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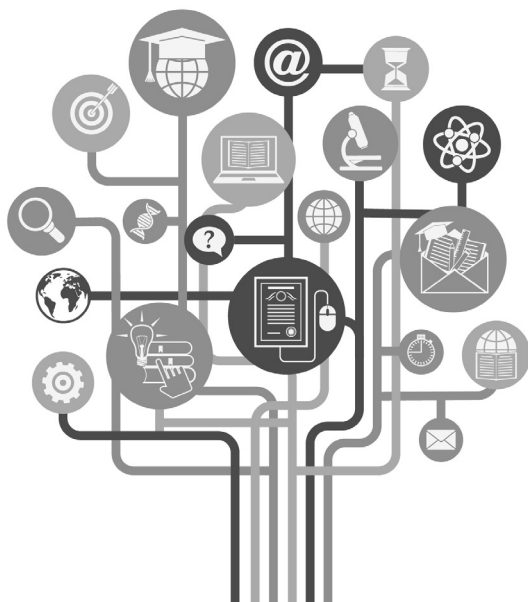
基于主成分分析的非物质文化遗产传承影响因素的实证分析

Jiabei Li and Xin Yu

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Abstract

Small opera is an important manifestation of the cultural diversity of the Chinese nation, and also very essential for its development and legacy. Jiangsu Dan- Opera（丹剧）is currently in good condition, but there are still many bottlenecks in the process of inheritance. Therefore, based on the principal component analysis, this paper discussed the influencing factors of intangible cultural heritage inheritance, and proposed innovation measures through a number of paths, so as to provide certain reference for the inheritance and development of Jiangsu Dan- Opera.

Keywords: Jiangsu Dan- opera; principal component analysis; intangible cultural heritage

Introduction

Dan- opera is a popular opera genre in Danyang area of Jiangsu Province, absorbing the local "Niulang tune（牛郎调）(Qian Xie et al., 2024)". The singing style of Dan- Opera with rich and varied rhythms in the first and last lines. Its performance program mainly relies on the absorption of Beijing Opera's performance program to enrich, because often choose a small girl so in the performance style and more close to

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the Yueju Opera（越剧）. The second source of Dan- Opera music is the folk songs, yangko, stirrups, Buddhist songs, work song, etc. Between 1958 and 1959, under the influence of the "Opera Reform" and the Great Leap Forward, the "langdang Tune（啷当调）" was taken as the basis, with accompanying instruments, absorbing local horns, minor folk songs and other music, synthesizing the music and singing, the performance line, the storyline and the wide audience. The music of the Dan- Opera is based on "langdang tune", accompanied by musical instruments, absorbing local bugles, ditties, folk songs and other music, and synthesizing the music and singing, acting, storyline and wide audience, etc., which has laid the foundation for the basic prototype of the Dan- Opera. Since 2009, the art of "langdang rap（啷当说唱）" was included in the second batch of Jiangsu provincial intangible cultural heritage project list, Dan- Opera has received more attention from the local government departments, and the repertoire production is more abundant. Into the 21st century, Dan- Opera Troupe and Danyang City government departments have cooperated with Jiangsu Provincial Theatre School, Yangzhou City Opera School, directed to commission a small number of Dan-Opera class students, for the revitalization of the Dan-Opera has brought new vitality. In the research, the article adopts the method of principal component analysis. After the analysis, it is found that many factors of Jiangsu opera itself and government factors have a significant impact on the inheritance status of Jiangsu opera. It is also pointed out that the establishment of Jiangsu Opera House should conform to the basic conditions and have the characteristics of intangible cultural heritage protection system to protect the good development of intangible cultural heritage.

Literature review

With the long development of human society, intangible cultural heritage, as a continuation of the diversity of human civilization, carries

