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Understanding Complexity in the Role of Market Forces in the Construction of a Public Cultural Service System: Evidence from 435 Children's Libraries in China

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Abstract: China's public cultural service system transitioned from a centrally controlled model to a more complex one due to the gradual introduction of market forces. This change brought new challenges and opportunities, making the role of market forces a practical concern. By analyzing data from 282 public and 153 private children's libraries in China, this study investigates how market forces compensate for the government's capacity limitations in constructing public cultural service systems. Results show that market factors within the scope of our study do not negatively impact the system but instead promote synergy between government and market entities to meet children's cultural needs. It is essential not to sever the role of the market from its interdependent relationship with the government, as this stance is based on unrealistic assessments of how policies function in practice, potentially leading to inadequate public cultural services. This study provides novel empirical evidence from China by confirming the interdependent relationship between the market and the government in constructing public cultural service systems and highlights the significance of applying complexity thinking. Overall, understanding the complexity of the role of market forces is essential for the construction of a robust and inclusive public cultural service system.

Keywords: public cultural service system; complexity; government; market; China

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1. Introduction to the Topic

As a vast country with a population of 1.4 billion, China has established a public cultural service system after its long-term development [1]. As a result, several modern libraries, museums, and art galleries have been established. By the end of 2020, there were 43,687 mass cultural institutions in China, including 3212 public libraries and 5452 museums [2].

Although a public cultural service system has been established in China, many deficiencies and problems remain. For example, the proportion of cultural and tourism expenses in eastern China in 2020 (45.1%) is almost equivalent to the sum of those in central and western China (54.9%), revealing the spatial inequality in the construction of the public cultural service system across the country [2].

New operational mechanisms have been proposed to further improve the public cultural service system in the Outline of the 14th Five-Year Plan (2021–2025) for National Economic and Social Development and Vision 2035 of the People's Republic of China. The socialization of public cultural services is considered an innovative path to improving the public cultural service system [3,4]. In socializing public cultural services, the views on the role of the market are still plagued by controversy in China, which remains an issue to be studied.

Until Deng Xiaoping initiated China's reform and opening up, the government had always been the only provider of public cultural services during the era of the planned economy. This resulted in a single and highly centralized system where the government

made all the decisions. However, market forces have gradually been introduced into China's public cultural service system as the country undergoes its transition to a market economy [5]. Due to the introduction of market forces during the reform and opening up era, the system became more complex because market forces brought competition and diversity, which were absent during the planned economy period.

The new system generated by the introduction of market forces also raises the important question of whether market forces can work in partnership with the government to improve its operational efficiency. This is significant because the public cultural service system is considered a public good, meaning that it should be accessible and beneficial to everyone, regardless of their ability to pay. Therefore, the question of how to maintain the public nature of the cultural service system while making it more efficient is a challenge that needs to be addressed.

Some argue that although the market mechanism has been regarded as a great success in China's rapid economic growth, the welfare of public cultural services and the profitability of the market mechanism are somewhat contradictory [6,7]. According to the traditional view, public cultural services are considered public goods [8]. Therefore, there may be an insufficient supply if the market provides public cultural services [9]. Given their characteristics, public goods have been considered market failures, requiring some form of intervention by the government [10]. Thus, a theoretical question can be raised regarding the complexity of the role of market forces in the construction of a public cultural service system.

Due to the limited empirical evidence available, the discussion of the role of market forces in the construction of a public cultural service system in China has largely remained at the theoretical level. A public cultural service system is a complex social system that comprises interconnected and interdependent elements, such as individuals, communities, institutions, and cultural practices. In this study, we focus on institutions, specifically children's libraries in China, as a practical example. We adopted a spatial analysis method to explore the role of market forces in compensating for the government's lack of capacity in the construction of a public cultural service system. The process and rationale for this empirical strategy will be elaborated in the subsequent sections. In this paper, the term "market forces" refers to the influence and contributions of market mechanisms and market participants in shaping and enhancing the public cultural service system.

The main contributions of our work are as follows: (1) So far, few quantitative studies have been devoted to the role of the market forces, largely due to the difficulty of quantifying the market's role in the construction of the public cultural service system. Using national data and spatial analysis methods, reliable empirical evidence is provided in our study to explore the role of the market in the provision of public cultural services. (2) The current debate on public cultural service system construction in China has been contentious and lacks consensus. Our study demonstrates that market-oriented reforms can complement the government's efforts in constructing a public cultural service system, leading to better efficiency of services. These results contribute to ongoing debates about public cultural service system development and provide a practical reference for policymakers and practitioners. (3) As a developing country transitioning to a market economy, China's experience provides valuable lessons for managing complexity in public cultural service systems in many countries. Our study contributes to the broader discourse on how to promote effective public cultural service system construction in different contexts.

2. Literature Review

Complexity thinking provides a fresh perspective and approach that can be adopted by various disciplines within the social sciences, enabling them to more effectively address the intricate challenges and opportunities arising from complex markets, cultural changes, and much more in this new era of human history [11,12]. Turner and Baker (2019) point out that emphasizing the importance of complexity thinking is crucial, particularly when grappling with ambiguity and uncertainty, as attempting to control complex systems would

merely result in temporary solutions [12]. Our actions can have lasting consequences for those affected by the change, necessitating a thorough evaluation of the impact and implementation of any required adjustments to ensure the well-being of all involved parties [13]. It is vital to recognize that a one-size-fits-all approach is inappropriate, as individuals often witness success in one context and mistakenly assume it will apply universally [14]. By embracing complexity thinking, organizations and governments can adapt to the dramatic shifts spurred by factors such as quality improvement and continuous innovation [15].

