching pathways, providing students with a more intuitive and interactive learning experience. With the advancement of technology, virtual reality (VR) and augmented reality (AR) have become possible in art education. For example, AI can create virtual museums where students can tour art galleries and exhibitions from around the world. Students can move freely within these virtual environments, exploring artworks from different cultures and eras, thus gaining a comprehensive art education experience. AI can also facilitate interactive teaching through gamified learning platforms, stimulating students interest in learning. Students can learn about art by completing tasks and challenges, such as the “Meta Art Museum” project at the Central Academy of Fine Arts, where students use NVIDIA GauGAN tools to generate surreal landscapes and then map their α brain waves during creation into color vibration frequencies via a brain-computer interface, forming a “neuro-aesthetic” educational system. Course data shows that this approach will enhance students cross-media creative abilities by 55%.

Artificial intelligence technology also provides new tools and platforms for artistic creation, promoting students learning

and practice in various art styles and techniques. Through AI-assisted platforms, students can simulate the styles of different artists, experiment with combining multiple styles to create entirely new works, thereby enhancing their creative skills. This not only helps students understand various art styles but also encourages creativity and experimentation. AI can also offer personalized instruction based on students' interests and levels, analyze progress, and tailor teaching plans. As technology advances, AI will play a significant role in artistic creation, education, and the market, driving art research into new stages and bringing both challenges and opportunities.

IV. Conclusion

The development of artificial intelligence in art research has brought about significant progress, profoundly impacting the formation of art history, criticism, evaluation, restoration, and new artistic trends. AI's ability to analyze large datasets has helped art historians and critics uncover patterns and connections that are difficult for humans to discern, enhancing our understanding of artistic styles and movements. In the assessment and restoration of artworks, AI demonstrates its capability to evaluate the value of pieces and predict material degradation, and through reconstruction, it suggests ways to protect cultural heritage integrity. Moreover, AI-generated art challenges traditional creative concepts, prompting a reevaluation of the role of artists. AI not only enhances existing methods but also opens up new avenues for understanding, creating, and experiencing art, becoming an indispensable resource for both artists and scholars.

At the same time, artificial intelligence is creating a "double helix structure" in art history research: on one hand, it delves into the material origins of artworks through high-spectral imaging and material gene analysis; on the other hand, it expands the boundaries of creative possibilities with generative adversarial networks. This dialectical movement between "centripetal restoration" and "centrifugal creation" echoes Hegel's spiral ascent trajectory of art development from "symbolic to archetypal to romantic." For future prospects, quantum computing may enable the simulation of an "alternate universe" in art history, reconstructing all possible forms of masterpieces damaged by war. The ethical application of neural style transfer (Neural Style Transfer) technology requires establishing a "digital fingerprint" authentication system. Metaverse art galleries will give rise to "editable art history," allowing audiences to participate in real-time reconstruction of historical narratives through brain-computer interfaces.

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Exploring New Ways of Disseminating International Chinese Education Based on the Perspective of “Genshin Impact” Going to Sea

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Abstract: The game “Genshin Impact” has been widely praised by many players at home and abroad in recent years, and as a popular game with strong Chinese elements, it not only has great influence on the development of the game industry, but also has great significance for the dissemination of international Chinese education. As a Chinese cultural phenomenon, Genshin Impact revolutionizes the gaming industry while offering insights for international Chinese education. This paper aims to analyze the case of “Genshin Impact” and find the common points of cultural communication paths, with a view to promoting the dissemination and development of international Chinese education.

Keywords: International Chinese Language Education; Dissemination; New Ways to Explore; Cross-Media Narrative

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1.Introduction to “The Genshin Impact” and its Creator

1.1 Introduction to Genshin Impact

The game takes place in a fantasy world called “Teyvat”, where those who are chosen by the gods will be granted the “God’s Eye” to channel the power of the elements.^[1] Players will take on the role of a mysterious character called the “Traveler”, and in the course of their free travels, they will meet companions with different personalities and unique abilities, and together with them, they will defeat powerful enemies, recover lost relatives - at the same time, gradually discover the truth of Teyvat. In the main plot of the game, the Rock King Emperor and his acting rulers “Li Yue seven stars” for Li Yue for years and years of dedication to win the general trust and love of the people, the people and the gods and the rulers of the relationship is very harmonious, to achieve mutual understanding and support, with Confucianism, “Dwell in one’s place and be revered by all under heaven” ideal color. It has the Confucianism ideal of “living in one’s own place with all the stars in the sky”.

