An Empirical Study on the Supply-Demand Matching of Zhejiang Rural Cultural Auditorium Service

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Abstract: In the context of building a strong cultural country to achieve spiritual wealth and promoting the high-quality development of public cultural services, cultural auditoriums, as the physical space and content carrier of rural public culture, have far-reaching impact on rural revitalization and strengthening of rural cultural construction. After 11 years of development, the number and quality of cultural auditoriums have greatly improved. However, there are still issues with public participation, content, and the depth of cultural activities. To explore the matching of supply and demand, this study reviewed existing literature, service norms, and other related documents in the service industry. An evaluation system of cultural auditorium service elements was developed, and a matching model of supply and demand was constructed to calculate the degree of matching of supply and demand of cultural auditorium services. The degree of matching of cultural auditorium service supply and demand of villagers with different characteristics was analyzed in detail. This helps to collect and analyze the villagers' demand in a targeted manner and optimize the service content and quality of cultural auditoriums. Optimize the service content and service level of cultural auditoriums.

Keywords: cultural auditorium, public cultural services, matching supply and demand, matching degree

1. Introduction

In recent years, the improvement of farmers' material living standards has brought attention to their spiritual and cultural needs, highlighting the importance of rural cultural life. To promote the development of spiritual and cultural life in rural areas, governments at all levels have proposed various guidelines. One of these is the 'Cultural Auditorium', which was first introduced by Zhejiang Province in 2013. The theme of the auditorium is 'Cultural Landmark, Spiritual Home', and it is designed to showcase the local culture and heritage. Constructed according to the standards of having a place, display, activity, team, and mechanism, this rural cultural complex embodies the theme of 'cultural landmark, spiritual home' and serves as a hub for etiquette, learning, teaching, and recreation. It has become synonymous with the current rural public cultural space. By the end of 2022, Zhejiang had constructed 20,511 rural cultural auditoriums, achieving full coverage of administrative villages with more than 500 people. This has played an active role in meeting the cultural needs of villagers. The experience of building cultural auditoriums has also been adopted by central ministries and commissions, as well as many provinces and municipalities, as a model case. In October 2019, the National Development and Reform Commission of the People's Republic of China initiated the 'Creating a Cultural Auditorium Plus Complex to Help Promote Rural Revitalization' program. The program aims to enrich the functional kernel of cultural auditoriums, enhance their attractiveness and vitality, and promote rural revitalization. In March 2021, the Ministry of Culture and Tourism, in conjunction with three other ministries, issued the 'Opinions on Promoting the High-Quality Development of Public Cultural Services'. The document emphasizes the importance of revitalizing, utilizing, and innovatively developing excellent traditional culture in rural areas. It also recommends constructing cultural auditoriums and other thematic functional spaces that are tailored to local conditions. However, despite the effectiveness of constructing rural cultural auditoriums, there are still issues with the insufficient and unbalanced allocation of cultural resources, misalignment between the supply of cultural services and the needs of villagers, and insufficient innovation in the quality of services and cultural forms. These issues seriously restrict the enhancement of the spiritual kernel of the cultural auditoriums and the fulfillment of their service functions. Based on the above observations and analyses, this paper collects and collates the real cultural demands of villagers, analyzes and explores in depth the match between supply and demand of the current cultural auditorium services, with a view to optimizing the content and form of the existing cultural supply, helping to improve the practical utility of the cultural auditorium, promoting the revitalization of rural culture, and facilitating the rural spirit of mutual enrichment.

2. Literature review

2.1 Study on rural cultural auditoriums

Research on rural cultural auditoriums focuses on three main areas:

The first is a study on the construction and development of cultural auditoriums. Researchers describe the current situation of cultural auditoriums and propose measures to promote future development, including space construction, application of new technologies, and formation of management teams. Bao Haizhou (2017) proposes to integrate new media into the construction of cultural auditoriums, and to come out with an innovative road that caters to the development of the times[2] . Huang Menghang (2018) explored the similarities and differences between the operation mode centered on rural cultural auditoriums and the traditional operation mode of public cultural projects in grass-roots cultural construction from the aspects of spatial setup and operation of cultural auditoriums, based on which he proposed system innovation and the introduction of social forces.[5] Based on this, system innovation and the introduction of social forces are proposed. Xie Anmin (2022) suggests that the hope of contemporary rural public space production lies in the maintenance of the social power of strategic actors rather than in checks and balances, and that the key to the production of this kind of public space lies in the stability of the organizational power of village committees rather than in democratization. It also encourages elite participation in the activities and construction of cultural auditoriums.[7] The elite are also encouraged to participate in the activities and construction development of cultural auditoriums.