Complexity thinking is gaining increasing recognition in public administration, policy, and management [16]. One implication of this complexity for public policy is the introduction of challenges related to equity and efficiency trade-offs [17]. For example, Jane Jacobs (1992) emphasized the incompatibility of "commercial syndrome" and "guardian syndrome", representing market and government values, respectively [18]. Nonetheless, both markets and governments are essential for addressing contemporary complex problems in a cooperative and symbiotic manner. Complexity theory proposes that public policy implementation should be approached pragmatically as a self-organizing system. This approach requires public managers to strategically engage with complexity in a manner consistent with such pragmatic understanding [19]. To navigate this landscape effectively, a modern state must possess the necessary structures and capacities for a robust and persistent "complexity policy" while maintaining the ability to learn and adapt [20].

In public policy and management, Colander and Kupers' (2014) influential work, *Complexity and the Art of Public Policy*, proposes a complexity framework [21]. This approach shifts the debate from a government-versus-market dichotomy to examining the government's role in structuring societal ecosystems and facilitating collective coordination. The authors assert that the state is a fundamental element of human society, with markets and governments being interconnected through co-evolution. Ignoring this relationship leads to suboptimal policies. The book highlights the limitations of market fundamentalism and emphasizes the need for policies that establish eco-structures for achieving collective benefits, integrating both top-down and bottom-up forces, as opposed to relying solely on narrow views of human behavior, such as the rational choice paradigm.

In contemporary China, the situation appears to be the opposite on the surface. China does not highlight the limitations of market fundamentalism. Instead, it advocates for market-oriented reforms in the economic and social system, harnessing the power of the market. This stance primarily stems from the Chinese Communist Party's pursuit of communism and a planned economic system following the establishment of the People's Republic of China. Consequently, the government's role has been exceptionally strong for an extended period, and even today, the Chinese government's role and leadership surpass those of Western governments by a significant margin [22,23]. Thus, a critical issue in Chinese society concerning the complexity of public policy and management is determining the appropriate role of market forces.

The public cultural service system aims to provide citizens with access to cultural resources and services, fostering cultural development and social cohesion. The system consists of various interconnected entities, including government agencies, private organizations, and the public [2]. These components work together to create a cohesive and adaptive system that can respond to changing cultural landscapes and societal needs. Complexity thinking helps explain the intricate interactions among these entities and how they adapt and evolve over time to meet the changing cultural needs of society [21].

However, in a sense, understanding and managing the complexity of the role of market forces in the construction of a public cultural service system is actually a limitation in Chinese academia's research. Specifically, in understanding the roles of the government and the market and their interaction, research in China's academia is, on the one hand, still at the theoretical discussion level, lacking reliable empirical evidence-based quantitative studies. On the other hand, these theoretical discussions lack complexity thinking, sep-

arating the roles of government and market, making it an oversimplified and idealized either/or situation.

To be more specific, there are two controversial opinions on further constructing China's public cultural system: (1) One side holds that by cultivating a diversified public cultural service system, China can solve the problems of government monopoly and low efficiency [24]. To this end, it is necessary to reconstruct a public cultural system based on the market economy [25]. (2) Another voice believes that market failure and social justice are the right reasons for government responsibility. Therefore, the development of public cultural service systems must begin with government departments or the public sector [26,27]. Therefore, in this study, we attempt to draw on complexity thinking and adopt quantitative research methods to specifically explore the role of the market in the construction of public cultural service systems.

3. Materials and Methods

3.1. Research Objective

The research objective of this study is to explore the role of the market in the construction of a public cultural service system in China.

Although it is considered that the government should not be the sole provider of public cultural services in China, it is wrong to directly affirm the role of market forces [28]. Because the role of the market in building a public cultural service system may actually be complex, it is helpful to quantitatively analyze and compare the public cultural services provided by different subjects, such as the government and the market, when exploring the role of the market in the construction of public cultural service systems in China [29].

In traditional social science research, scholars typically propose dichotomous research hypotheses when examining the issue of market involvement in public cultural service systems. However, presenting research hypotheses in such an either/or manner oversimplifies the complexity of market roles. Traditional public policy approaches are fundamentally rooted in control and prediction, as they involve comparing the expected costs and benefits of a proposed set of alternatives [30]. This approach tends to overlook the interaction between government and market forces, as well as the specific role of the market within this interactive relationship. Regrettably, the policy models employed by economists have not advanced to accommodate these complexities and remain entrenched in either market fundamentalist or government control narratives. Although these standard narratives may prove useful in some cases, they can be detrimental in others, diverting attention away from creative, innovative policy solutions [21].

By suggesting research hypotheses in an either/or style, scholars unintentionally embrace a way of thinking that is not in line with the "complexity perspective". Hence, this paper opts to articulate the research objectives rather than proposing a deterministic or binary research hypothesis.

3.2. Empirical Strategy

The first challenge in quantifying and analyzing the market's role in constructing the public cultural service system lies in defining the concept of public cultural services. Perhaps due to the elusive nature of culture, public cultural services lack a universally accepted definition within academia [31]. Consequently, it is essential to approach this issue from a practical standpoint. According to the Public Cultural Service Guarantee Law of the People's Republic of China, "public cultural services" are defined as any public cultural facility, cultural product, cultural activity, or other relevant services in which the government takes the lead, with social resources participating primarily to satisfy citizens' basic cultural demands.

