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Research on the Branding of Intangible Cultural Heritage Drama from the Perspective of Short Video Matrix Communication

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Abstract The arrival of the era of integrated media has brought changes to the brand communication of Guangxi Maonan opera, and further promoted the protection and inheritance of traditional opera. The article adopts SWOT matrix analysis tool to analyze the advantages, disadvantages, opportunities and threats in the process of Guangxi Maonan opera brand development from a micro perspective. Using fuzzy set qualitative comparative analysis (fsQCA) method, 50 head short video accounts and 1895 short videos released by them are selected as research objects, and the key components affecting the communication effect of short videos of Guangxi Maonan Opera brand as well as the logic of communication are derived, and the results of the analysis are subjected to multivariate linear regression test. This paper derives three groups of group paths of Guangxi Maonan opera brand communication, including fan participation driven by social dominant logic, positive energy and brand resource driven by social dominant logic, and fan participation driven by fame. Therefore, the branding of Guangxi Maonan opera can be carried out in the direction of accelerating brand industrialization and brand publicity, and using short videos to better increase the popularity of Guangxi Maonan opera.

Index Terms SWOT, QCA, multiple linear regression, Guangxi Maonan opera, branding

I. Introduction

With the rapid development of the Internet and the popularization of mobile smart terminals, the new social media not only promotes the interconnection between individuals, but also opens the window for individuals to participate, express and show themselves, and “no video, no communication” has become a popular slogan in the field of Internet [1]-[4]. As the most popular social media for young and old, short videos are highly sought after for their short and fast traffic content, and gradually change the way people watch and experience the world. As an important part of China's intangible cultural heritage, the combination of Guangxi Maonan opera and short video communication is an epochal choice for protection and inheritance [5]-[8].

Maonan opera is a national culture created by the Maonan people, which is a kind of national theater that absorbs the cultures of Han, Zhuang and other brother nationalities, and gradually integrates, refines and develops on the basis of Maonan folk songs, folk myths and legends, rituals and religious ceremonies, and is mainly circulated in the area of Huanjiang in Guangxi [9]-[12]. In the short video has become a highly influential form of content dissemination, Maonan opera wants to attract more attention through short video to achieve effective dissemination, it is necessary to create a strong short video content dissemination matrix, to realize the “Internet + opera” branding path, the combination of Maonan opera and short video is a modernized and digitalized embodiment of the network of opera art dissemination. The combination of Maonan opera and short video is the modernization and digitalization of the dissemination of opera art network, and under the empowerment of media and information technology, it promotes the active participation of the public in the promotion and inheritance of Chinese outstanding culture [13]-[16].

The study firstly adopts SWOT analysis tool to comprehensively analyze the advantages, disadvantages, opportunities and threats existing in the development process of Guangxi Maonan opera brand from a micro perspective. Subsequently, taking the short videos in the Jittery platform as the research object, the condition variables and outcome variables of the study are determined, and the fuzzy set qualitative comparative analysis (fsQCA) is applied to analyze the necessity of individual condition variables and the condition grouping state, so as to come up with the factors affecting the communication effect of the short videos of Guangxi Maonan Opera brand. Meanwhile, multiple regression analysis is applied to further verify the robustness of the influencing factors of brand communication in terms of constituting the grouping path. Based on the results of the group state analysis, a branding strategy for Guangxi Maonan opera is proposed.

II. Matrix analysis of the brand communication of Guangxi Maonan opera

This section through the SWOT analysis method rationally and objectively analyze the advantages and disadvantages of Guangxi Maonan opera itself, the opportunities and challenges, so as to be able to develop a more targeted brand communication strategy.

II. A. Guangxi Maonan opera brand communication advantages (S)

As local authoritative information channels, traditional media and official government websites also have a large audience base, and the platform can enhance the influence of the brand of “Guangxi Maonan Opera Brand”. By creating an all-round, three-dimensional integrated media combination brand communication matrix, it can maximize the breadth and depth of the brand communication of “Guangxi Maonan opera brand”.

II. B. Guangxi Maonan opera brand communication disadvantage (W)

In the current mobile Internet era, due to the empowerment of new media technology, the transmitter and the recipient is no longer a one-way transmitter-receiver relationship in the traditional media era, through a variety of channels, the audience can maintain interaction with the transmitter at any time, and the transmitter can change the communication strategy and adjust the content of the communication at any time through the interaction with the audience, and even the audience can decide the content of the information that they want to receive, and nowadays big data, The combination of algorithmic recommendation and artificial intelligence to realize the personalized push of information is a good reflection of this. Therefore, the concept of the audience is slowly changing, realized by the audience to the transformation of the user. Brand communication thinking should also change with the “user thinking” Guangxi Maonan opera brand communication, to focus on interaction with consumers, rather than focusing on advertising “bombing” for brand exposure and promotion.

II. C. Opportunities for brand communication of Guangxi Maonan opera (O)

With the in-depth development of media integration and the in-depth promotion of the construction of integrated media, Guangxi Maonan Opera has gradually formed its own integrated media center publicity matrix, and the choice of platforms for brand dissemination has become increasingly diversified. The brand of “Guangxi Maonan Opera” has gradually formed a new media publicity matrix composed of QQ, microblog, WeChat, website, Jitter, etc. Although each media platform is not perfect, each platform is also growing its own operation team and improving the platform operation ability.