The plot of “Genshin Impact” is interspersed back and forth, repeatedly presenting the scene of foreign travelers and local residents living in harmony, friendly interoperability, including players in the game, “foreign stranger” settings and other details are intentionally downplaying the conflict brought about by cultural differences, creating a culturally diverse and tolerant, harmonious coexistence of the space for the player.

1.2 Introduction of the Creator of “Genshin Impact

1. The creators of “Genshin Impact” are three graduate students from Shanghai Jiaotong University’s School of Electrical

Engineering, who define themselves as “techno-geeks”.

2. The initial intention of the creators of “Genshin Impact” is to create a game that they like, and there was no game on the best-seller list that could make these techno-geeks move their hearts.

3. Mihayou Networks, adhering to the mission of “techno geeks save the world”, has always been committed to technology research and development, exploring cutting-edge technology, and has accumulated leading technical capabilities in the fields of cartoon rendering, artificial intelligence, and cloud gaming technology.

4. Miha Tour Networks corporate vision - 2030, to create a global billion people, willing to live in the virtual world.

2.Traditional Chinese cultural elements embodied in The Genshin Impacts

2.1 Value elements

2.1.1 Love and respect for work, people-oriented

In the fantasy world built by \Genshin Impact\, the land of Liyue was once shrouded in the haze of World of Warcraft, and the people suffered from hardship. The Rock God Zhong Li, a god with both dignity and benevolence, resolutely set off the tide of the Demon God War, vowing to clean up the dirty heaven and earth. He led Li Yue’s people on the road of resistance. After years of bloody battles, the magical beasts finally dispersed and the dawn reappeared. After the smoke of war cleared, people built a new city on the fertile soil of Guiliyuan, symbolizing nirvana and rebirth. The Kitchen God’s crispy rice is guided by the divine fire, and teaches the secrets of cooking to the people, so that warmth and delicacy can circulate in the world. Thanks to the joint efforts of all the Liyue people, this land that had been poisoned by war had now transformed into the richest pearl of the Tiwat Continent, engraved with their epic legends.

2.1.2 Collective ideology

Traditional festivals such as the Spring Festival and the Mid-Autumn Festival contain a profound collective consciousness of national unity and family reunion. In the background story of the Sea Lantern Festival, the villagers fly bright lights in the night, illuminating the way home for the warriors who defend their homes and country, and guiding the souls of the fallen heroes to return to their hometown. On the occasion of the festival, important game characters and NPCs from all regions will gather in Li Yue Port. In this festival full of traditional Chinese reunion atmosphere, they will spend the Sea Lantern Festival with players in Li Yue. These plots are closely linked with reality and full of profound meaning.

2.1.3 The people are the masters of the country

Zhong Li believed that the era of theocratic rule had ended, and Li Yue’s future should be in the hands of the people of Li Yue themselves. Therefore, he chose to retire after the war, fully stimulating the enthusiasm and creativity of the people, and attaching importance to and giving full play to their initiative. When the Demon God Osel wreaked havoc once again, Li Yue’s people’s army stepped forward and bravely stood the behemoth with their mortal bodies. They knew that the road ahead was difficult and dangerous, but none of them flinched. They used their lives to build a strong Great Wall to guard Li Yue, and finally won the victory.

To sum up, people-centered governance, that is, people-oriented, is the core of Confucian classical theory. Li Yue’s story is like the epitome of China, and the people-oriented thought has been fully displayed in many aspects such as game characters and storylines. This idea emphasizes that the government should put people’s happiness and rights and interests first, and strive to achieve harmonious coexistence between the government and the people. The plot of the game takes emotional resonance as a link, shows the tolerance and openness of Chinese culture, and takes the common value orientation as a bridge to convey the charm of China and Chinese culture to overseas audiences equally, friendly and sincerely.