In accordance with the Law of the People's Republic of China on Public Libraries, a library is considered a public cultural facility if it is open to the public free of charge; collects, reviews, and preserves literature information; provides search, lending, and related services; and conducts social education. Both "public libraries" established by the government and

"private libraries" established by the market are considered public cultural facilities in China [32]. Therefore, using libraries as an example offers a viable method for analyzing the spatial distribution of public cultural facilities when quantifying the supply of public cultural services [33,34].

To the best of our knowledge, there is limited quantitative research on the market's role in constructing the public cultural service system in China. Existing quantitative studies on public cultural service provision primarily focus on the government sector, utilizing national data from sources such as the China Statistical Yearbook or the Chinese Culture and Tourism Statistics Yearbook [35,36]. As a result, a unique research design and data collection approach is necessary to quantify and analyze the market's role in constructing the public cultural service system.

Children's libraries are well received by both parents and children during the marketization process, accumulating valuable experience in combining public welfare principles with market-oriented directions [37]. This study analyzes the spatial distribution of public and private children's libraries in China to evaluate the role of market forces in constructing the public cultural service system. The specific methodology involves applying spatial analysis techniques to determine the spatial distribution of public cultural facilities in conjunction with population survey data and geographic information systems (GIS) to assess the local supply level of public cultural services.

3.3. Data Sources

The analysis is based on the geographic information database of 337 prefecture-level cities. The data for the dependent and independent variables were matched into the geographic information database according to their administrative division.

As explained variables, the two variables of "the number of public children's libraries" and "the number of private children's libraries" are used to reflect the role of the government and the market in the construction of local public cultural facilities. The number of children's libraries was obtained from Baidu Maps Coordinate System. Baidu Maps includes the largest geographic information collection capability and China's most advanced collection technology. It uses a variant of the web Mercator projection, with distances expressed in degrees, referring to latitude–longitude information. According to the administrative divisions of the People's Republic of China, we obtained the number of public and private children's libraries in 337 prefecture-level cities (excluding Hong Kong, Macao, and Taiwan).

In this study, private children's libraries refer to children's cultural institutions funded and established by individuals or social groups primarily for lending and reading information resources. In contrast, the government constructs public children's libraries. It is important to note that public children's libraries include separate children's departments within public libraries, while private children's libraries do not encompass bookstores, picture book rooms, or picture book libraries. As this study examines the spatial distribution of children's libraries, the quantity statistics are based on individual library buildings, indicating that if a library has multiple branches, each is included in the statistical count. Data collection commenced in December 2021.

The explanatory variables are spatial characteristics at the prefecture level, including administrative attributes ("whether it is a provincial-level capital/sub-provincial city/municipality" (yes = 1, no = 0), "whether it is an ethnic minority area" (yes = 1, no = 0), demographic characteristics (population density, primary, and secondary school students), and economic conditions (logarithm of GDP per capita, GDP growth rate, the share of the tertiary industry in total GDP, the share of tertiary industry employment in total employment). The data for the explanatory variables come from the China City Statistical Yearbook 2019 and provincial statistical yearbooks.

The operationalization of these variables can be found in Table 1, and their descriptive statistics are summarized in Table 2.

Table 1. Operationalization of variables.

Variable Type		Variable Name	Variable Symbol	Note
Explained variables		Number of public children's libraries	*lib_public*	——
		Number of private children's libraries	*lib_private*	——
Explanatory variables	Administrative attributes	Provincial-level capital/sub-provincial city/municipality	*capital*	Yes = 1, no = 0
		Ethnic minority area	*minor*	Yes = 1, no = 0
	Demographic characteristics	Population density	*density*	People per km^2 of land area
		Primary and secondary school students	*stu*	Unit: 10,000 people
	Economic conditions	Logarithm of GDP per capita	*lnGDP*	——
		GDP growth rate	*GDP_growth*	%
		The share of the tertiary industry in total GDP	*GDP_struc*	%
		The share of tertiary industry employment in total employment	*employ_stru*	%

Table 2. Descriptive statistics.

Variable	Maximum	Minimum	Mean	Variance	Observation Number
lib_public	14	0	0.84	3.37	337
lib_private	11	0	0.45	1.72	337
capital	1	0	0.11	0.10	337
minor	1	0	0.13	0.11	337
density	2578.44	4.08	434.95	127,049.47	337
stu	210	2	32.65	712.42	337
lnGDP	12.16	9.45	10.87	0.28	337
GDP_growth	13.00	0.30	6.92	3.66	337
GDP_struc	80.98	26.54	60.36	58,033.13	337
employ_stru	92.74	16.57	56.31	201.23	337

3.4. Methods

3.4.1. Spatial Autocorrelation

Spatial autocorrelation analysis is used to estimate and analyze the spatial dependency and heterogeneity among objects, commonly using Moran's I index to this end. Global Moran's I reflects the global spatial autocorrelation among geographical regions, whereas local Moran's I reflects the local similarities and differences between neighboring cities [38].

This study used the global Moran's I index to detect global spatial patterns, such as an east–west trend or an unusually large cluster among children's libraries. Let x_i be the observed value of the number of children's libraries in the i-th city and w_{ij} the spatial weight coefficient between the i-th and j-th cities. The spatial weight matrix was calculated based on contiguity edges and corners.

The form of global Moran's I is as follows:

$$\text{Global Moran'I} = \frac{n\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}(x_i-\overline{x})(x_j-\overline{x})}{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}\sum_{i=1}^{n}(x_i-\overline{x})^2}$$

The interval value of global Moran's I is $[-1, 1]$, where $[-1, 0]$ represents negative autocorrelation, and $[0, 1]$ positive.