II. D. Guangxi Maonan opera brand communication threat (T)

At present, the competition of the brand product "Guangxi Maonan Opera" in the market is slightly inferior, and it is also necessary to strengthen brand communication, expand the brand influence to all parts of the country, and under the influence of brand effect, the brand of "Guangxi Maonan Opera" needs to develop a more effective brand communication strategy.

III. Branding path

III. A. Fuzzy set affiliation calibration

QCA analysis is an approach based on set theory, which determines set relationships between measured variables by calibrating them. This method usually converts the variables into a set of aggregates and assigns a degree of affiliation to them [17].

Any mapping on the closed interval from the domain X to $[0,1]$:

$$\mu_A : X \to [0,1] \tag{1}$$

$$x \to \mu_A(x) \tag{2}$$

Determine a fuzzy set A on X, μ_A is called the affiliation function of A, and $\mu_A(x)$ is called the degree of affiliation of x to the fuzzy set A, denoted as:

$$A = \{(x, \mu_A(x)) / x \in X\} \tag{3}$$

FsQCA is applicable to different types of data, not only is it able to convert different types of data to the $[0,1]$ range using fuzzy set calibration, but also, fsQCA can be combined with categorical variables that do not need to be converted to fuzzy sets. In this case, some variables are dichotomous or multicategorical values, while others have continuous values in the range of $[0,1]$ fsQCA has a good compatibility with variable types.

The "four-value fuzzy set calibration method" can effectively detect discontinuous values, and according to the membership degree of the case result variable and the condition variable, $[0-0.33-0.67-1]$ four-point equal difference calibration is used to ensure the accuracy and reliability of the data, "1" = full membership, "0.67" = partial

membership, "0.33" = partial non-membership, "0" = no membership at all. In the case of dichotomous variables, only full and complete affiliation are considered.

For continuous variables, in fsQCA, it is necessary to calibrate the value of a variable in a case to a fuzzy set affiliation from 0 to 1, so as to become a set. For this reason, with reference to previous studies, this paper "mean anchor point method" for fuzzy set calibration, firstly, the variable data are arranged in descending order, and the quartiles are selected as the fully affiliated and fully unaffiliated values, and the mean of the upper and lower quartiles is the intersection value, so as to determine the anchor point.

(a) Anchor point values

Completely unaffiliated:

$$Q_1 = QUARTILE\left(x_{1j}, x_{nj}, 1\right) \tag{4}$$

Intersection:

$$Q_2 = QUARTILE\left(x_{1j}, x_{nj}, 2\right) \tag{5}$$

Fully affiliated:

$$Q_3 = QUARTILE\left(x_{1j}, x_{nj}, 3\right) \tag{6}$$

(b) Fuzzy set calibration

$$x'_j = Calibrate\left(x_j, Q_3, Q_2, Q_1\right) \tag{7}$$

III. B. Univariate necessity analysis

Qualitative comparative analysis determines whether there is a relationship of necessity and sufficiency between variables through the calculation of consistency and coverage.

(a) Consistency

Consistency refers to the degree to which cases that meet a condition lead to the necessity of the outcome variable and is calculated as follows:

$$Consistency\left(X_i \le Y_i\right) = \sum\left[\min\left(X_i, Y_i\right)\right] / X_i \tag{8}$$

When the consistency indicator is greater than 0.9, then X is necessary for Y, i.e., X is always present when Y occurs, and if the consistency indicator is less than 0.9, then the combined effects of multiple conditioning variables need to be analyzed.

(b) Coverage

Coverage is the extent to which these given conditions explain the occurrence of the outcome. When consistency is satisfied, the researcher can assess the ability of X to explain Y by calculating the coverage rate, where a higher coverage indicator indicates that X is empirically better explained by the following formula:

$$Consistency\left(X_i \le Y_i\right) = \sum\left[\min\left(X_i, Y_i\right)\right] / \sum Y_i \tag{9}$$

III. C. Configuration Analysis

QCA is a set theory configuration analysis method based on Boolean algebra, which uses Boolean operation to simplify the conditional configuration and obtain the key elements. The threshold of sufficient consistency of configuration is set to 0.8 and the threshold of PRI consistency is set to 0.75, and a truth table with the exclusion of logical remainders is constructed to obtain the configuration path of high (low) network cluster behavior [18]. The symbol "*" in the conditional combination path means "and", "" means "or", and "~" means "not", i.e., the opposite value.

Boolean arithmetic is the logical deduction method of numerical symbolization, including union, intersection, and subtraction. Boolean operations are performed by combining, differing, and intersecting two or more objects to obtain a new form of the object. Boolean operations are used to simplify conditional combinations by logical deduction in the following ways:

The method of concatenation:

$$Y = ABC + A'BC = \left(A + A'\right)BC = BC \tag{10}$$

Absorption method:

$$Y = AB + ABC = AB \tag{11}$$

Elimination method:

$$\begin{aligned} Y &= AB + A'C + B'C = AB + \left(A' + B'\right)C \\ &= AB + (AB)'C = AB + C \end{aligned} \tag{12}$$

Matching term method:

$$Y = AB + BC + AC' = AB\left(C + C'\right) + BC + AC' \\ = (A+1)BC + AC'(B+1) = BC + AC' \tag{13}$$

III. D. Robustness Tests

Checking the robustness of the analysis results is a key step in QCA research, and there are many different ways to check the robustness of QCA, the most common of which is to adjust the relevant parameters, analyze the cohort again, and revisit the changes to assess the robustness of the results based on the changes in the cohort. It is common to adjust the calibration affiliation, consistency threshold, frequency of cases, etc. If the parameter changes do not lead to substantial changes in the histogram results, the findings will be highly reliable [19]. In this paper, we adopt the robustness test method applicable to set theory, adjust the consistency threshold to test the robustness of the histogram results adjust the original consistency threshold from 0.8 to 0.85, and other treatments remain unchanged.