Second, the cultural connotation and spiritual value of cultural auditoriums are studied. Starting from "tea", Xi Shaoying (2023) emphasizes the important function of cultural auditoriums in spreading the national mainstream ideology and passing on rural culture.[10] Xu Langjing, Lu Xiaosai Xu Langjing, Lu Xiaosai, and Wang Li (2020) suggest that the focus of the construction of cultural auditoriums should be on the spiritual core, and believe that the construction of cultural auditoriums is essentially a "process of cultural self-construction", and that it is necessary to do a good job of constructing the dual values of cultural auditoriums.[6] Ding Zhe (2023) pointed out that the construction of rural cultural auditoriums is an important measure to improve people's livelihood, satisfy the spiritual and cultural needs of farmers, and build a spiritual home for farmers.[9] Ding Zhe (2023) points out that building rural cultural auditoriums is an important measure to improve people's livelihood, satisfy farmers' spiritual and cultural needs and build their spiritual home.

Thirdly, researchers will study the governance function of cultural auditoriums. After experiencing the rule-based governance of "village rules and regulations" at the beginning of the "abolition of societies and the establishment of townships", grass-roots social governance has entered the period of cultural governance of "public culture (body)". Zhang Jinfeng and Li Yonghua (2018) point out that the creation of village-level cultural auditoriums marks the entry of the governance model into a new stage of value governance as a base for the propaganda and cultivation of socialist core values.[3] .

2.2 Research on supply-demand matching models

Upon categorising the literature, it was found that the current model for matching supply and demand is widely used, particularly in the fields of environmental science and resource utilisation, as well as construction science and engineering. However, it is less commonly applied in the field of public culture. The earliest domestic research using the supply and demand matching model can be traced back to the paper on Beijing's innovation and entrepreneurship policy published by Xu Deying and Han Botang (2015) in the journal Science Research. The study systematically sorted out the system of policy elements, constructed a policy supply and demand matching model, and drew conclusions on policy optimization through investigation and analysis. The researchers are. In their 2018 study, Weng Lian, Wang Huiyu, and Lu Jiebing categorized community public cultural services into six areas: traditional culture, literature and art, sports and fitness, nutrition and health care, basic public education, and scenic tourism. They utilized a supply and demand matching model to analyze the correlation between the supply and demand of these services and provided recommendations [4]. Wang Taoqin (2023) investigated the issue of matching supply and demand in the public cultural industry in the middle and lower reaches of the Yangtze River and proposed reasonable suggestions. The language used is clear, objective, and value-neutral, with a formal register and precise word choice. The text follows conventional academic structure and maintains grammatical correctness. No changes in content were made.

3. Design of a system of elements for matching supply and demand of cultural auditoriums services

Through Maslow's Hierarchy of Needs Theory and the document "Rural Cultural Auditorium Management and Service Standards", a system of cultural auditorium service elements is constructed, which contains four first-level cultural

auditorium service elements of awareness-raising and education, daily lives, recreation, and online functions, and 25 second-level cultural auditorium service elements (As shown in Table 1).

Table 1. System of service elements of cultural auditoriums

First elements	Simple tag	Secondary elements	Simple tag	First elements	Simple tag	Secondary elements	Simple tag
Awareness-raising and education	P1	Ideology and policy category	P1-1	Recreation	P3	Appreciation film	P3-1
		Festivals and Ceremonies	P1-2			Opera performance activities	P3-2
		Promotion of Moral Ethics	P1-3			Song and dance performance	P3-3
		Legal education category	P1-4			Skits,comedy and talk shows etc.	P3-4
Daily lives	P2	Health Literacy	P2-1			Traditional Arts and Crafts	P3-5
		Life Skills	P2-2			Literature	P3-6
		Daily lives Services	P2-3			Puzzle & Chess	P3-7
		Literature Reading	P2-4			Recreational Competition Category	P3-8
		Physical exercise category	P2-5	Online functionality	P4	Event Notification Channels	P4-1
		Sporting events	P2-6			Feedback channels	P4-2
		Indoor Fitness and Sports Facilities	P2-7			Watch live	P4-3
		Outdoor Fitness and Sports Facilities	P2-8			Live commerce services	P4-4
		Social gathering	P2-9				