Local Moran's I (local indicators of spatial association, LISA) is a step further in testing the correlation of the libraries' spatial distribution between neighboring cities and can be modeled as:

$$\text{Local Moran'I} = \frac{(x_i - \overline{x})}{\sum_{i=1}^{n}(x_i - \overline{x})^2} \sum_{i=1}^{n} w_{ij}(x_i - \overline{x})^2$$

Local Moran's I can be used to classify the spatial cluster types.

A high–high (HH) cluster type refers to areas with higher-than-expected values of the variable of interest surrounded by areas with high values of the variable, a low–low (LL) cluster type refers to areas with lower-than-expected values of the variable of interest surrounded by areas with low values of the variable, a low–high (LH) cluster type refers to areas with lower-than-expected values of the variable of interest surrounded by areas with high values of the variable, and a high–low (HL) cluster type refers to areas with higher-than-expected values of the variable of interest surrounded by areas with low values of the variable [39].

3.4.2. Spatial Autocorrelation

The geographically weighted regression (GWR) model is a local spatial technique designed to deal with spatial non-stationarity by examining spatial variabilities [40]. Compared with the ordinary least squares (OLS) regression model, the GWR model considers geographical distance [41].

The OLS model can be written as:

$$y_i = \beta_0 + \sum_{j=1}^{n} \beta_j x_{ij} + \varepsilon_i$$

where regression coefficient β_j is assumed to be a constant value.

The GWR model can be regarded as an extended spatial disaggregation of the OLS model, which can be expressed as:

$$y_i = \beta_0(u_i, v_i) + \sum_{j=1}^{n} \beta_j(u_i, v_i) x_{ij} + \varepsilon_i$$

where regression coefficient β_j is no longer assumed to be a constant value but varies with the regression point (u_i, v_i), which represents the longitude and latitude coordinates of the i-th city.

The Lagrange multiplier (LM) test can indicate the appropriateness of a spatial regression model with respect to spatial lag dependence and spatial error [42]. $p \leq 0.05$ means a statistically significant test result.

4. Results

4.1. The Spatial Features of Libraries' Distribution

Data on 435 children's libraries in 31 provinces and 337 cities were collected, including 282 public and 153 private children's libraries [1]. The spatial distributions of public and private children's libraries are shown in Figures 1 and 2, respectively. As can be seen from both figures, the spatial distribution of children's libraries is high in the east and low in the west, distributed in a three-step shape [2].

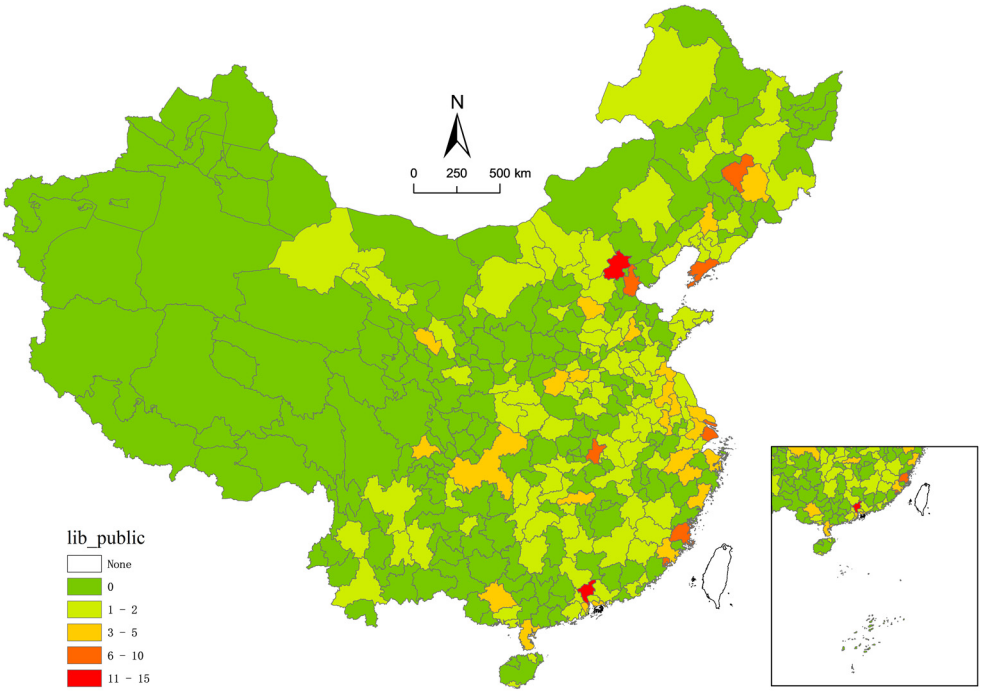

Figure 1. Spatial distribution of public children's libraries in China.