IV. Study on the grouping path of brand short video communication based on QCA

IV. A. Research methodology and study population

This section uses Qualitative Comparative Analysis (QCA) to conduct experimental research aimed at analyzing complex causal relationships such as interdependence of independent variable factors, being able to view the research object as a grouping of conditioned variables in different combinations, integrating the strengths of case study and variable research, and analyzing the pooled relationship between grouping and outcome through pooling as a means of answering the questions of causal complexity such as multicollinear causation, causal asymmetries, and multiple scenarios . Fuzzy set qualitative comparative analysis possesses both qualitative and quantitative attributes and is best suited to deal with complex dependencies between multiple factors, and can make up for the shortcomings of dichotomous methods that lead to loss of information and arbitrariness in the selection of proximate values.

In this study, the sample selection refers to the “Jieyin Short Video & Live Streaming Influence Index Ranking”, and combines with the third-party short video data service platform to supplement and update the account data, and browse and analyze the 3695 videos released by 50 typical head accounts during the research cycle, and remove the repeated short videos and conduct 3 analyses. The repetitive short videos were eliminated and three comprehensive manual inspections were conducted, and finally 1,895 valid short videos were obtained as the research object. In terms of sample selection, all the samples are from the influence ranking of short video accounts in the research cycle, which have a certain degree of social influence and attention, in line with the typicality characteristics.

IV. B. Identification and Measurement of Conditional and Outcome Variables

This section identifies eight condition variables and one outcome variable.

Content theme (CT) of short videos. Content theme is the core of short videos and one of the key factors to attract users to view them.

Length of short videos (LV). The completion rate of users watching short videos is related to the length of the video, too long or too short will have a direct impact on the dissemination effect. In this paper, we choose to measure and count the duration of video samples, and then calculate the average duration of short videos for each account, and the results are included in the quantitative raw data set.

Short video release time (RT). Video release time refers to the specific release time of Guangxi Maonan opera brand short videos on the Shake platform.

Short video direction (DV). Video direction refers to the horizontal and vertical ratio of the screen presentation of the short video about Guangxi Maonan opera brand on the Jieyin platform. Horizontal screen has always been the main presentation form of movies and TV sets, but with the popularization of smartphones and 5G networks, cell phone videos have become mainstream, and vertical screen videos have come into being. Compared with the horizontal screen in the past, the vertical screen is more adaptable to the size and format of the cell phone screen, which strengthens the portability of cell phones on the mobile side and prolongs the user's usage duration.

Account influence (IA). Account influence refers to the influence of the short video account that releases Guangxi Maonan opera brand on the Jitterbug platform, and account influence can be measured and evaluated from several aspects.

Narrative Strategy (NS). Narrative strategy refers to the narrative characteristics of the content in Guangxi Maonan opera brand short videos. In order to create an objective and real feeling, creators use different narrative strategies to tell the Guangxi Maonan opera brand from different angles.

Emotional color (EC). Emotional color refers to the emotional characteristics that appear in Guangxi Maonan opera short videos. The emotion conveyed in the video affects the users' willingness to like, comment and forward

the video, and when users are infected by the emotion of the short video, they are more likely to show their support and love for the video by liking or forwarding it.

Sound element (SE). Sound elements refer to the sound elements appearing in Guangxi Maonan opera brand short videos. In the dimension of auditory perception, sound, like visual symbols, has an image, which can evoke a certain image in the user's memory or make associations, and generate understanding and perception of the content heard, thus realizing the further expansion and extension of the connotation of the perceptible sound.

Outcome variable: Jitterbit communication power index is chosen as the outcome variable to quantify the communication effect of short videos. Referring to the third-party data “Qingbo Index”, the DCI formula of Tik Tok Communication Power Index is used to comprehensively reflect the communication influence of Tik Tok accounts in terms of the number of short videos released by Tik Tok accounts, the interaction status, and the degree of coverage of users, which is included in the original quantitative dataset.

$$\begin{aligned} DCI = \{ & 0.10 * \ln(X_1 + 1) + 0.76 * [0.17 * \ln(X_2 + 1) \\ & + 0.37 * \ln(X_3 + 1) + 0.46 * \ln(X_4 + 1)] \\ & + 0.14 * [0.11 * \ln(X_5 + 1) + 0.89 * \ln(X_6 + 1)]\} * 100 \end{aligned} \tag{14}$$

Among them, X_1 is the number of new works, X_2 is the number of likes, X_3 is the number of comments, X_4 is the number of shares, X_5 is the number of new fans, and X_6 is the total number of fans. In addition, the data of X_1, X_2, X_3, X_4, X_5 and X_6 are all from Tik Tok platform.

