Analysis on the Configuration Path of Improving the Quality and Efficiency of County-Level Libraries in China

Yan Jiang *

Zhongyuan Institute of Technology Library, Zhengzhou 450007, Henan Province, China

Corresponding author: Yan Jiang, 3721@zut.edu.cn

Abstract: County-level libraries have an inescapable responsibility for cultivating local cultural identity and realizing rural revitalization. Therefore, we analyzed factors that affect the service efficiency of grass-roots libraries in Henan Province through a field investigation and qualitative comparative analysis (QCA), and proposed a high-efficiency configuration. In addition, we put forward the strategy of improving the quality and efficiency of our country's county-level libraries in the electronic information age.

Keywords: County libraries; Henan county-level libraries; Resource allocation efficiency; Qualitative comparative analysis

1. Introduction

Since the 18th National Congress of the Communist Party of China, our country has built public libraries and cultural centers in counties and comprehensive cultural stations in townships, and the framework and pillars of the modern public cultural service system has been basically established[1]. However, due to the impact of the urban-rural dual structure, there are still many problems of unbalanced and insufficient urban-rural development in China's library undertakings. County-level libraries, especially those in the central and western regions, are not well-constructed, lack resources, and have low utilization rates. In the age of electronic information, it is necessary to overcome the general shortage of government financial, human, and material resources, and outline a new development path for county-level libraries. In fact, insufficient is not the only factor that affects the service effectiveness of county-level libraries. "Configuration" in this context refers to the organization and alignment of resources or modules with distinct functions, similar to assembling "building blocks" to create a specific arrangement that accomplishes the necessary functions. This study aims to investigate the factors influencing the service efficiency of county-level libraries and identify the configuration paths utilized to enhance service effectiveness.

2. Research methods and case selection

2.1. Methods for evaluating resource allocation efficiency

Data envelopment analysis (DEA) is a quantitative analysis method suitable for quantitative evaluation of the cultural industry, based on multiple input indicators (i.e., resources) and multiple output indicators

(i. e., services), relatively effective evaluation of comparable units of the same type[2]. DEA is a linear programming model that calculates the input-output ratio and finds ways to reduce inefficiency by comparing inefficient and efficient units[3].

2. 2. Methods of studying factors affecting service effectiveness

The ineffectiveness of county-level library services can be attributed to various factors, including resource factors, environmental factors, and subject factors. Traditional quantitative methods such as multiple regression analysis and structural equation modeling focus on the unique "net effect" of a single variable, while ignoring that the causes or conditions of social phenomena are mostly interdependent rather than independent[4]. The qualitative comparative analysis method of fuzzy sets (fsQCA) was adopted in this study, which integrates both qualitative and quantitative approaches. By incorporating "configuration comparison" and "set theory," fsQCA allows for the examination of intricate asymmetric causality and potential interdependencies among variables through multi-case comparisons. Moreover, it uncovers multiple equivalent paths leading to the same outcome[5], enabling a more detailed and comprehensive analysis.

2. 3. Case selection

Henan Province has jurisdiction over 18 cities, 83 counties, and 1, 791 townships. According to statistics, in 2021, there will be 169 public libraries, 2, 412 township (street) cultural stations, more than 50, 000 comprehensive cultural service centers in villages (communities), and more than 46, 000 rural bookstores[6]. During the "Thirteenth Five-Year Plan" period, most of the county-level libraries in Henan Province built new buildings, "urban study rooms," and "24-hour self-service libraries," and generally carried out the mode of branch libraries. However, according to statistics, the average area of the county-level libraries in Henan Province, the book purchase funds per capita and the total number of books in the collection are all at the middle and lower levels in the country[7]. There are not many professional and technical personnel in the library, and many township libraries do not have full-time staff, services are usually provided by volunteers. In April 2018, the Henan provincial digital public cultural service platform "People's Culture Cloud" was officially launched. In 2020, a province-wide public cultural service distribution and management platform "Wenhua Yuyue" was built, and a closed-loop service structure of "the people order, professional organizations receive orders, and the government pays" was established[8].

2. 4. DEA method to calculate resource allocation efficiency

We used the development of county-level libraries in 18 regions of Henan Province in 2020 as panel data, and the data was divided into primary data and second-hand data. However, the conditions are limited and some data are not particularly accurate. The procedure that we adopted for this research is as follows: First, a scientific and reasonable evaluation index system was established to ensure efficient library resource allocation, where the output index (Y) was the service effectiveness, and the input index was the book-borrowing rate, the number of visitors, and the rate of reviews. From the perspective of resource-based theory, physical resources such as financial resources, material resources, and human resources invested in the service process were selected. These resources are directly influenced by intangible factors, such as management, system, cultural activities, etc. There are also some indirect influencing factors, such as external environmental variables, GDP per capita, degree of informatization, and culture of residents.