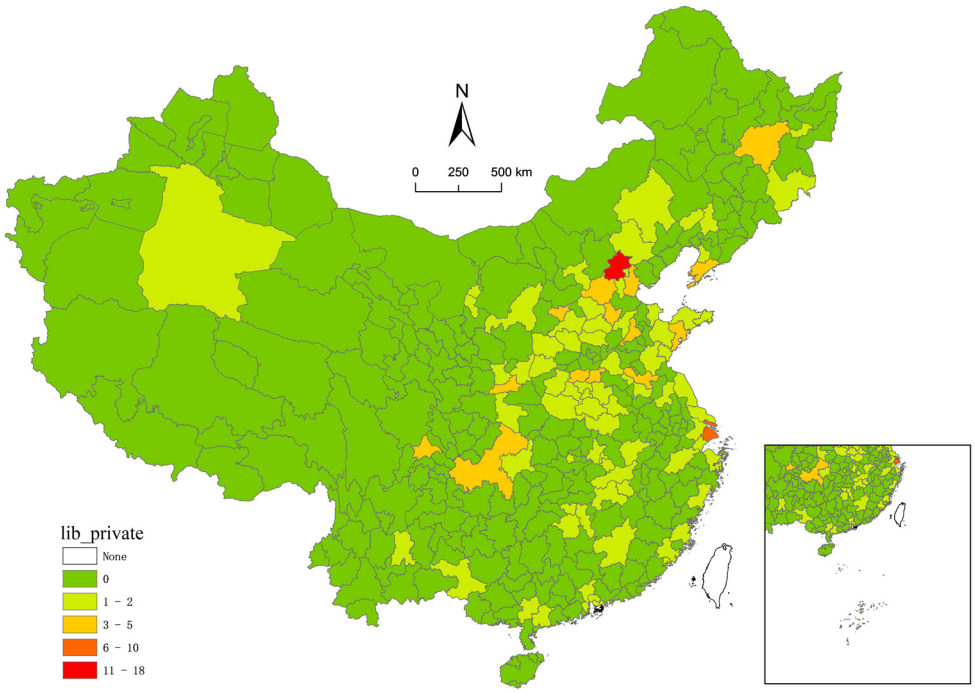

Figure 2. Spatial distribution of private children's libraries in China.

Table 3 further suggests the spatial features of this three-level ladder distribution. The number of public children's libraries nationwide is nearly twice that of private children's libraries, which indirectly shows that the government occupies a dominant position in constructing China's public cultural service system. Meanwhile, the regional gap in the spatial distribution of private children's libraries is smaller than that of public children's libraries.

Table 3. Spatial descriptive statistics of children's libraries by region.

Region		lib_public (n = 282)	lib_private (n = 153)	Total (n = 435)
Eastern Region	Subtotal	169	78	241
	Mean	15	7	22
Central Region	Subtotal	74	52	126
	Mean	9	7	16
Western Region	Subtotal	39	23	62
	Mean	3	2	5

4.2. The Spatial Features of Libraries' Distribution

We used Geoda 1.14 (Center for Spatial Data Science Computation Institute, Chicago, IL, USA) to perform spatial autocorrelation analysis to further analyze the unequal spatial distribution of children's libraries.

The results are presented in Table 4. From Table 4, the global Moran's I index values of public and private children's libraries in 337 prefecture-level cities in 2021 were 0.134 and 0.172, respectively. The normalized z-scores are 4.058 and 5.873, respectively, which are much larger than the significant horizontal threshold of 1.96 and pass the significance-level test. This shows a significant spatial autocorrelation between the number of children's libraries in 337 prefecture-level cities and a strong agglomeration phenomenon. The number of children's libraries in the cities adjacent to cities with a higher number of children's libraries is also correspondingly higher. By contrast, the number of children's libraries in cities adjacent to cities with a lower number of children's libraries is also low.

Table 4. Global Moran's I index and test of global autocorrelation of library numbers.

Index	Lib_public	Lib_private	Total
Moran's I	0.134	0.172	0.133
z-score	4.058	5.873	4.524
p-value	$p < 0.001$	$p < 0.001$	$p < 0.001$
Adjacency matrix	CONTIGUITY_EDGES_CORNERS		

To express more intuitively the degrees of the differences in the numbers of public and private children's libraries for each administrative city and their changing trend, we mapped the LISA agglomeration at a significance level of $\alpha = 0.05$ (Figures 3 and 4). As shown in the figure, the LISA agglomeration map has the following characteristics.

- HH-type zone. This area belongs to prefecture-level city units with high numbers of children's libraries and correspondingly high numbers of children's libraries in the surrounding areas. Local expenditures in neighboring municipalities can be spatially interdependent because of spillovers, cooperation effects, competition effects, or mimicking [43]. The specific characteristics are that the number of children's libraries in such areas is relatively high, and the spatial difference between adjacent units is relatively small. The HH-type zone of public children's libraries is mainly dominated by economically developed cities whose governments have strong financial capacities and advantages in the expenditure of public cultural services, for example, Dalian in Northeast China; Beijing and Tianjin in North China; Shanghai, Suzhou, Nantong, and Yangzhou in East China; and Quanzhou, Guangzhou, Zhuhai, and Shenzhen in Southeast China. Cities with large populations of primary and secondary school students dominate the HH-type zone of private children's libraries. Economic development is not a common feature in such regions, which include Beijing, Tianjin, Shijiazhuang, Baoding, Langfang, Chengde, and Hengshui in North China; Yantai, Qingdao, Weifang, and Shanghai in East China; and Zhumadian, Zhoukou, Kaifeng, and Zhengzhou in Central China. In addition to agglomerations in first-tier cities such as Beijing and Shanghai, the number of private children's libraries also has a

significant agglomeration effect in cities with underdeveloped economies and large numbers of primary and secondary school students.

- LL-type zone. No prefecture-level cites were distributed in this area; therefore, no analyses were performed.
- HL-type zone. This area belongs to prefecture-level city units with high numbers of children's libraries and correspondingly low numbers of children's libraries in surrounding areas. The spatial relationship shows a negative correlation and strong spatial heterogeneity. The HL-type zone of public children's libraries is mainly concentrated in economically developed cities adjacent to cities with weaker economies. Due to the large differences in financial resources between governments, expenditures on public cultural services vary greatly, forming a local spatial heterogeneity HL cluster, including Chongqing and Nanning in Southwest China and Wuhan in Central China. The HL-type zone of private children's libraries is mainly concentrated in Harbin in Northeast China and Chongqing in Southwest China.
- LH-type zone. This area belongs to prefecture-level city units with low numbers of children's libraries and correspondingly high numbers of children's libraries in surrounding areas. The HL-type zone of public children's libraries is mainly concentrated in Langfang and Chengde in Hebei Province, and that of private children's libraries is mainly concentrated in Zhangjiakou City in Hebei Province.