IV. C. Results and analysis

IV. C. 1) Single-factor necessity analysis

In this study, eight variables that may lead to the realization of good communication effects and the non-realization of good communication effects of Guangxi Maonan opera brand short videos are tested for consistency, and the results of the univariate necessity analysis of the realization of good communication effects of short videos are shown in Table 1. The results of univariate necessity analysis for realizing non-good communication effect of video are shown in Table 2. As can be seen from the table, the consistency of the eight conditional variables of video length, release time, video direction, account influence, content theme, narrative strategy, emotional color, sound elements are all less than 0.9, and none of them constitute the necessary conditions for realizing the good and non-good communication effect of Guangxi Maonan Opera brand short video and are unable to explain the communication effect of Guangxi Maonan Opera brand short video alone. Accordingly, it can be determined that the explanatory power of a single conditional variable on the communication effect of Guangxi Maonan opera brand short video is weak, and it is necessary to further explore the reasons affecting the outcome variables from the group perspective of the conditional variables.

Table 1: Analysis of the necessity of single variable

Conditional variable	Consistency	Coverage
Video duration(LV)	0.491	0.567
~Video duration (~LV)	0.785	0.643
Release time (RT)	0.609	0.644
~Release time (~RT)	0.661	0.529
Video direction (DV)	0.528	0.582
~Video direction (~DV)	0.508	0.347
Account influence (IA)	0.783	0.661
~Account influence (~IA)	0.414	0.429
Content theme (CT)	0.845	0.596
~Content theme (~CT)	0.163	0.288
Narrative strategy (NS)	0.688	0.511
~Narrative strategy (~NS)	0.531	0.542
Emotional color (EC)	0.822	0.522
~Emotional color (~EC)	0.144	0.324
Auditory element (SE)	0.711	0.465
~Auditory element (~SE)	0.469	0.672

Table 2: Analysis of the necessity of single variable

Conditional variable	Consistency	Coverage
Video duration (LV)	0.578	0.783
~Video duration (~LV)	0.671	0.618
Release time (RT)	0.432	0.643
~Release time (~RT)	0.735	0.659
Video direction (DV)	0.41	0.414
~Video direction (~DV)	0.638	0.637
Account influence (IA)	0.529	0.515
~Account influence (~IA)	0.684	0.786
Content theme (CT)	0.628	0.453
~Content theme(~CT)	0.367	0.714
Narrative strategy (NS)	0.64	0.603
~Narrative strategy (~NS)	0.532	0.664
Emotional color (EC)	0.598	0.48
~Emotional color (~EC)	0.361	0.745
Sound element (SE)	0.82	0.616
~Sound element (~SE)	0.311	0.572

IV. C. 2) Analysis of configuration results

The grouping paths are shown in Table 3 (“●” indicates that the core condition exists, “⊗” indicates that the core condition does not exist, “●” indicates that the edge condition exists, “⊗” indicates that the edge condition does not exist, and a blank indicates that the condition may or may not exist in the influence path). Table shows the group paths of this study to finally get the short video of Guangxi Maonan opera brand to realize good communication effect, a total of eight first-order group paths, of which the core conditions of H1a, H1b, H1c, H1d are consistent, the core conditions of H2a, H2b are consistent, the core conditions of H3a, H3b are consistent, constituting four groups of second-order equivalence group. From the consistency of the group states, the consistency of the influence path is greater than 0.8, and the overall consistency of the group states is greater than 0.9, indicating that these group states are sufficient conditions to influence the short video dissemination of Guangxi Maonan opera brand. From the perspective of group state coverage, the overall coverage is 0.618, indicating that the above 8 paths can explain 62% of the Guangxi Maonan opera brand short videos obtaining good communication effects, and all 8 paths have strong explanatory power to realize the good communication effects of the Guangxi Maonan opera brand short videos, and this study categorizes the 8 paths, and summarizes a total of 3 main modes, i.e., the fan participation-driven path, fan participation-driven path, fan participation-driven path, fan participation-driven path, fan participation-driven path, fan participation-driven path, fan participation-driven path, fan participation-driven path, fan participation-driven path and fan participation-driven path under social dominant logic. This study categorizes the eight paths and summarizes three main patterns, namely, fan participation-driven path under social dominant logic, positive energy and brand resource-driven path under social dominant logic, and fan participation-driven path relying on fame boosting.

Table 3: Configuration path

Conditional variable	H1				H2		H3	
	H1a	H1b	H1c	H1d	H2a	H2b	H3a	H3b
LV	●	•	⊗		⊗	•	⊗	⊗
RT		⊗	⊗	⊗	⊗			•
DV	●	●	•	●		⊗	⊗	•
IA	⊗	⊗	•			•	●	●
CT	●	●	●	•	●	●	●	•
NS	⊗	⊗	⊗	⊗		•	⊗	•
EC	●	●	●	•	●		•	•
SE	⊗	⊗	⊗	⊗	•	•	⊗	
Consistency	0.866	0.963	0.9912	1	0.826	0.924	1	0.899
Raw consistency	0.06	0.069	0.115	0.036	0.172	0.225	0.149	0.178
Unique Coverage	0.01	0.01	0.069	0.33	0.0265	0.014	0.097	0.035
Solution consistency	0.9063							
Solution Coverage	0.618							

IV. D. Analysis of the results of the multiple linear regression test

In this section, three multiple linear regression models are constructed based on the brand communication driving path, and the results of the QCA analysis are cross-checked and validated.

IV. D. 1) Multiple linear regression analysis of model 1

Model 1 is the fan participation-driven path under the social dominant logic, and the results of model 1 summary analysis are shown in Table 4. Among them, R is 0.901, R-squared is 0.827, and adjusted R-squared is 0.81, indicating a good degree of explanation of the independent variables. The Durbin-Watson value of Model 1 is 1.528, which proves that the independent variables are independent of each other.