4. Modeling the Matching of Supply and Demand of Cultural Auditorium Services

Academics frequently use descriptive methods to examine the relationship between the supply and demand of cultural services. However, they do not provide a precise match between supply and demand through quantitative analysis. The model for matching the supply and demand of cultural auditorium services is based on the assumption of rationality, and the degree of matching and environmental variables can be used to measure the matching of supply and demand of cultural auditorium services quantitatively. The model's theory is constructed using the similarity theory, which generalises general phenomena into universal laws. The satisfaction of the villagers with the cultural auditorium service is taken as the supply, and the villagers' demand for the service is taken as the demand, based on the existence of similarity constants between the two. In addition, the relationship between supply and demand is linear rather than a simple additive or subtractive relationship. Therefore, the function formula is used to calculate it.

4.1 Variable Interpretation and Modeling

Matching degree of supply and demand of services in cultural auditoriums: It refers to the degree of fulfillment between the strength of service supply enjoyed by villagers and the services actually demanded. The formula is as follows:

$$\lambda_{ij} = \cos(\theta_{ij} - 45°) \quad \theta_{ij} \in [0°, 90°] \tag{1}$$

Where denotes the angle between the supply and demand coordinates and the horizontal axis for sample j for service i in a coordinate system where demand is the horizontal axis and supply is the vertical axis.

Matching environment: Marked with 1, -1. When the villagers enjoy the service supply strength of the cultural auditorium is greater than the villagers' real demand, the environment variable is labeled as -1. At this time, it indicates that the service supply is excessive and the supply should be reduced appropriately. When the villagers enjoy the service supply strength is less than the villagers' demand, the environment variable is labeled as 1. At this time, it indicates that the supply exceeds the demand, and the supply should be increased.

Matching supply and demand for services: the discrepancy situation between the strength of the supply of services enjoyed by villagers in their actual lives and the actual demand for services by villagers, expressed as a two-dimensional vector of service supply and demand matching and environmental variables.

Perfect service supply-demand match: that is, the villagers enjoy the strength of the supply of services in real life and the

actual demand for services of the villagers, in numerical value for the service supply-demand match is 1, the environmental variable is 1.

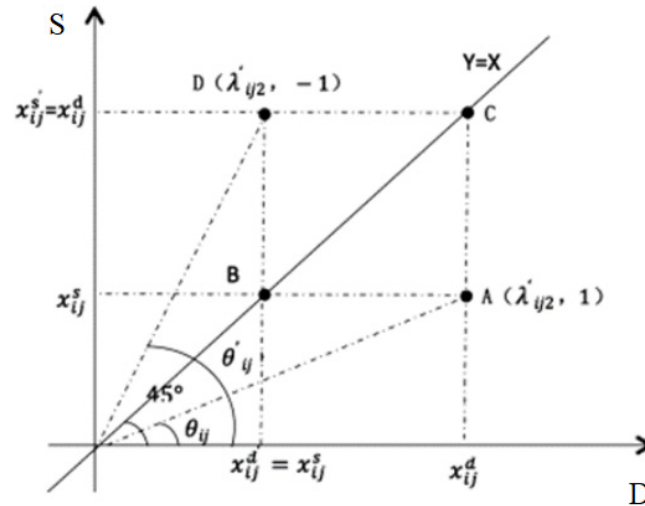## 4.2 Basic properties of the model

Figure 1. Matching supply and demand model diagram

Property 1: perfect matching of supply and demand, i.e. the point of supply matching value falls on the straight line Y=X, at this time the supply is equal to the demand. Through the matching model, researchers can get that the matching degree of points B and C is 1, and the environmental variables are also 1, so researchers call the supply and demand of services in the state of B and C a perfect supply and demand match, at this time, the strength of the supply of services in the cultural auditorium (supply) perfectly meets the needs of the villagers.

Property 2: At the same level of demand or supply, the larger the difference between demand and supply, the smaller the match between supply and demand; and vice versa. In the figure, point A and point B are at the same level of supply, but the demand from villagers at point A is large, resulting in a smaller angle, so the match between supply and demand becomes smaller. Similarly, point D and point B are at the same level of demand, the larger the gap between supply and demand, the smaller the match between supply and demand.

Property 3: With Y = X as the symmetric non-perfect matching value, the supply and demand matches are the same, differing in that their environmental variables are different (-1 and 1). With the same match between supply and demand, it can still be categorized as a case of oversupply, and a case of undersupply.