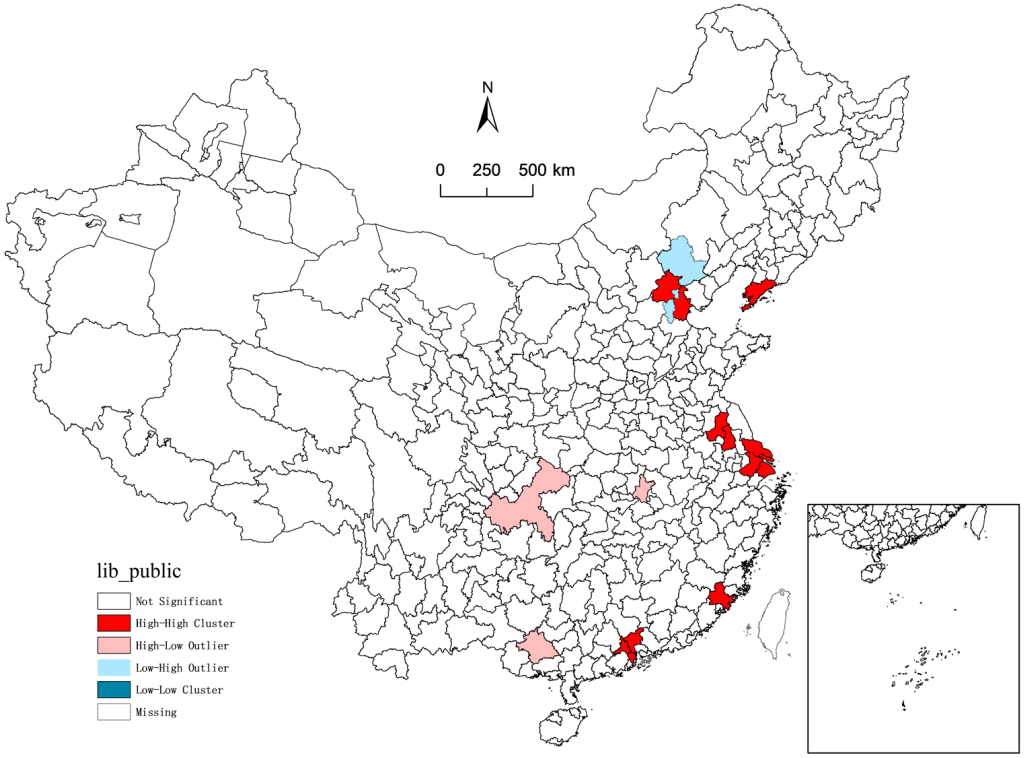

Figure 3. LISA agglomeration of the number of public children's libraries.

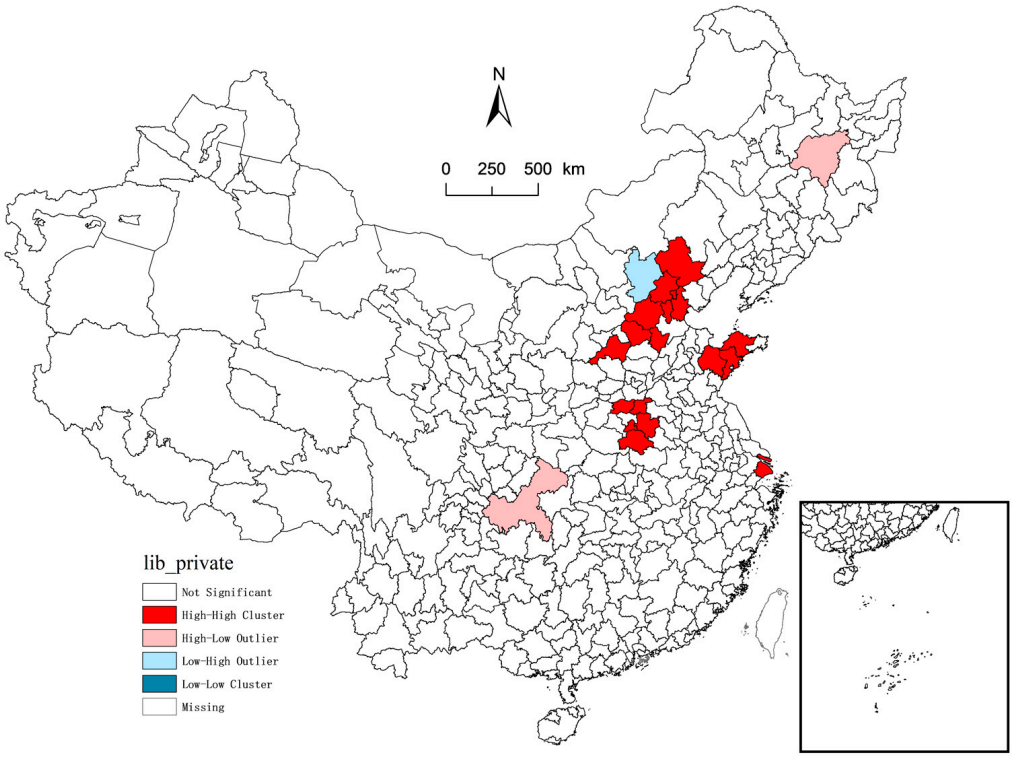

Figure 4. LISA agglomeration of the number of private children's libraries.