Table 4: Summary analysis results of model 1

Model	R	R^2	Adjusted R^2	Standard estimation error	Texbin Watson
1	0.901	0.827	0.81	0.113	1.528

The results of model 1 ANOVA are shown in Table 5. The mean squares of the regression and residuals are 2.262 and 0.015, and the F-value is 142.261, with a significance level close to 0, indicating that regression model 1 explains the amount of variance at a significant level.

Table 5: ANOVA results of model 1

Model 1	Sum of squares	df	Mean square	F	Significance
Regression	6.552	4	2.262	142.261	0.000
Residual error	1.362	85	0.015	-	-
Total	7.914	89	-	-	-

The standardized predicted values of Model 1 are shown in Figure 1, with the vertical axis 0 as the axis of symmetry, and the scatter points are evenly distributed in its vicinity, which indicates that the linear relationship between the independent and dependent variables in Model 1 is correct.

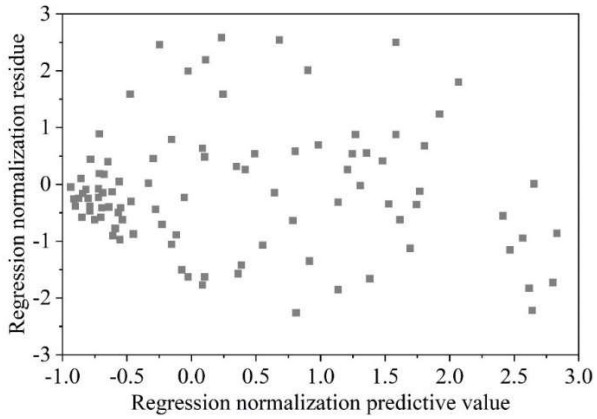

Figure 1: Model 1 standardized predictive value

Model 1 residual statistics are shown in Table 6 and Figure 2. The P-P plot of model 1 standardized residuals is shown in Figure 3. The mean of the model 1 standardized residuals is close to 0, the standard deviation is 0.985, and the data are normally distributed, indicating that model 1 has normality.

Table 6: Residual statistics of model 1

model 1	Minimum value	Maximum value	Mean value	Standard deviation	Case number
Predictive value	0.006	1.058	0.303	0.256	100
Residual error	-0.342	0.374	0	0.132	100
Standard forecast	-0.972	2.94	0	1	100
Standard residue	-2.528	2.651	0	0.985	100

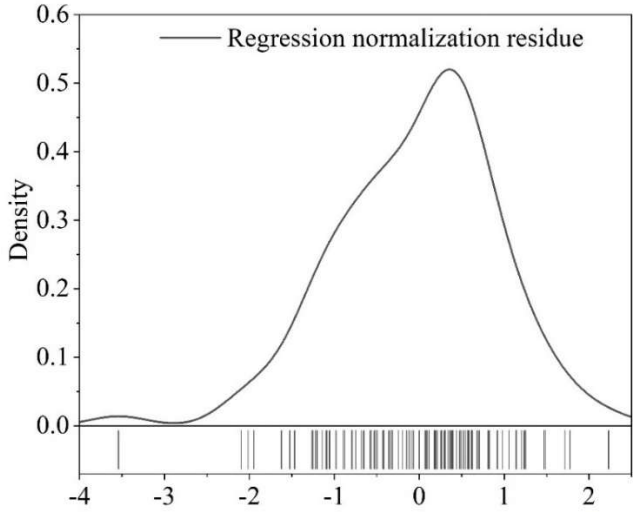

Figure 2: Model 1 standardization residue

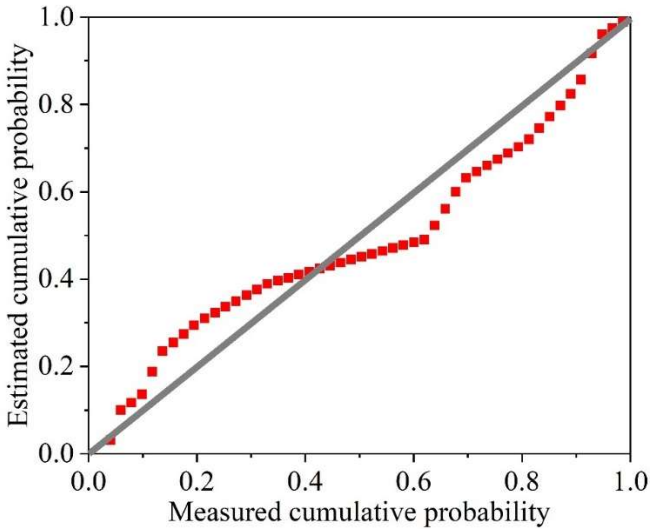

Figure 3: P-P diagram of the standardized residuals of model 1

The results of model 1 multiple regression analysis are shown in Table 7. Among them, the tolerances of content topic, short video duration and short video posting time are 0.348, 0.275 and 0.258, respectively, which are all greater than 0.1, and their VIFs are 2.718, 3.325 and 4.11, respectively, which are less than 5, indicating that there is no covariance problem in Model 1. The regression coefficients of the variables of content topic (β = 0.412, p < 0.001), short video duration (β = 0.219, p < 0.05), and short video posting time (β = 0.415, p < 0.01) all show positive and significant.