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heavy historical genes. Nowadays, with the development of scientific and technological civilization, the cultural value, protection value and regeneration value of the popular Dan drama in Dan yang, Jiangsu Province are worth studying and thinking about (Lanxin Li & Yue Tang, 2024). Since UNESCO put forward the" masterpiece of heritage" in 1997, academic circles have begun to pay attention to Dan drama. At present, the study of Dan drama is mainly based on qualitative research, and there are relatively few research documents related to the activation and communication strategies of intangible cultural heritage, lacking comprehensive mechanism research and practical strategies with strong opera ability. Therefore, starting from the reality of the protection, inheritance, activation and dissemination of the intangible cultural heritage of Dan-Opera, this paper analyzes its present situation, characteristics and bottlenecks, and puts forward the optimization strategies for the activation and dissemination of intangible cultural heritage in terms of communication efficiency, communication means, personnel training and integrated development under the existing conditions. For example, Diamonds Panagiotopoulos (Diamantis Panagiotopoulos et al., 2023) applied the "5W"theory of lasswell's communication to make an exploratory analysis on the subject, content, ways, objects and feedback of intangible cultural heritage; (Cristina Coscia and Francesca Pasquino, 2023) Combining intangible cultural heritage with new media technologies and industries, exploring innovative ways of intangible cultural heritage communication; Bakhtiar (Bakhtiar Feizizadeh et al., 2023) studied how the way of thinking, national character and artistic form contained in intangible cultural heritage spread abroad from the perspective of cross-cultural communication, and put forward communication strategies to reduce the understanding, adaptation, identity and integration between different cultures.

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Empirical analysis of factors influencing the inheritance of intangible cultural heritage Dan-Opera

Selection of methods

Principal Component Analysis

Principal Component Analysis, or PCA for short, is a kind of multivariate statistical factor analysis. (Lanxin Li & Yue Tang, 2024) It applies the idea of dimensionality reduction to linearly transform multiple variables to select fewer composite factors to represent most of the original variables, so that these composite factors not only do not correlate with each other but also try to reflect the information of the original variables, thus simplifying the process of data analysis. As a special case of factor analysis, principal component analysis also meets the prerequisites of factor analysis, i.e., to calculate the correlation coefficient matrix, KMO test and Bartlett's test, which are more commonly used in practice.By adopting the method of principal component analysis, complex factors can be reduced to several principal components while introducing various variables, which simplifies the problem and obtains more scientific and effective data information.

Stepwise regression method

Stepwise regression is one of the more commonly used linear regression analysis methods for multivariate statistics. (Tianxin Zhang et al., 2023)It introduces the independent variables into the regression equation one by one by considering the role of the independent variables on the dependent variable, the degree of significance and the size of the contribution rate and other factors, by eliminating one variable from the regression equation each time, and by testing the chi-square test each time, so that the regression equation before the introduction of the new variables contains only the variables that have a significant effect on the dependent variable, and the non-significant variables have been excluded,

in order to achieve the purpose of improving the fitting effect of the regression model. The optimal linear regression equation is not established until there are no new variables to be introduced and no old variables to be excluded.

Principal Component Analysis Score

Comprehensive score of inheritance status

In this study, 58 respondents, all related to the inheritance and development of drama in Jiangsu Danyuan, were selected to conduct a questionnaire survey. A total of 58 questionnaires were distributed, and 58 questionnaires were recovered. The effective rate of questionnaires was 100% and the recovery rate was 100%. Based on the results of the questionnaire survey, this paper selects the indicators of crisis cognitive situation, preference degree, cultural significance attitude, influence degree, artistic taste, viewing willingness, etc. in the questionnaire, and applies the idea of dimensionality reduction to derive the coefficient matrix of the inheritance status quo score through the principal component analysis method. The relevant operation steps are as follows:

Table 1 : Correlation coefficient matrix of inheritance status score

	Crisis awareness situation	Preferences	Attitude towards cultural significance	Degree of influence	Artistic taste	Willingness to watch
Crisis awareness situation	1.00	0.382	0.541	0.534	0.007	0.349
Preferences	0.382	1.000	0.369	0.582	0.435	0.392
Attitude towards cultural significance	0.541	0.369	1.000	0.522	0.678	0.653

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Table 1 : Correlation coefficient matrix of inheritance status score (Cont.)

	Crisis awareness situation	Preferences	Attitude towards cultural significance	Degree of influence	Artistic taste	Willingness to watch
Degree of influence	0.534	0.582	0.522	1.000	0.582	0.657
Artistic taste	0.007	0.435	0.678	0.582	1.000	0.387
Willingness to watch	0.349	0.392	0.653	0.657	0.387	1.000

Table 2 : KMO and Bartlett's test

KMO Sample Suitability Quantity		0.720
Bartlett's test of sphericity	Cardinality of last reading	284.596
	Degrees of Freedom	15
	Significance	0.000

From the above Table 1 and Table 2, it can be seen that most of the correlation coefficients of the matrix of correlation coefficients of the current state of inheritance are greater than 0.3, and the KMO value is 0.720, which is in line with the requirements and is suitable for principal component analysis. (Lan Yu, 2023)

It can be seen that the maximum common factor variance is 0.980, and the minimum is 0.616, indicating that the vast majority of information in the variables can be extracted by the factor, which shows the effectiveness of the results of factor analysis.

