# Analysis of Song Yun Culture Support Based on Binary Logistic Model

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*Abstract:* As an ancient capital of the Southern Song Dynasty, Hangzhou has a responsibility to further inherit the Song culture and promote China's excellent traditional culture. Through a binary logistic model, we found that age, cultural level, region, and occupation all affect the support of Hangzhou citizens for Song rhyme culture. At the same time, we found that the more Hangzhou citizens participated in cultural activities related to the Southern Song Dynasty, the lower their support for the culture of the Southern Song Dynasty.

*Keywords:* Binary Logistic Model; Song Rhyme Culture; Support Analysis; Hangzhou Citizens

## Introduction

As an ancient capital of the Southern Song Dynasty, Hangzhou has the heavy responsibility of inheriting and promoting the Song culture. At present, the Hangzhou Municipal Government is continuously promoting the transmission project of Song Yun culture, hoping to use Song Yun culture to support the Asian Games. By investigating the support of Hangzhou citizens for Song rhyme culture, it can help relevant departments understand the current development status of Song rhyme culture in Hangzhou, help Hangzhou citizens understand Song rhyme culture, expand its audience and influence, and enhance Hangzhou's cultural soft power.

Due to the diverse views of Hangzhou citizens on the support for Song rhyme culture and the influence of various subjective and objective factors, in order to conduct a more accurate and objective quantitative analysis, a logistic regression model will be established below.

## 1. Model building

## 1.1 Selection of variables

We found that there are significant differences in individual support for the development of Hangzhou Song rhyme culture. Based on the survey questionnaire, we selected age, cultural level, region, occupation, economic level, participation frequency, understanding level, and publicity effectiveness as independent variables, and Hangzhou citizens' support for the development of Song rhyme culture as dependent variables. We established a binary logistic regression model to predict different individuals' views on the effectiveness of the red education base.

## 1.2 Assignment of variables

We define whether we support the development of Song rhyme culture as the dependent variable, where Y=1 represents support for the development of Song rhyme culture; Y=0 indicates that it does not support the development of Song rhyme culture.

To avoid collinearity, we define a dummy variable for each independent variable. The independent variables we set are as follows:

**Table1 Variable Assignment Table**

| variable | | assignment |
|---|---|---|
| **area $X_1$** | $X_{11}$ | Living area in Yuhang District=1, not belonging to living area in Yuhang District=0 |
| | $X_{12}$ | Living area in Xiaoshan District=1, not belonging to living area in Xiaoshan District=0 |
| | $X_{13}$ | Living area in West Lake area=1, not belonging to living area in West Lake area=0 |