4.3. Regression Analysis of Factors Influencing the Construction of Public Children's Libraries

4.3.1. Spatial Autocorrelation

The OLS regression model was used, and the number of public and private children's libraries was taken as explained variables. The results are presented in Tables 5 and 6, respectively.

Table 5 shows a significant positive correlation between the construction probability between public children's libraries and a city's administrative attributes (whether it is a provincial-level capital/sub-provincial city/municipality), population density, the number of primary and secondary school students, and the logarithm of the GDP per capita. Table 6 shows a significant positive correlation between the construction probability of private children's libraries and a city's administrative attributes, population density, the number of primary and secondary school students, and the proportion of employees in the tertiary industry.

The R^2 of the two models is greater than 40%, indicating that the fitting effect is ideal; however, the results of the LM-lag test are both significant, which suggests that the existence of spatial autocorrelation may cause the estimation results to be biased. As it is difficult to judge whether spatial dependence is derived from the variable itself or the model's error term in empirical research, it is necessary to decide which spatial autoregressive model is more in line with objective reality according to the specific discriminant criterion.

Anselin (2003b) proposed the following criterion. If the LM-lag is statistically more significant than the LM-error, it can be concluded that the appropriate model is a spatial lag model [44]. Conversely, if the LM-error is more statistically significant than the LM-lag, it can be concluded that the spatial error model is more appropriate. As can be seen from Table 5, the statistical tests of the LM-lag are significant ($p < 0.05$), while the LM-error is not significant ($p = 0.88$), meaning the spatial lag model is more suitable for the autocorrelation regression analysis. Table 6 presents similar information and conclusions.

Table 5. Factors influencing the construction of public children's libraries (OLS).

Explanatory Variable	Coefficient	SE	*p*
capital	2.610	0.294	<0.001
minor	−0.290	0.748	0.698
density	0.001	0.002	0.002
stu	0.017	0.004	<0.001
lnGDP	0.289	0.115	0.012
GDP_growth	−0.117	0.046	0.010
GDP_struc	0.001	0.004	0.679
employ_stru	0.002	0.006	0.739
lib_private	0.581	0.059	<0.001
Constant	−2.412	1.415	
R^2		0.562	
F		26.99	
LM-*lag*		0.001	
LM-*error*		0.882	
Observation number		337	

Table 6. Factors influencing the construction of private children's libraries (OLS).

Explanatory Variable	Coefficient	SE	*p*
capital	1.047	0.239	<0.001
minor	−0.501	0.607	0.409
density	0.001	0.001	0.102
stu	0.019	0.003	<0.001
lnGDP	0.181	0.093	0.054
GDP_growth	−0.017	0.037	0.627
GDP_struc	0.001	0.002	0.813
employ_stru	0.012	0.005	0.015
lib_public	0.378	0.039	<0.001
Constant	−2.619	1.147	0.023
R^2		0.426	
F		14.68	
LM-*lag*		0.003	
LM-*error*		0.116	
Observation number		337	

4.3.2. Spatial Autocorrelation

The GWR regression results in Tables 7 and 8 further reveal the regression mechanism and spatial autocorrelation between the spatial distribution of children's libraries and the degree of influence of its driving factors. The GWR models showed great advantages over OLS models in terms of the higher model R^2. The prediction accuracy (R^2) of the GWR models of public and private children's libraries increased to 59.3% and 50.2%, respectively, which were approximately 3.1% and 7.6% higher than the prediction accuracies of the OLS models. The specific results are as follows.

First, the city's administrative attributes and economic level impact the probability of constructing public children's libraries. Table 7 shows that the construction probability of public children's libraries in a provincial-level capital/sub-provincial city/municipality is significantly higher than that in other cities. In China, prefecture-level city governments are required by law to build public libraries but are not compelled to build public children's libraries. Only eligible regions are encouraged to do so [3]. The level of economic development directly affects local fiscal revenue, thereby affecting investment in public cultural services [45]. The resource allocation capacity of the government is highly dependent on its administrative attributes and local financial budget [35], which may restrict the construction of public children's libraries in lower administrative and economically underdeveloped areas.

Second, the construction probability of children's libraries is higher in cities with a high population density and a large number of primary and secondary students. Such statistical associations are valid for both public and private children's libraries. For example, for every 10,000 increase in the number of primary and secondary school students, the construction probability of public and private children's libraries in local cities increases by 1.6% and 1.7%, respectively. This suggests that even children's libraries built by market forces align with the orientation of the public cultural policy, that is, to meet the basic cultural needs of citizens.

Table 7. Factors influencing the construction of public children's libraries (GWR).

Explanatory Variable	Coefficient	SE	*p*
capital	2.731	0.287	<0.001
minor	−0.389	0.722	0.589
density	0.001	0.002	0.010
stu	0.016	0.004	<0.001
lnGDP	0.272	0.111	0.014
GDP_growth	−0.039	0.046	0.013
GDP_struc	0.001	0.003	0.641
employ_stru	0.004	0.006	0.511
lib_private	0.553	0.108	<0.001
Constant	−2.554	1.363	0.060
R^2			0.593
Observation number			337

Table 8. Factors influencing the construction of private children's libraries (GWR).