The cumulative contribution rate of variance reaches 70.77%, which can explain the vast majority of the original variables, so the first three principal components can be extracted to replace the original six variables.

Table 3 : Matrix of coefficients of scores of components of inherited status quo

	Subassemblies		
	1	2	3
Crisis awareness situation	0.046	0.977	0.094
Preferences	0.353	0.045	-0.337
Attitude towards cultural significance	0.256	-0.023	0.608
Degree of influence	0.306	-0.013	-0.703
Artistic taste	0.265	-0.197	0.373
Willingness to watch	0.270	0.005	0.278

From the above table 3, we can get the score expression of the three principal components, we make the first principal component selected as F_1, the second principal component as F_2, and the third principal component as F_3.

F_1 = 0.046* Crisis awareness situation^+0.353*Preferences^+0.256 *Attitude towards cultural significance^+0.360*Degree of influence^+0.265*Degree of influence^+0.270*Willingness to watch^

F_2 = 0.977* Crisis awareness situation^+0.045*Preferences^-0.023*Attitude towards cultural significance^-0.013*Degree of influence^-0.197*Degree of influence^+0.005*Willingness to watch^

F_3 = 0.094* Crisis awareness situation^-0.337*Preferences^+0.608* Attitude towards cultural significance^-0.703*Degree of influence^+0.373*Degree of influence^+0.278*Willingness to watch^

Where the variable name plus "^" indicates the standardized data. As can be seen from the above equation, F_1 is mainly determined by the degree of preference, the degree of influence and the willingness to

watch, so it can be interpreted as an indicator of the audience effect; F_2 can be interpreted as an indicator reflecting the crisis cognition; F_3 can be interpreted as an indicator reflecting the treatment attitude.(Bakhtiar Feizizadeh et al., 2023)

Since the comprehensive score = $\sum$ (each principal component score × the variance contribution rate corresponding to each principal component), so that the comprehensive score of the current state of inheritance is Y, you can get the comprehensive score model of the current state of inheritance:

$$Y = 0.35456 * F_1 + 0.15626 * F_2 + 0.13846 * F_3$$

status comprehensive score Y can be used as a new variable for subsequent regression analysis of inheritance status and influencing factors. Comprehensive score of influencing factors

Using SPSS22.0 statistical software operation to obtain the results of the inheritance status quo influence factor score is as follows, from the following table 4 can be seen that the KMO value of each factor meets the standard, and the cumulative contribution rate of variance also meets the requirements. (Jianfeng Zhang et al., 2023)

Table 4: KMO value and variance cumulative contribution rate of each factor

	KMO	master fraction	Cumulative contribution to variance
one's own factors	0.804	1	67.34%
Market factors	0.710	1	76.85%
Government Factors	0.693	1	89.43%
Social factors	0.887	1	75.17%

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Then the matrix of factor component score coefficients for each factor is derived. From the above matrix of component scoring coefficients, the main component scores of each influencing factor can be obtained. Referring to the comprehensive scoring method of the inherited status quo, the comprehensive scores of own factors, market factors, government factors and social factors can be obtained as follows:

X_1 = 0.6734*Principal Component Score of Own Factors

X_2 = 0.7685*market factor principal component score

X_3 = 0.8943* government factor principal component score

X_4 = 0.7517*Social factor principal component score

Stepwise regression analysis

The inheritance status quo and the various influencing factors to do principal component analysis, the comprehensive score of each variable, the comprehensive score of each variable as quantitative data for subsequent regression analysis. This paper adopts the linear regression method, and establishes the regression equation model of the influencing factors of the inheritance of Jiangsu Dan-Opera through step-by-step regression method, and further analyzes the influence of each factor on the current situation of inheritance. (Caicai Liu & Lei Kang, 2023) The processing flow of regression analysis between the inheritance status (Y) and its own factors (X_1), market factors (X_2), government factors (X_3) and social factors (X_4) is shown in the following:

The results of Pearson correlation coefficient as well as correlation coefficient significance test show that the correlation coefficient test passes, indicating that the sample correlation coefficient can represent the overall degree of correlation, and that there exists a linear correlation between the dependent variable and the independent variable, which meets the prerequisites for linear regression analysis.