Property 4: Non-perfect matching, when the difference between demand and supply is the same, the larger the value of supply (or demand), the better the match. When the difference between demand and supply is the same, the larger the value of supply (or demand), the better the match.

5. Empirical Study on Matching Supply and Demand of Cultural Auditorium Services

In order to understand the strength of the supply of cultural auditorium services that villagers actually enjoy and the actual demand of villagers for cultural auditorium services, this study designed a relevant questionnaire for the system of cultural auditorium services elements in TX city, and selected appropriate areas for the survey based on stratified sampling and judgmental sampling methods. The questionnaire was designed for the villagers of TX city, and the questionnaire utilized a five-point Likert scale to measure the villagers' real demand and the supply of cultural auditorium services enjoyed by the villagers. 1 represents the villagers' actual demand is the smallest and the villagers' perceived supply of cultural auditorium services is the smallest. 5 represents the villagers' actual demand is the largest and the villagers' enjoyment of cultural auditorium services is the largest. In order to ensure the authenticity and reliability of the sample data in the pre-study period, fieldwork and interviews were conducted in TD Town and SM Town. The survey covers the age level from teenagers to the elderly, and the sample is relatively comprehensive, while the sample size of youth and middle-aged people as the main participant groups of cultural auditoriums is large and representative. Collected through field visits as well as online surveys,

a total of 600 questionnaires were distributed, 587 questionnaires were retrieved, and 545 valid questionnaires were obtained after review, with a valid questionnaire rate of 92.84%. Using Cronbach's coefficient for the reliability test, the Cronbach's coefficient of the demand for the service elements of the four types of first-level cultural auditoriums is 0.936, and the Cronbach's coefficient of the supply of cultural auditorium services is 0.962, which indicates a high reliability on the whole.

The validity test is generally divided into content validity and structural validity. Firstly, the questionnaire focuses on understanding the supply and demand of cultural auditorium services, and the system of cultural auditorium service elements involved is determined through the construction norms of cultural auditoriums and literature analysis, and is also recognized by the managers of the cultural auditoriums as well as the experts in the interviews. Secondly, the structural validity of the questionnaire was examined, and the correlation test was passed for each of the first-level cultural auditorium service elements, and the significance test was passed for the 25 second-level elements at the 5% level, so the questionnaire has good structural validity.

Using the model of matching supply and demand for cultural auditorium services, the data were calculated to derive the current level of matching supply and demand for cultural auditorium services for the whole as well as for different groups, as shown in Table 2.

On the whole, the matching degree of supply and demand of villagers for the four categories of cultural auditorium services, namely awareness-raising and education, daily lives, recreation, and online functions, is above 0.9990, and the matching environment is 1, indicating that the demand exceeds the supply. The matching degree is from high to low for this is awareness-raising and education, recreation, life and online function. This indicates that the gap between supply and demand for awareness-raising and education services is the smallest while the gap between supply and demand for online function services is relatively large under the overall good matching degree.

Analyzing the first elements of cultural auditorium services from a gender perspective, it can be seen that for men the matching of supply and demand for awareness-raising and education and entertainment services is high, while the matching of supply and demand for daily lives and online functions is low, with the lowest being online functions; for women the highest matching of supply and demand is for awareness-raising and education services, followed by daily lives services, while the matching of supply and demand for recreation and online functions is low.

In terms of age groups, the supply and demand matching degree of cultural auditorium awareness-raising and education services of the youth group reaches 1, which is in the state of perfect matching, but the supply and demand matching degree of life and online functional services is lower; the youth group thinks that the supply and demand of education services is more balanced, while the supply and demand matching degree of life, entertainment and online functional services is relatively low; the middle-aged group has a higher overall supply and demand matching degree, but there is a service oversupply situation. The middle-aged group has a higher matching degree of supply and demand as a whole, but there is an oversupply of services, as shown by the matching environment of -1 in the areas of publicity and education, life and recreation; the matching degree of supply and demand of the four first-level cultural auditorium service elements of the elderly group is lower than that of the other groups, with the matching degree of supply and demand of publicity and education services being the lowest.