Table 7: Results of multiple regression analysis of model 1

Model 1	Unnormalized coefficient				Common linear statistics	
	B	Standard error	t	Significance	Tolerance	VIF
_cons	0.027	0.013	0.727	0.481	--	--
CT	0.412	0.059	5.19	0.027	0.348	2.718
LV	0.219	0.096	2.233	0.027	0.275	3.325
RT	0.415	0.175	3.071	0.027	0.258	4.11

IV. D. 2) Multiple linear regression analysis of model 2

Model 2 is the positive energy and brand resource-driven path under the social dominant logic, and the results of model 2 summary analysis are shown in Table 8. Among them, R is 0.943, R-squared is 0.863, and adjusted R-

squared is 0.795, indicating that the degree of explanation of the independent variables of Model 2 is good. The Durbin Watson value of 1.795 for Model 2 implies that the variables are independent of each other.

Table 8: Summary analysis results of model 2

Model	R	R^2	Adjusted R^2	Standard estimation error	Texbin Watson
2	0.943	0.863	0.795	0.123	1.795

The results of model 2 ANOVA are shown in Table 9. The mean squares of regression and residuals of model 2 are 1.659 and 0.015, and the F-value is 115.362, the significance level is close to 0, which indicates that the regression model 2 explains the amount of variance to reach the level of significance, and that the independent variable has a linear relationship with the dependent variable.

Table 9: ANOVA results of model 2

Model 2	Sum of squares	df	Mean square	F	Significance
Regression	6.668	5	1.659	115.362	0.000
Residual error	1.231	85	0.015	-	-
Total	7.899	90	-	-	-

The standardized predicted values of Model 2 are shown in Figure 4, in which the scatter points are distributed in their vicinity on average, with no obvious positive or negative bias, indicating that the linear relationship between the independent and dependent variables in Model 2 is correct.

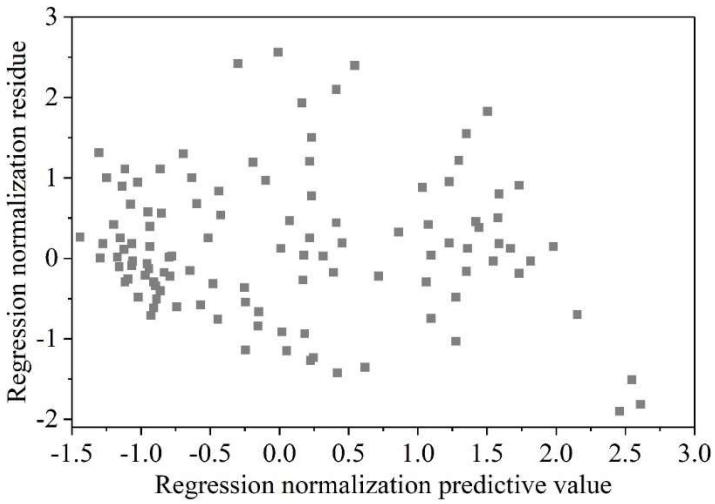

Figure 4: Scatter plot of normalized predicted values for Model 2

The statistics of Model 2 residuals are shown in Table 10 and Figure 5, and the P-P plot of Model 2 standardized residuals is shown in Figure 6. The mean of model 2 standardized residuals is close to 0, the standard deviation is 0.975, close to 1, and the data are normally distributed, implying that model 2's have normality.

Table 10: Residual statistics of model 2

Model 2	Minimum value	Maximum value	Mean value	Standard deviation	Case number
Predictive value	-0.01	0.986	0.298	0.299	100
Residual error	-0.253	0.362	0	0.129	100
Standard forecast	-1.031	2.606	0	1	100
Standard residue	-2.179	3.016	0	0.975	100