On the basis of determining the data of input indicators (investment funds, number of books, area of

county-level library buildings) and output indicators (borrowing rate, number of visitors), DEAP 2. 1 software was used to calculate the efficiency of county-level libraries in 18 regions of Henan Province, and the input-oriented BCC model was used for analysis. The estimated results are shown in Table 1.

Table 1 Efficiency of county-level libraries in 18 regions of Henan Province

Region	Comprehensive technical efficiency	Pure technical efficiency	Scale efficiency	State
Zhengzhou	0. 34	0. 713	0. 477	drs
Xinyang	0. 401	1	0. 401	drs
Xinxiang	0. 24	0. 505	0. 476	drs
Anyang	0. 411	1	0. 411	drs
Kaifeng	0. 393	0. 653	0. 601	drs
Xuchang	0. 413	0. 59	0. 701	drs
Jiyuan	1	1	1	−
Zhumadian	0. 314	1	0. 314	drs
Pingdingshan	0. 345	0. 547	0. 630	drs
Puyang	0. 14	0. 14	0. 993	irs
Luohe	1	1	1	−
Sanmenxia	0. 288	0. 297	0. 970	irs
Luoyang	0. 289	0. 610	0. 474	drs
Nanyang	0. 228	1	0. 228	drs
Zhoukou	0. 222	0. 932	0. 239	drs
Shangqiu	0. 183	0. 62	0. 295	drs
Hebi	0. 96	0. 97	0. 989	irs
Jiaozuo	0. 56	0. 56	1	−
Average	0. 429	0. 73	0. 622	

Note: ": drs" means decreasing scale efficiency, "irs" means increasing scale efficiency, "−" means constant scale efficiency

Table 1 shows that the overall efficiency of county-level libraries in Henan Province was not high, with an average comprehensive technical efficiency of 0. 429, and the efficiency of most areas was below average. These results indicate that there is still much room for improvement in the efficiency of county-level libraries in Henan Province; secondly, there are large differences in the efficiency of the 18 regions. Therefore, the reasons for uneven development needs to be analyzed.

3. Configuration analysis of influencing factors and efficient paths with QCA method

The fsQCA method was used to identify the influencing factors and efficient paths, with the comprehensive technical efficiency of 18 regions as the outcome variable, and four variables including book resources, human resources, external environment (GDP per capita), and cultural activities as the antecedent conditions. Because there is a minimum sample size for fsQCA analysis, in which the number of cases needs to be greater than $2k$ (k is the number of explanatory variables). This study selected data from 18 regions, so four explanatory variables were chosen.

3. 1. Variable assignment and calibration

When performing fsQCA analysis, it is first necessary to assign values to the explanatory variables. Variable assignment is the process of judging whether or to what extent a case belongs to a certain set. The data of the variables in the fsQCA method is also called the degree of membership. According to the characteristics of the data of each variable, a direct calibration method was used to convert the data of 18

regions into a four-valued fuzzy set (0, 0. 33, 0. 67, 1) membership scores. Among them, "0" means no membership at all, "0. 33" means that the degree of no membership is greater than that of membership, "0. 67" means that the degree of membership is greater than that of no membership, and "1" means complete membership.

3. 2. Analysis of necessity of single condition variable

A truth table with $2k$ rows was first constructed, where k was the number of antecedent conditions, and each row represented a possible combination of conditions. A single conditional variable and a non-state necessary conditional analysis of each conditional variable were then performed. The analysis of necessity of fsQCA is simply the extent to which the result set is included in a certain condition set. Only when the consistency level of a condition variable exceeds 0. 9 can the condition variable be considered a necessary condition for the outcome variable.

Table 2 Necessity test of single conditional variable

Variable	Consistency	Coverage
Book resources	0. 826	0. 783455
Book resources	0. 456	0. 940035
Human resources	0. 741	0. 962222
Human resources	0. 683	0. 886667
External environment	0. 624	0. 812918
External environment	0. 743	0. 962306
Cultural activities	0. 713	0. 926
Cultural activities	0. 626	0. 813

Table 2 shows that the consistency levels of the four conditional variables (including non-state) were all less than 0. 9, which means that none of the individual conditions alone can affect the efficiency of resource allocation. indicating that the conditional variable of library resources is a sufficient condition for high efficiency. However, the explanatory power of a single conditional variable for high efficiency is limited, meaning that the high efficiency of county-level libraries is not solely determined by one condition but is the outcome of multiple conditional configurations.