2.2 Use of natural elements

Li Yue Port skillfully integrates mountains, stones, water, architecture and other element carriers, which embodies the concept of the harmony between humanity and nature in Chinese traditional philosophy. The scene design of Jueyun Jian incorporates fairyland elements in traditional landscape paintings, which highlights Chinese people’s appreciation and taste of mountains. The scene between the clouds includes not only the implicit expression of trees and landscapes by the ancients, but also their yearning for a free fairyland and their unremitting pursuit of a quiet life, expressing the distant artistic conception of \only being in this mountain.

2.3 The integration of Chinese traditional national musical instruments

Haragami's music composition skillfully blends Western orchestral music with Chinese elements, and the perfect combination of folk music and orchestral music brings players an immersive experience. The background music of the Liyue region, "The Traveler's String Song," is a subtle blend of traditional Chinese instruments such as the erhu, guzheng, guqin, flute, pipa, and so on, creating a rustic and remote atmosphere. The soundtrack "Mountain Breeze Brushes Luo Clothes (Lightly Steering the Day)", which is highly favored by players, adopts the traditional Chinese pentatonic tuning as the melodic basis, complementing the clarinet and strings in unison, while incorporating piano embellishments and echoing the melodious flute, which is evocative of the traditional Chinese culture.

2.4 Traditional Costume Cultural Elements

Zhong Li's jacket has dragon scale and phoenix feather patterns, traditional Chinese patterns such as the Fangsheng pattern and the Hui pattern all over the body, and the back decoration in the shape of a silver Chinese knot, all of these elements have a good meaning of honor and good luck in traditional Chinese culture, and at the same time, they are suitable for the character's identity, which not only reflects traditional Chinese culture, but also integrates with other cultures, and promotes the better rooting and sprouting of traditional Chinese culture on the soil of the world. It can promote Chinese traditional culture to take root and germinate better in the world.

To summarize, The Genshin Impact integrates a lot of Chinese cultural elements, and is a game with great Chinese characteristics.

3. User Feedback on Genshin Impact

Behind the explosion of a Chinese game lies the influence of Chinese culture on the world. This is even more important for the international Chinese education business. After the author's survey on the users of the game around the "Genshin Impact" and the current academic user survey on the "Genshin Impact", the following emotional and rational feedback.

3.1 Emotional feedback

1. Small Li thinks: "What impresses me most is a passage in the plot of Gongzi D'Artagnan: 'Childhood dreams are the most fragile things, and even if you leave them unattended, they will someday break on their own. So, someone must protect it, right?'" I believe that many boys have a dream of being a hero since they were children, and as time passes, they have a deeper understanding of the real world, and the game world just happens to be on the fringe of ideals and reality.
2. Xiao Shen thinks that the picture quality of "Genshin Impact" is very well done in a bunch of games, in addition to the fact that each character has a separate plot of their own, and even in each area there are a lot of separate plots for the game NPCs.

3.2 Rational Feedback

Through the survey feedback, we can understand that the players' satisfaction with the game and their understanding of the game's derivatives both show a high percentage. Players have shown a certain dependence on the IP of "Genshin Impact". The secondary conversion rate of the game output content of The Genshin Impacts has a high coverage effect on players, and a considerable portion of players have a certain degree of knowledge and self-understanding of the stories of the characters in the game and the main plot.

Among them, players have the highest satisfaction with the details of Genshin Impact's games and the highest satisfaction with music; Secondly, gamers' understanding of Genshin Impact's related derivative works is investigated, and gamers know the most about Genshin Impact's comic works; Secondly, I know more about the second creation works such as calligraphy and role songs.

4. A New Way of International Chinese Education Communication from the Perspective of Genshin Impact

4.1 Looking back on self with the other

From the perspective of communication, we can observe Genshin Impact's new way, and Genshin Impact's creators and players are the relationship between the sender and the receiver. Genshin Impact's biography reflects on self by the other, which is always accompanied by the choice of the receiver. In this process, pay attention to the feedback from players and

constantly improve the program.