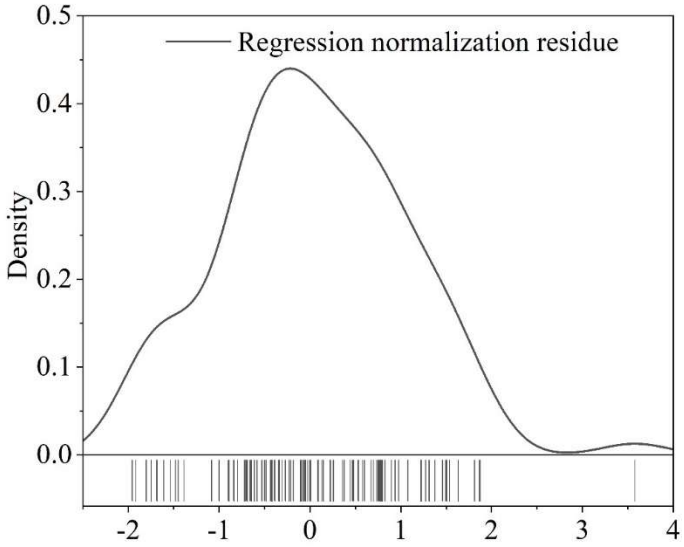

Figure 5: Model 2 standardization residue

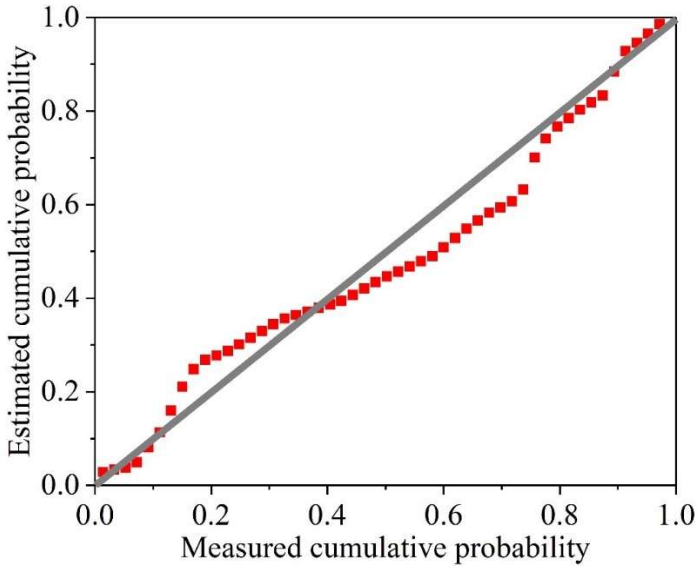

Figure 6: P-P diagram of the standardized residuals of model 2

The results of the multiple regression analysis of Model 2 are shown in Table 11. Among them, the tolerances of content topic, short video direction, account influence, and short video posting time are 0.392, 0.961, 0.951, and 0.345, respectively, which are all greater than 0.1, and their VIFs are 2.692, 1.039, 1.052, and 2.651, respectively, which are less than 5, indicating that there is no problem of covariance in Model 2. The regression coefficients of content topic (β = 0.454, p < 0.001), short video direction (β = 0.177, p < 0.01), and short video posting time (β = 0.498, p< 0.001) are all positive and significant, but the influence of their brand accounts (The regression coefficient of β =0.022,p> 0.1) is not significant.

Table 11: Results of multiple regression analysis of model 2

Model 2	Unnormalized coefficient				Common linear statistics	
	B	Standard error	t	Significance	Tolerance	VIF
_cons	-0.012	0.004	-1.136	0.218	--	--
CT	0.454	0.08	5.85	0.022	0.392	2.692
DV	0.177	0.028	3.592	0.02	0.961	1.039
IA	0.022	0.071	0.292	0.737	0.951	1.052
LV	0.498	0.123	4.55	0.013	0.345	2.651

IV. D. 3) Multiple linear regression analysis of model 3

Model 3 is a fan participation-driven path dependent on fame boosting, and the results of Model 3 summary analysis are shown in Table 12. Among them, the R is 0.855, the R-squared is 0.806, and the adjusted R-squared is 0.772, which indicates that the degree of explanation of the independent variables in Model 3 is good. The value of Durbin Watson for Model 3 is 1.498 and the variables are independent of each other.

Table 12: Summary analysis results of model 3

Model	R	R^2	Adjusted R^2	Standard estimation error	Texbin Watson
3	0.855	0.806	0.772	0.124	1.498

Model 3 ANOVA results are shown in Table 13. The ANOVA results list the mean squares of the regression and residuals of model 3 as 2.05 and 0.016, with an F-value of 112.362 and a significance level close to 0, indicating that the regression model 3 explains the amount of variance at a significant level and that the regression equations established are valid.

Table 13: ANOVA results of model 3

Model 3	Sum of squares	df	Mean square	F	Significance
Regression	6.32	7	2.05	112.362	0.000
Residual error	1.623	85	0.016	-	-
Total	7.943	92	-	-	-

The standardized predicted values of Model 3 are shown in Figure 7, where the scatters are evenly distributed around them, indicating that the linear relationship between the independent and dependent variables in Model 3 is correct.

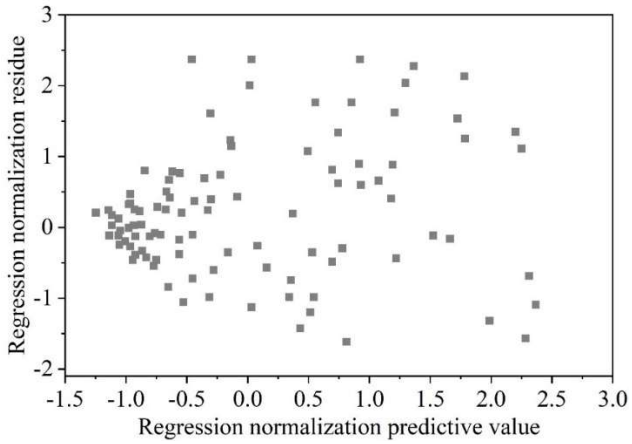

Figure 7: Scatter plot of normalized predicted values for Model3

The statistics of Model 3 residuals are shown in Table 14 and Figure 8, and the P-P plot of Model 3 standardized residuals is shown in Figure 9. The mean of the model 3 standardized residuals is close to 0, the standard deviation is 0.985, and the residuals are normally distributed, implying that model 3 has normality.