Analyzed from an occupational perspective, the student group has the highest match between supply and demand for awareness-raising and education services, and the match between supply and demand for daily lives and entertainment services is relatively low, while the lowest match between supply and demand is for the online functional elements; the farmers' group has the highest match between supply and demand for awareness-raising and education services and is in a state of demand exceeding supply, but the supply of daily lives, recreation, and online functionalities are all in oversupply, with an environmental match of -1; the supply and demand of the cultural auditorium services of enterprise workers have the highest matching degree from high to low as awareness-raising and education, online functionalities, recreation, and daily lives; individual businessmen and entrepreneurs' group has a relatively balanced supply and demand for daily lives services, but considers the supply and demand for daily lives services of the cultural auditorium as relatively balanced. The match between supply and demand of cultural auditorium services for enterprise employees is awareness-raising and education, online functions, recreation and life from high to low; the match between supply and demand of individual businessmen and entrepreneurs for life services is close to 1, and they think that the supply and demand of life services in cultural auditoriums are more balanced, but the demand of this group for awareness-raising and education and entertainment services is lower than the supply of services, and they think that the services are oversupplied; the match between supply and demand of civil servants, employees of state-owned enterprises and institutions for awareness-raising and education services is highest, followed by life services, recreation and online functions, and the environment match is -1. Civil servants, employees of state-owned enterprises and institutions have the highest match between supply and demand for awareness-raising and

education services, followed by life services, and the match between supply and demand for recreation and online functional services is relatively low.

Table 2. Matching the supply and demand of service elements of the first-level cultural auditoriums

Level 1 elements	Publicity and education	Lives	Recreation	Online function
Assemble	(0.999960, 1)	(0.999411, 1)	(0.999431, 1)	(0.999087, 1)
Male	(0.999912, 1)	(0.998555, 1)	(0.999339, 1)	(0.998455, 1)
Women	(0.999949, 1)	(0.999616, 1)	(0.999461, 1)	(0.999351, 1)
Adolescents	(1, 1)	(0.999051, 1)	(0.999902, 1)	(0.999873, 1)
Youthful years	(0.999899, 1)	(0.998797, 1)	(0.998739, 1)	(0.998328, 1)
Middle-aged	(0.999988, -1)	(0.999997, -1)	(0.999989, -1)	(0.999985, 1)
old aged	(0.995609, 1)	(0.998868, 1)	(0.998274, 1)	(0.975313, 1)
Schoolchildren	(0.999005, 1)	(0.993634, 1)	(0.992658, 1)	(0.989776, 1)
Peasants	(0.999945, 1)	(0.999391, -1)	(0.998505, -1)	(0.999767, -1)
Employee	(0.999913, 1)	(0.999609, 1)	(0.999732, 1)	(0.999746, 1)
Entrepreneurs	(0.999338, -1)	(0.999999, 1)	(0.999997, -1)	(0.999964, 1)
Civil servant	(0.999648, 1)	(0.998781, 1)	(0.997319, 1)	(0.997255, 1)

Note: a: individual business owners
b: civil servants
c: employees of state-owned enterprises and institutions

6. Concluding remarks

By analyzing the results of the available data, the following problems still exist in the services provided by the cultural auditoriums in the surveyed areas: the supply of the majority of cultural auditorium services is smaller than the demand; the online function has the lowest matching degree of supply and demand, and there is still a gap between the villagers' demand and the supply; the middle-aged group thinks that there is an oversupply of education, daily lives and recreation services; the farmer group responds that the demand for daily lives, recreation and online function is lower than the supply; individual businessmen and entrepreneur groups think that there is an oversupply of education and recreation services. The middle-aged group thinks that there is an oversupply of educational, daily lives and entertainment services; the farmers group responds that the demand for daily lives, recreation and online services is lower than the supply; and the self-employed and entrepreneurs group thinks that there is an oversupply of educational and recreation services.

Therefore, in response to the problems and deficiencies currently reflected in the cultural auditorium services, the main measures that can be taken are as follow three items: first, according to the cultural auditorium supply and demand matching model to react to the gap between villagers' demand and supply, the cultural auditorium services adhere to the villagers' demand as the guide, and provide villagers with accurate service supply. Second, promote digital empowerment, increase the improvement of online programs, enhance the level of online service supply, integrate the use of online programs into the daily work and activities carried out by the cultural auditorium, make reasonable use of the shared nature of online programs, and realize the interconnection of online and offline services. Thirdly, optimize the service structure, design the services and activities of the cultural auditoriums with the villagers' needs and richness of variety in mind, combine innovative ways of thinking, pay attention to cultural trends and novel cases of information on planning activities, innovate the existing cultural services and activities, and at the same time, strengthen the publicity of the services and activities carried out.

Acknowledgments

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