3. 3. Conditional configuration analysis

Conditional configuration analysis measures the impact of different combinations of antecedent condition variables on outcome variables, and it is the core of fsQCA research methods. In this study, the case frequency was set at 1, the consistency was greater than 0. 8, and the PRI consistency was greater than 0. 75. A standard analysis was performed to output complex solutions, parsimonious solutions, and intermediate solutions. Since there were only 4 explanatory variables in this study, the conclusions were not many, so the analysis of high-efficiency configuration through complex solutions was chosen (Table 3).

As shown in Table 3, there were 3 groups of high-efficiency condition combination paths, and the consistency indexes of these 3 groups of configurations were 1, 0. 939, and 1 respectively, indicating that the 3 groups of configurations were all necessary conditions for high efficiency. The total consistency was 0. 89, indicating that these three configurations are also sufficient conditions for improving service efficiency. The total coverage was 88. 7%, indicating that these 3 combinations can explain the vast majority of cases. Further analysis showed that these three groups of configurations can be summarized into the following two high-efficiency paths:

Table 3 Configurations with high resource allocation efficiency

Explanatory variables	Condition combination		
	1	2	3
Book resources	●	●	⊗
Human resources	●		●
External environment GDP		●	⊗
Cultural activities		⊗	●
Consistency	1	0.939	1
Original coverage	0.524	0.496	0.497
Unique coverage	0.059	0.033	0.056
Total consistency		0.89	
Total coverage		0.887	

Note: ● indicates that the core resource is a core condition; ⊗ indicates that the resource is lacking; blank indicates that the resource is dispensable

(i) Resource support type

Corresponding to configuration 1 (book resources * human resources) and configuration 2 (book resources * external environment * cultural activities). Configuration 1: ample library resources and human resources. The combination of these two resources can produce high quality service. A typical example of this configuration is the Mengjin District Library of Luoyang City, which has abundant funds, resources, and facilities. The library also contains the center of the "National Cultural Information Resource Sharing Project" and 120 village-level grassroots service points. The library and its branches have a collection of more than 485,000 volumes, with 13 professional librarians. It was rated as a national first-class museum. Configuration 2 means that the economically developed areas have rich book resources, and although the cultural propaganda activities are less prominent, the residents are still relatively civilized, which can also lead to high quality service. For example, the Yuzhou Library under the jurisdiction of Xuchang City has an area of 8,000 square meters and a collection of more than 400,000 books. Besides, a total of 140,000 books were borrowed from that library in 2022. Therefore, it has been rated as a national first-class museum for many times.

(ii) Management-driven

Configuration 3 (book resources * external environment * human resources * cultural activities) means that although the area is economically backward and lack book resources, but the management personnel are highly professional, and cultural promotion and publicity activities are carried out relatively well, which can also bring about the improvement of service effectiveness. For example, Zhoukou City's GDP per capita ranks relatively low in Henan, and its Huaiyang District (County) library was built earlier, but there are not many collections in the library. However, many activities have been carried out to promote reading, such as lectures and parent-child reading class of Chinese classics. These initiatives have led to the library receiving multiple awards. It was rated as a national first-class library in the sixth national evaluation of public libraries above the county level. During the pandemic, the library was closed but online services were provided, which served more than 100,000 people.

3.4. Further conclusions

The service efficiency will not be affected by one factor alone, except for book resources. From this, it can be concluded that county-level libraries should pay attention to the allocation of book resources, because excellent book resources are crucial for the development of county-level libraries. Besides, a prerequisite for county-level libraries to excel in their services is the establishment of a document resource system that meets the needs of grassroots residents. However, in many areas of our country, there is still an

inadequate supply of public cultural service resources, coupled the issue of "suspension" in terms of supply and "weak participation" in terms of consumption. It is necessary to form mechanisms and policies that promote the allocation and function of resource elements through government leadership. Moreover, enhancing the service efficiency of county-level libraries necessitates the collective influence of multiple factors, with the combination and allocation of resources being more critical than the improvement of individual resource capabilities[9]. Therefore, we should also pay attention to other aspects, so as to effectively improve the effectiveness of public cultural services in county-level libraries.