| | | |
|---|---|---|
| | $X_{14}$ | Living area in Gongshu area=1, not belonging to living area in Gongshu area=0 |
| | $X_{15}$ | Living area in the Shangcheng area=1, not belonging to living area in the Shangcheng area=0 |
| | $X_{16}$ | Living area in Binjiang District=1, not belonging to living area in Binjiang District=0 |
| | $X_{17}$ | Living area in Lin'an District=1, not belonging to living area in Lin'an District=0 |
| | $X_{18}$ | Living area in Linping District=1, not belonging to living area in Linping District=0 |
| | $X_{19}$ | Living area in Fuyang District=1, not belonging to living area in Fuyang District=0 |
| | $X_{110}$ | Living area in Qiantang District=1, not belonging to living area in Qiantang District=0 |
| career$X_2$ | $X_{21}$ | Public institution or government staff=1, not belonging to public institution or government staff=0 |
| | $X_{22}$ | Enterprise staff=1, not belonging to enterprise staff=0 |
| | $X_{23}$ | Self employed=1, not belonging to self employed=0 |
| | $X_{24}$ | Freelancers=1, non freelancers=0 |
| | $X_{25}$ | Workers engaged in agriculture, forestry, animal husbandry and fishery=1, workers not engaged in agriculture, forestry, animal husbandry and fishery=0 |
| | $X_{26}$ | On campus student=1, not belonging to on campus student=0 |
| | $X_{27}$ | Retirees=1, non retirees=0 |
| | $X_{28}$ | Service industry personnel=1, non service industry personnel=0 |
| cultural level$X_3$ | $X_{31}$ | Junior high school and below=1, not belonging to junior high school and below=0 |
| | $X_{32}$ | High school and technical secondary school=1, not belonging to high school and technical secondary school=0 |
| | $X_{33}$ | College=1, not part of college=0 |
| | $X_{34}$ | Undergraduate=1, not part of undergraduate=0 |
| economic level$X_4$ | $X_{41}$ | 0-2000 yuan=1, not belonging to 0-2000 yuan=0 |
| | $X_{42}$ | 2000-5000 yuan=1, not part of 2000-5000 yuan=0 |
| | $X_{43}$ | 5000 to 10000 yuan=1, not part of 5000 to 10000 yuan=0 |
| | $X_{44}$ | 10000-20000 yuan=1, not belonging to 10000-20000 yuan=0 |
| age$X_5$ | $X_{51}$ | Under 18 years old=1, not under 18 years old=0 |
| | $X_{52}$ | 18-25 years old=1, not belonging to 18-25 years old=0 |
| | $X_{53}$ | 26-35-1 years old, does not belong to 26-35 years old=0 |
| | $X_{54}$ | 36 to 55 years old=1, not belonging to 36 to 55 years old=0 |
| understanding level$X_6$ | $X_{61}$ | Very familiar=1, not belonging to very familiar=0 |
| | $X_{62}$ | Relatively familiar=1, not belonging to relatively familiar=0 |
| | $X_{63}$ | Not very familiar=1, not belonging to Not very familiar=0 |
| promotion | $X_{71}$ | Very effective=1, not classified as very effective=0 |

| effectiveness $X_7$ | $X_{72}$ | Relatively effective=1, not belonging to relatively effective=0 |
|---|---|---|
| | $X_{73}$ | Not very effective=1, not belonging to Not very effective=0 |
| number of Attendees $X_8$ | $X_{81}$ | Never been=1,Not belonging to Never been=0 |
| | $X_{82}$ | 1-2 times=1, not belonging to 1-2 times=0 |
| | $X_{83}$ | 3-4 times=1, not belonging to 3-4 times=0 |

## 1.3 Definition model

From this, we can define the following binary logistic regression equation model:

$$ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_{11} + \beta_2 X_{12} + \beta_3 X_{13} + \beta_4 X_{14} + \beta_5 X_{15} + \cdots + \beta_{39} X_{83}$$

Among them, $p = P(Y = 1)$ is the probability that Hangzhou citizens support the development of Song rhyme culture.

## 2. Result and analysis

With the help of SPSS software, we used the regression method to screen and eliminate independent variables, effectively ensuring the predicted results. After four iterations, the selection of independent variables ended, and the final remaining independent variables were cultural level, participation frequency, and level of understanding. Due to space limitations, we have only shown the final model selection results here, as shown in the table below:

**Table 2 Estimation of Variable Parameters in the Equation**

| | | B | S.E. | Wals | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| **Variables in the equation** | | | | | | | |
| | cultural level | | | 10.625 | 4 | .031 | |
| | cultural level（1） | -.271 | .530 | .260 | 1 | .610 | .763 |
| | cultural level（2） | -.292 | .534 | .300 | 1 | .584 | .747 |
| | cultural level（3） | .971 | .401 | 5.868 | 1 | .015 | 2.640 |
| | cultural level（4） | .128 | .349 | .134 | 1 | .715 | 1.136 |
| | number of Attendees | | | 36.144 | 3 | <.001 | |
| | number of Attendees（1） | -.947 | .367 | 6.652 | 1 | 0.010 | .388 |
| S T A P 4 | number of Attendees（2） | -2.072 | .364 | 32.321 | 1 | <.001 | .126 |
| | number of Attendees（3） | -20.388 | 6479.722 | .000 | 1 | .997 | .000 |
| | understanding level | | | 14.902 | 3 | .002 | |
| | understanding level（1） | -20.912 | 11748.594 | .000 | 1 | .890 | .000 |
| | understanding level（2） | -1.707 | .451 | 14.313 | 1 | <.001 | .181 |
| | understanding level（3） | -.189 | .308 | .379 | 1 | .538 | .827 |