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The results of the model ANOVA are shown in the following table, and from the data 5 in the table below, it can be learned that both Model I and Model II passed the significance test. According to the model summary, it can be seen that at this time the adjusted R-square is 0.463, the model fit goodness of general, to be improved.

Table 5 : Simulated Analysis of Variance ANOVA

		square sum	df	mean square	F	$Sig.$
1	regression	37.744	1	37.744	42.934	0.000[b]
	residual	267.256	304	0.879		
	Total	305.000	305			
2	regression	43.737	2	21.869	25.362	0.000[c]
	residual	261.263	303	0.862		
	Total	305.000	305			

The coefficient test of model I and model II is good, and model II established by stepwise method indicates that the current status of inheritance is significantly influenced by own factors and government factors. The independent variables X_2 and X_4 were discarded when modeling the regression equation because they did not pass the significance test. (Wai-Kit Ng et al., 2023)

Combined with the above and Covariance Diagnostic Diagnostic results, it can be seen that there is no multicollinearity between the respective variables.

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Table 6 : Residual Statisticsa

	minimum value	maximum value	average value	Standard Deviation	N
projected value	-1.205	0.706	0.000	0.379	306
residual	-2.308	3.184	0.000	0.926	306
Standardized prediction value	-3.182	1.864	0.000	1.000	306
Standard Residual	-2.486	3.429	0.000	0.997	306

Table 6 above shows that the residuals and the mean value of the predicted value is 0. Combined with the P-P plot and scatter plot observation, it can be seen that the data points are around the baseline, and the residuals are randomly distributed around 0 with the change of the standardized predicted value, which excludes the possibility of large heteroskedasticity, and comprehensively viewed, the residuals satisfy the requirements of linear regression model.

Summary analysis

Through the aforementioned linear regression analysis process, it can be concluded that the linear regression model equation of the inheritance status of the tea-picking opera is $Y = 0.164X_1 + 0.267X_3$, Y represents the inheritance status, X_1 represents its own factors, and X_3 represents the governmental factors, and the model's goodness of fit is 0.472, which is generally effective. It can be seen that the many factors of Jiangsu Dan-Opera itself and the government factors have a significant effect on the inheritance status of Jiangsu Dan-Opera. In addition, by the limitations of the ability level of the members of the investigation team, the regression equation model may have deficiencies, therefore, in the investigation of the analysis of the factors should not be ignored market

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factors and social factors for the inheritance of the current situation of Jiangsu Dan-Opera.

Strategies for the inheritance and development of intangible cultural heritage Jiangsu Dan-Opera

mprove the government support strategy

Formulate policies and improve measures

In order to protect and support the development of intangible cultural heritage, the government can introduce relevant policies and measures to strengthen the protection of intangible cultural heritage, provide support and guarantee for its development, and escort the inheritance of Jiangsu Dan-Opera and product innovation and development. (Jiacan Wang et al., 2023)On the one hand, the government-led and social participation in the principle of accelerating the development of Jiangsu Dan-Opera intangible cultural heritage projects related to the inheritance and protection of policy documents, such as the introduction of tax incentives to encourage enterprises or individuals to increase investment in Jiangsu Dan-Opera and the establishment of relevant laws and regulations on the implementation of Jiangsu Dan-Opera program for real-time supervision, and regularly carry out the work of the assessment of the excellent contribution of the unit to give awards! Recognition, the negative slack individuals and their units to be punished. On the other hand, the local cultural sector is responsible for taking the lead in the establishment of synergistic departments and organizational structure, a clear division of labor, to ensure the positive and smooth implementation of each task, but also the establishment of Jiangsu Dan-Opera Support Fund, used to support the development of related work and make a good budget for expenditure, so that the construction of the later more work. In short, the establishment of Jiangsu Dan-Opera in line with the basic situation, with the characteristics of the intangible cultural heritage

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protection system, to protect the good development of intangible cultural heritage.