4. Strategies for improving the quality and efficiency of county-level libraries in our country in the electronic information age

4. 1. Shaping service brand strategy with characteristic culture

Shaping a service brand strategy with characteristic culture involves proactive and distinctive cultural integration, breaking through various limitations, and innovating around elements such as resources, services, space, and personnel. The provincial government should protect and develop key areas of with excellent culture by gathering experts to interpret classic documents, excavating and protecting intangible cultural heritage, building digital platforms for ancient books, and developing cultural and creative products. Besides, the government needs to improve their leadership and coordination, and do a good job in terms of top-level management and organization. Provincial and municipal libraries should do a good job in industry leadership and service training. Improving competitiveness at the county-level libraries can only be achieved when the construction of local characteristic culture and the development a distinct cultural service brand system is emphasized.

4. 2. Innovating and building a resource system based on demand

To achieve high-quality service and create an optimum information environment, it is necessary to dig deep into the potential of internal resources and carefully analyze the advantages of external resources. It is also important to encourage the participation of social forces and improve the multi-subject joint construction input system through project-driven, "government + organization + library," and other models, and enhance the supply of resources. Under the multi-supply structure, it is also necessary to actively seek the perfect balance between the supply and demand. On one hand, this system should allow grassroots residents to express their needs. On the other hand, the system should be able to predict the cultural information needs of the masses through accurate data collection and analysis[10].

4. 3. Seeking breakthroughs in sustainable development led by digital intelligence technology

Leveraging modern digital intelligence technology to effectively explore the cultural essence of literature resources allows for the creation of a diverse virtual service environment in the digital library. This transformation positions the library as the focal point for the cultural experience and atmosphere of the masses[11]. It is important to predict the needs of the masses and provide personalized and refined services. Internal and external resources of the organization should be integrated, and resource allocation and spatial layout should be optimized. Moreover, the flow of talents, resources, information, and other elements between urban and rural areas should be promoted. In addition, the equalization of public cultural services should also be improved. County-level libraries should actively participate in the construction of national public digital cultural projects and actively participate in the construction of the national smart library system. The "order-based," "menu-based," and "reservation-based" service mechanisms should be gradually promoted and enhanced to foster self-improvement and functional

expansion of county-level libraries.

Disclosure statement

The author declares no conflict of interest.

References

[1] "14th Five-Year Plan" Public Cultural Service System Construction Plan, n. d. , viewed May 20, 2023. https://baike. baidu. com/item/%E2%80%9C%E5%8D%81%E5%9B%9B%E4%BA% 94%E2%80%9D%E5%85%AC%E5%85%B1%E6%96%87%E5%8C%96%E6%9C%8D%E5% 8A%A1%E4%BD%93%E7%B3%BB%E5%BB%BA%E8%AE%BE%E8%A7%84%E5%88%92/ 57493475.

[2] Li D, Ru M, Hong W, et al. , 2017, Research on Public Digital Cultural Service Performance Evaluation System Based on Data Envelopment Analysis. Information Exploration, 19(5): 10−14.

[3] Zhao R, Tian Y, 2018, Nonlinear Relationship between Local Government Competition and Local Government Debt Utilization Efficiency — Empirical Evidence from Interprovincial Panel Data. Technological Economy, 37(4): 121−130.

[4] Lu M, 2020, Is There a Way to Improve the Efficiency of China's Logistics Industry?. Business Economics and Management, 24(7): 27−37.

[5] Du Y, Jia L, 2017, Configuration Perspective and Qualitative Comparative Analysis (QCA): A New Path of Management Research. Management World, 2017(6): 155−167.

[6] Henan Provincial Department of Culture and Tourism, 2021, An Overview of Henan Culture, viewed May 20, 2023, https://www. henan. gov. cn/2011/03−04/260811. html.

[7] Basic situation of county-level public libraries in various regions in 2020. Statistical Yearbook of Chinese Cultural Relics and Tourism, 2021, 76−85.

[8] Department of Culture and Tourism of Henan Province, 2021, There is a Good Way to Solve the Chronic Diseases of Grass-Roots Public Cultural Venues in Henan's Precise Policy, viewed May 20, 2023, https://www. henan. gov. cn/2021/01−11/2075994. html.

[9] Ding Y, Xu N, Guo J, 2020, Can Resource Advantages Bring Higher E-Government Service Capabilities?. Journal of Gansu Administration College, 19(1): 25−35.

[10] Wang S, 2019, Research Progress of China's Library Cultural Targeted Poverty Alleviation. New Century Library, 2019(3): 91−96.

[11] Department of Culture and Tourism of Henan Province, 2021, There is a Good Way to Solve the Chronic Diseases of Public Cultural Venues at the Grassroots Level in Henan's Precise Policy, May 20, 2023, https://www. henan. gov. cn/2021/01−11/2075994. html.