**Table 3 Hosmer and Lemeshow tests**

| step | chi-square | degree of freedom | significance |
|---|---|---|---|
| 1 | 5.332 | 8 | .722 |
| 2 | 8.999 | 8 | .342 |
| 3 | 13.720 | 8 | .089 |
| 4 | 5.042 | 6 | .538 |

The variable parameter estimation table shows that the P values of the three remaining independent variables Wald test are all less than 0.05, that is, they pass the significance test: the results of the Hosmer and Lemeshow Test reflect the Goodness of fit, and its Sig (P value) is greater than 0.05 (preferably greater than 0.1), that is, the Goodness of fit of the model meets the requirements. Therefore, the binary logistic regression equation we obtained is relatively reliable, and the specific binary logistic regression equation is as follows:

$$ln\left(\frac{p}{1-p}\right) = 0.971X_{33} - 1.707X_{62} - 0.947X_{81} - 2.072X_{82}$$

## 3. Application of binary logistic regression equation

Based on the above model, for specific Hangzhou citizens, we will make the following specific analysis on their support for the development of Song rhyme culture.

(1) When the education level is junior college ($X_{33} = 1$) and the understanding level is relatively good ($X_{62} = 1$), selecting a Hangzhou citizen who believes that they have never been to ($X_{83} = 1$) for the survey can obtain

$$ln\left(\frac{p}{1-p}\right) = 0.971 \times 1 - 1.707 \times 1 - 0.947 \times 1 = -1.683$$

At this point, $P = 15.67\%$, indicating that with an education level of junior college, Hangzhou citizens who have never participated in Song Yun culture related activities have a support level of about 15.67% for Song Yun culture.

(2) When the education level is junior college ($X_{33} = 1$) and the understanding level is comparative ($X_{62} = 1$), selecting a Hangzhou citizen who believes that they have participated 1-2 times ($X_{82} = 1$) for the survey can obtain

$$ln\left(\frac{p}{1-p}\right) = 0.971 \times 1 - 1.707 \times 1 - 2.072 \times 1 = -2.808$$

At this point, $P = 5.69\%$, indicating that with an education level of junior college, Hangzhou citizens who have participated in a Song Yun culture related activity have a support level of about 5.69% for the development of Song Yun culture.

Comparing the above data, we can see that under the same other conditions, when the number of citizens participating in Song rhyme cultural activities increased from never before to 1-2, the support of Hangzhou citizens for the development of Song rhyme culture decreased from 15.67% to 5.69%. From this, we found that the number of participation in activities has a significant impact on whether they support the development of Song rhyme culture.

## 4. Summary

Overall, we believe that Hangzhou Song Yun has great potential for development. It attracts tourists from all over Hangzhou with its unique cultural heritage, drives Hangzhou's economic growth, and endows it with a unique cultural heritage in the new era. However, based on the data, we can also find that the current development status of Song Yun culture is not satisfactory. This may be due to the rise of Song Yun activities in recent years, and the lack of experience of relevant leaders in organizing activities. Therefore, it is inevitable that during the activities, there are problems such as ticket website crashes, dirty activity venues, and single activity forms, which are difficult to provide participants with a good experience. In solving the problem of how to effectively integrate Song rhyme culture with the event, the person in charge of the event needs to constantly innovate and break the current lack of cultural heritage in the event. Many participants may notice a significant difference between the activity and their expectations after participating in it, so they will not continue to participate in subsequent activities. In response to this phenomenon, we can improve the facilities related to the Song Yunwen event, develop more comprehensive plans in event planning, ensure that all aspects of the process

can proceed smoothly at the beginning of the event, and at the same time, the organizers can add more interesting elements to the event, thereby increasing the support of Hangzhou citizens for Song Yunwen culture.

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