Protection-oriented, revitalization first

First of all, it is necessary to strengthen the protection of Jiangsu Dan-Opera, including the protection of non-heritage bearers and the protection of non-heritage culture.(Der-Lor Way & Yu-Hsien Wei, 2023) Emphasis on protection is the foundation, revitalization is the key; at the same time, it is also necessary to focus on the revitalization of non-heritage culture in the process of modernization, so that it can be renewed in the modern society with new vitality and brilliance, can be carried out through the implementation of the Jiangsu Dan-Opera Non-heritage Cultural Festival and other activities, through a variety of ways to attract more and more people to understand and participate in the protection of non-heritage culture.

Cross-cultural exchange and dissemination

In order to expand the influence of Jiangsu Dan-Opera in the world, cross-cultural exchange and dissemination activities can be carried out. Through mutual exchanges and cooperation using common human and material resources, the innovative creation and development plan aiming at realizing revitalized creation can be used to strengthen exchanges and cooperation with the international community. To make foreigners understand the charm of Jiangsu Dan-Opera by participating in international exhibitions, international conferences and seminars on the development of intangible cultural heritage, and by organizing the China International Intangible Cultural Heritage Festival. Through the exchange and dissemination with other cultures, it can enrich the connotation of Jiangsu Dan-Opera culture, and at the same time, it can draw on the advantages of other cultures to inject new inspiration into the innovative development of Jiangsu Dan-Opera.

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Jiangsu Dan-Opera's own development path
Innovation and integration, heritage development

As a traditional intangible cultural heritage, Jiangsu Dan-Opera needs to be combined with modern aesthetic concepts and market demand in order to better adapt to the needs and development of modern society. Therefore, we need to promote the innovation and integration of Jiangsu Dan-Opera and apply it in the field of modern theater in order to realize its innovation and modernity. On the basis of the protection and revitalization of Jiangsu Dan-Opera, the elements of Jiangsu Dan-Opera are combined with the local economy through the way of innovation and integration, and the non-legacy resources are reasonably utilized to realize the economic value of "interaction" of the cultural industry in the fields of cultural and creative industry, tourism development and etc. (Li S N et al., 2024) For example, by integrating the elements of Jiangsu Dan-Opera into the local economy, we can better adapt to the needs and development of the modern society. For example, the Jiangsu Dan-Opera elements into modern clothing design, cultural and creative products design, home decoration and other fields, to create a fashionable product that meets the current aesthetics, so that more people understand and contact with the Jiangsu Dan-Opera, feel its unique charm and value. At the same time, it can also be combined with the Jiangsu Dan-Opera culture and local tourism to create a unique brand image of cultural and tourism products, in order to introduce more people to this tourism and consumption, and drive the development of local economic diversity.

Cultivate Jiangsu Dan-Opera inheritors of heredity

Intangible cultural heritage bearers are the guardians of China's intangible cultural heritage. Inheritors are both bearers and transmitters of intangible cultural heritage. On the one hand, they have exquisite handcraft skills, not only is the living cultural treasury, but also China's

intangible cultural heritage from generation to generation in the "relay race" in the important "baton bearer" and representative figures; on the other hand, the outstanding inheritors should be in the inheritance of traditions have the ability to make fine cultural choices and the courage to On the other hand, the excellent inheritors should have the ability and obligation to inherit the tradition, and should be able to make excellent cultural choices and be brave to make cultural innovations, which are of great significance in the process of inheritance, protection, continuation and development of intangible cultural heritage, and should be respected and promoted by the public.(Yang J & Xu C, 2024) Therefore, the relevant departments should do a good job in the cultural heritage of traditional skills, focusing on the passing on of the flame, the recognition of the outstanding inheritors and honor recognition, as well as the development of the rights and interests that the inheritors should enjoy, as well as the management of the work. In addition, the government departments or Jiangsu Dan Drama Troupe regularly open non-genetic inheritance classes and skills training to train more inheritors, to provide more people with opportunities and conditions to learn and master batik skills.

Conclusion

Intangible cultural heritage as an important carrier of economic and cultural development in today's world, its inheritance and development have received widespread attention. Jiangsu Dan-Opera is currently facing the impact of global economic and cultural integration. This paper discusses the influence of intangible cultural heritage inheritance factors, the conclusion confirms that Jiangsu Dan-Opera's own many factors and government factors have a significant impact on the inheritance. Therefore, this paper puts forward corresponding optimization suggestions, so as to provide certain reference for the inheritance and development of Jiangsu Dan-Opera and other intangible cultural heritage.

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