Table 14: Residual statistics of model 3

model 3	Minimum value	Maximum value	Mean value	Standard deviation	Case number
Predictive value	0	1.103	0.32	0.266	100
Residual error	-0.4	0.337	0	0.136	100
Standard forecast	-1.039	3.075	0	1.013	100
Standard residue	-2.593	2.542	0	0.985	100

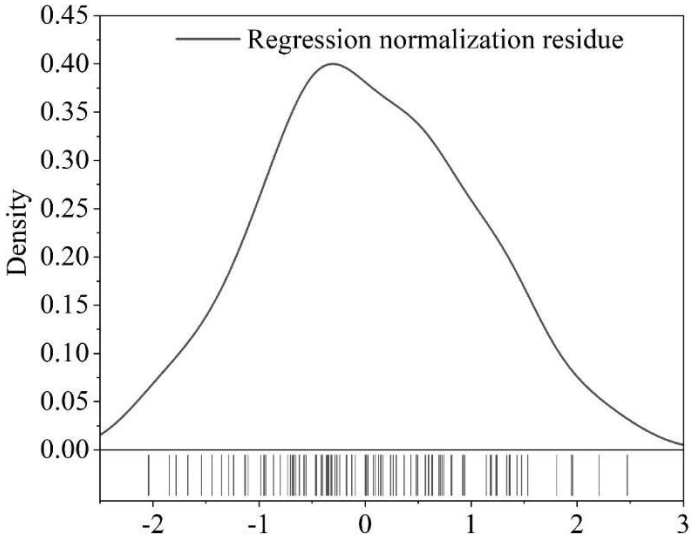

Figure 8: Model 3 standardization residue

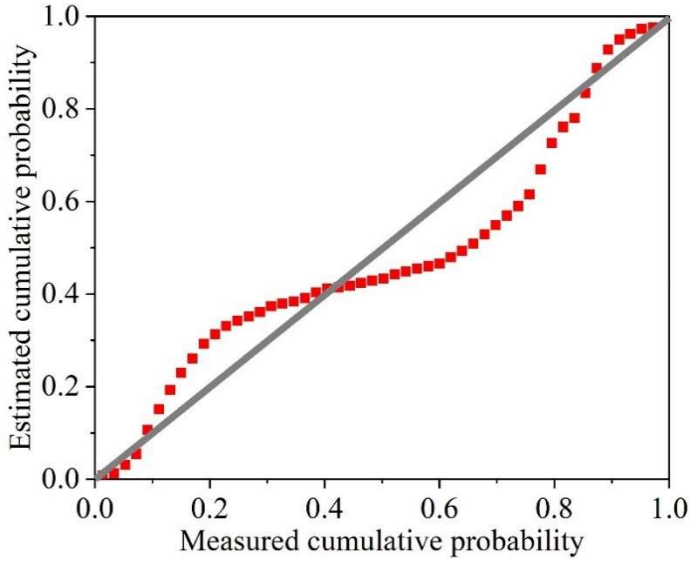

Figure 9: P-P diagram of the standardized residuals of model 3

The results of the multiple regression analysis of Model 3 are shown in Table 15. The tolerances of affective color, short video duration, and short video posting time are 0.813, 0.276, and 0.29, respectively, which are all greater than 0.1, and their VIFs are 1.236, 3.314, and 3.164, respectively, which are all less than 5, indicating that there is no covariance problem in Model 3. The regression coefficients of the variables of emotional color (β = 0.231, p < 0.01), short video duration (β = 0.268, p < 0.05), and short video posting time (β = 0.738, p < 0.001) are all positive and significant.

Table 15: Results of multiple regression analysis of model 3

Model 3	Unnormalized coefficient				Common linear statistics	
	B	Standard error	t	Significance	Tolerance	VIF
_cons	-0.018	0.02	-0.561	0.561	--	--
EC	0.231	0.074	2.883	0.057	0.813	1.236
LV	0.268	0.135	2.191	0.017	0.276	3.314
RT	0.738	0.14	5.307	-0.006	0.29	3.164

V. Guangxi Maonan opera branding strategy

(1) Strengthening the inheritor protection mechanism is the key to the sustainable development of “Guangxi Maonan Opera”.

Guangxi Maonan Opera is facing the crisis of natural aging of the inheritors, and the crisis of no successor of the inheritors. How to effectively utilize the laws and regulations of non-genetic inheritance, and increase efforts to cultivate the Maonan “Guangxi Maonan Opera” inheritors, will be the key to the sustainable development of Guangxi Maonan Opera.

(2) Strengthen the publicity, implement the “Guangxi Maonan opera” brand construction

Publicity is a fundamental way for the sustainable development of traditional opera culture in the current society, especially in the current social context, must be combined with the advantages of multimedia, Guangxi Maonan Opera can be more diverse forms of contact with the outside world, and more widely publicize themselves.

(3) Accelerating brand industrialization is the way out for the sustainable development of “Guangxi Maonan Opera”.

The characteristics of cultural industry are wide, in addition to spirituality and service, people emphasize more on the dependence of the industry. How to accelerate the development and promotion of “Guangxi Maonan Opera”, to realize “Guangxi Maonan Opera” real industrialization needs more thinking.

VI. Conclusion

After the matrix analysis of Guangxi Maonan opera brand communication, this paper takes QCA as the main research method to study the short video communication grouping path of Guangxi Maonan opera brand and explore the branding strategy of Guangxi Maonan opera. This paper draws the following conclusions:

In the analysis of the grouping results, the consistency of the grouping paths are all greater than 0.8, the overall consistency is greater than 0.9, and the overall coverage is 0.618, which leads to the conclusion that this paper's article paths can explain 62% of the short videos of Guangxi Maonan opera brand obtaining good communication effects, and at the same time, it summarizes the fan participation-driven paths under the logic of social dominance, the positive energy and brand resource-driven paths under the logic of social dominance and the At the same time, three main paths are summarized: fan participation driven path under social dominant logic, positive energy and brand resource driven path under social dominant logic, and fan participation driven path under fame, which are tested by multiple regression.

The branding strategy of Guangxi Maonan Opera can be implemented by strengthening the protection mechanism of inheritors, accelerating the industrialization of the brand and strengthening publicity.

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