Looking at the spread of Genshin Impact from the perspective of international Chinese education, we can find that Genshin Impact has done a good job of going out to sea with culture. This concept means that the products, contents and values of a country or region in the fields of culture, media, art, entertainment and education go to the international market and enter other countries and regions to meet the needs of people with different cultural backgrounds around the world. This concept emphasizes cross-cultural communication, cultural export and globalization.^[2] While promoting Chinese, international Chinese education should pay more attention to the international attitude towards Chinese and the motivation of foreigners to learn Chinese. For example, many students think that online buzzwords such as \single-born dog\ and \blind date angle are very interesting. Then teachers should pay attention to the places where foreigners are interested in Chinese when teaching. Keep pace with the times in teaching and insert these buzzwords appropriately. Make the classroom lively, interesting and practical, and make teachers and students feel more involved!

4.2 Pay attention to cross-media narration

International Chinese education should pay attention to cross-media narration, just like Genshin Impact. There are three indispensable elements: cross-platform, participation in the expansion of creators and the extension of stories. Cross-media narration integrates multi-platform, multi-subject and multi-content creation, fully embodies the development trend of media integration in the digital age, and extends the creative subject and content, which is in line with the current situation of cultural communication.

4.3 Creating Metacosmic Narration

The metaverse will continue to evolve and iterate with technological advancements, societal development, and changing social structures.^[3] The metaverse constructs a richer, more comprehensive, and lifelike new dimensional world. On this unprecedented communication stage, traditional strategies and methods for enhancing national soft power have undergone subversive transformations, profound restructuring, and innovative reinvention. The rise of “meta-soft power” has opened up a new path for building a digital cultural powerhouse, offering unprecedented opportunities for development.

Leveraging precise “user profiling” technology, international communication can delicately insight into the diverse needs and personalized preferences of overseas audiences, enabling targeted content creation and point-to-point precision information delivery. Through innovative techniques that blend virtual and physical elements, we achieve differentiated synergistic communication across multiple platforms, levels, and dimensions. This integration generates a multiplicative effect that transcends the simple “1+1” synergy, achieving an exceptional outcome of “1+1>2”.

Meanwhile, we closely monitor user feedback and continuously adjust optimize communication strategies content based on effectiveness evaluations to satisfy audiences’ ever-changing curiosity and thirst for knowledge. This shift from one-way indoctrination to active audience acceptance not only enhances the reach and coverage of international communication but also strengthens its appeal and influence, making China’s voice resound louder and more vibrantly on the global stage.

5. Genshin Impact’s Insights for International Chinese Education

5.1 Strengthening digital infrastructure is imperative to leverage technology for global communication challenges

Genshin Impact’s global success reveals the pivotal role of digital infrastructure in cultural dissemination, offering an innovative technology-enabled paradigm for international Chinese education. Through Unity engine-built immersive virtual environments—such as Liyue Harbor’s overhanging eaves and bracket sets, and Inazuma’s mortise and tenon joints—the game transforms cultural symbols into interactive 3D spaces. With an average daily user engagement of 1.8 hours, low-latency virtual environments have proven to significantly deepen cultural understanding. Multilingual NPC dialogues powered by NLP technology allow learners to naturally acquire language skills while completing quests like the “Liyue Merchant War,” validated by players’ 32 weekly interactions and 83% accuracy rate in gamified learning.

The operational model of its global digital community—2000+ server nodes ensuring cross-region synchronization and 3 million+ UGC contents driving secondary dissemination—suggests that Chinese education should build a “technology-mediated + user-driven” ecosystem. Examples include a “Chinese Cultural Metaverse” platform using VR devices to recreate

Beijing hutong dialogues or blockchain technology to generate personalized learning trajectory badges. At its core, this technological empowerment converts digital infrastructure into a “cultural translator,” enabling global learners to transition from language proficiency to cultural identity through participatory experiences. This paves a new path of “technology-as-cultural-container” for international Chinese education.

5.2 Actively use innovative tools and approaches to promote the transformation and upgrading of international communication, and protect the practice of shipbuilding and going to sea of its own digital media platform and the exploration of metaverse technology.

5.2.1 Deepen the digital development of international Chinese education

More than 34,000 courses have been launched on the Chinese Alliance platform. For Chinese learners in Arab countries, the Zhiyuan Chinese Learning Network is launched, covering more than 30 courses such as language learning, Chinese examination, and Chinese + vocational skills. 13 new online Chinese classrooms and 5 Chinese smart classrooms will be built around the world to create a new format of Chinese learning.^[4]

5.2.2 Actively expand new partnerships

More than 30 new cooperation agreements have been signed with the education authorities of Saudi Arabia, Greece, Uzbekistan and other countries, Chinese and foreign universities, etc., and six new Chinese majors in foreign universities have been supported. Support the United States, Australia, South Korea and other countries to form 33 pairs of Chinese and foreign primary and secondary language partner schools. Signed \Chinese +\ project agreements with Harbin, Lanzhou and Lianyungang.

5.3 On the basis of safeguarding national security and national interests, we should mobilize all resources to form a chorus, let China’s volume match China’s volume, and build an international communication environment in a three-dimensional way.

5.3.1 Promoting Chinese into the national education system

In 2023, our country will actively promote the entry of Chinese into the national education system. It has successively signed memorandums of understanding with the ministries of education of Georgia, Nicaragua and other countries to cooperate in Chinese education. Up to now, it has cooperated and supported 85 countries to incorporate Chinese into the national education system, and continued to provide quality services for people of all countries to learn Chinese. At the same time, the World Chinese Conference was held innovatively. Ding Xuexiang, member of the Standing Committee of the Political Bureau of the CPC Central Committee and Vice Premier of the State Council, attended the 2023 World Chinese Conference in Beijing and delivered a keynote speech. The conference held more than 10 international forums and exhibitions, attended by about 2,000 representatives from more than 160 countries at home and abroad, including heads of relevant education authorities and institutions, heads of international language and culture promotion agencies and international organizations, experts and scholars.

5.3.2 Promoting the construction of international Chinese education standards

Continue to strengthen the global promotion and application of the International Chinese Proficiency Standard for Chinese Education, and complete the translation and publication of 16 languages. The International Chinese Textbook Evaluation Standard, Vocational Chinese Proficiency Level Standard and General Curriculum Outline for International Chinese Teaching were developed and published to help build a diversified school-running, standards and curriculum resource system for international Chinese education. Completed the translation and publication of \International Standards for Professional Competence of Chinese Teachers\ in 11 languages, providing strong support for local Chinese teachers around the world to carry out teaching.

5.3.3 Strengthen the supporting ability of international Chinese education

Nearly 5,000 international Chinese teachers and volunteers were sent to various countries to carry out Chinese teaching, and nearly 10,000 Chinese and foreign teachers were trained. The International Chinese Teacher Scholarship admitted more than 5,000 students from more than 110 countries, and signed agreements with 20 colleges and universities in 9 countries to jointly train local teachers. Vigorously promote the construction of international Chinese education professional degrees, and

promote the cultivation of undergraduate, master's and doctoral degrees.

5.3.4 Create a development model with Chinese+ characteristics

Cooperate with Morocco, Russia, Indonesia and other countries to set up seven new \Chinese workshops.^[5]Established the world's first language and vocational education college in Thailand, launched the world's first Chinese+Agricultural Science and Education Development Center in Brazil, and opened special projects such as Chinese+Business and Chinese+Medical Care in Kiribati, Russia and other countries.

6.Conclusion

Deepen international cooperation. Deepen cooperation and exchanges with governments, education and relevant authorities in various countries, and jointly build a global education partnership in chinese numerals.

Increase investment. According to the needs of digital and intelligent development of Chinese education, we will support online Chinese teaching with governments and various educational institutions through flexible ways such as co-organizing online Chinese classrooms, Chinese smart classrooms and Chinese learning test centers.

Strengthen research and development. Establish a high-level scientific research team to promote the deep integration of new information technologies such as big data analysis, artificial intelligence and virtual reality with Chinese education.

Strengthen the support ability. Refine all kinds of online teaching standards and improve their global adaptability and practicability; Establish an excellent typical case promotion and sharing mechanism to help the reform and innovation of teaching mode; Improve the resource supply system, expand the contents of graded reading materials, teaching tools and teaching auxiliary resources, and speed up the iteration of digital resource updating; Increase the scale and frequency of training such as online teaching and digital ability expansion, and promote the optimization and improvement of teachers' literacy.

Strengthen multi-party coordination. Here, we welcome and invite Chinese and foreign educational institutions, colleges and enterprises to participate, gather high-quality resources, expand joint construction and sharing, and jointly contribute our wisdom and strength to promoting the digital and intelligent development of international Chinese education.

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