Explanatory Variable	Coefficient	SE	*p*
capital	1.128	0.231	<0.001
minor	−0.468	0.580	0.589
density	0.001	0.001	0.160
stu	0.017	0.003	<0.001
lnGDP	0.163	0.089	0.067
GDP_growth	−0.012	0.035	0.733
GDP_struc	0.001	0.002	0.780
employ_stru	0.013	0.005	0.012
lib_public	0.346	0.178	<0.001
Constant	−2.558	1.098	0.019
R^2			0.502
Observation number			337

Third, there is a negative correlation between the construction probability of public children's libraries and the GDP growth rate. Extant studies have confirmed a robust negative causal or inverted U-shaped relationship between public welfare spending and economic growth [46,47]. We also captured this inverse relationship in public children's libraries, as shown in Table 7. If such an association is robust and valid, it may imply that the government's enthusiasm for constructing public cultural service systems is, to some extent, suppressed by the goal of economic growth. Some studies have pointed out that local governments that have gradually become rich have not increased their investment in public cultural services. On the contrary, rising prices are the main reason for the increase in public cultural expenditure in China [48,49].

Fourth, the construction probability of private children's libraries has no significant statistical correlation with local economic factors (logarithm of GDP per capita and the share of the tertiary industry in the total GDP) but has a significant correlation with the number of primary and secondary school students. This suggests that the construction of private children's libraries may help ease pressure on the supply of public cultural services in a way that does not discriminate against economically underdeveloped areas. Additionally,

no negative correlation between the construction of private children's libraries and the GDP growth rate was observed in this study.

Finally, there was a significant positive correlation between the number of public and private children's libraries. It can be seen from Tables 7 and 8 that cities with more public children's libraries have more private children's libraries and vice versa. This statistical correlation indicates that introducing market factors would not result in a competitive relationship between the government and the market, causing public and private children's libraries to crowd out each other. By contrast, this indirectly proves that the two major forces of the government and the market can form an effective synergy in constructing the public cultural service system.

Overall, the statistical analysis presented above suggests that in order to comprehend the role of market forces in the construction of a public cultural service system, it is essential to adopt a complexity thinking perspective. Specifically, understanding the role of the market requires acknowledging the interdependence and adaptation between the government and market forces. Both government and market forces contribute to the development of public cultural services. By recognizing their interdependence, we can explore avenues to foster collaboration and synergy between these two entities rather than perceiving them as adversaries in the construction of public cultural service systems.

5. Discussion

To the best of our knowledge, there are few empirical studies on the construction of a public cultural service system in China, and few quantitative studies have been devoted to the role of market forces. What is even more serious is that, so far, the academic community has focused on the issue of lake complexity thinking, separating the roles of government and market, making it an oversimplified and idealized either/or situation. This has led to a lack of suitable understanding of the role of market forces in the construction of China's public cultural service system so far.

This study adds to the limited body of empirical work on the role of market forces in China's public cultural service system construction. By taking public and private children's libraries as an example, we examined the relationship between the government and the market on the construction of the public cultural service system and the role played by the market.

We have observed that the interplay between government and market forces is not an "either/or" situation but rather a complex interaction, which needs to be thoroughly understood for optimal system construction. It indicates that the role of market forces in the construction of a public cultural service system is complex. To understand this complexity, the role of market forces must be placed in the interaction with the government, and the two cannot be separated.

Although the supply of public cultural services is closely related to government behavior, there is a large gap between China and developed countries in the financial guarantee mechanism of public cultural services [50]. For example, China's per capita expenditure on cultural services in 2020 was only CNY 77.08, according to the *Cultural and Tourism Development Statistics Bulletin 2020* [4]. Although public cultural expenditure may increase with GDP growth, its growth is generally stable and slow. It would not be affected by the ideological positions of political parties, the form of government, and political business cycles [45]. Therefore, it is impossible to fully develop the public cultural service systems of developing countries such as China by simply advocating the full play of government functions.

Compared to countries such as the USA and the U.K., which have long embraced market fundamentalism and emphasize the limitations of market forces when considering their complexity [21], China takes a contrasting approach. China recognizes the longstanding dominant role of the government in the supply of public cultural services and the challenges it faces, necessitating reforms toward utilizing the potential of market forces.

The functional limitations of the government suggest that the socialization of public cultural services is a means to advance the development of the public cultural service system. Within the scope of this study, the functional limitations of the government manifest in two aspects: (1) the construction of government-funded public cultural facilities is significantly influenced by a city's administrative attributes and economic development level, leading to issues such as an unequal supply of public cultural services; (2) as a non-productive public welfare expenditure, public cultural service expenditure may crowd out the investment demand for productive public expenditure, potentially inhibiting the government's enthusiasm and initiative to increase spending on public cultural services.

In addition, no evidence within the scope of this study demonstrates that market factors have detrimental effects on the development of the public cultural service system. Whether it is a government-sponsored public children's library or a market-sponsored private children's library, the construction probability is highly correlated with the number of primary and secondary school students. This suggests that, during the socialization of public cultural services, the market mechanism also adheres to the objective of satisfying citizens' basic cultural needs.

Possibly due to the full or partial welfare nature of public cultural service provision, we did not observe a competitive relationship between the government and the market in crowding each other out in public cultural service provision. On the contrary, there is a positive correlation between the construction probability of government-sponsored public children's libraries and market-sponsored private children's libraries. Nevertheless, we recognize that market forces may introduce new issues not addressed in this study. For instance, this study identified a significant spatial autocorrelation between the number of private children's libraries in 337 prefecture-level cities and a strong agglomeration phenomenon. Whether this spatial agglomeration and spatial autocorrelation effect will cause market forces to further exacerbate the spatial inequality issue in the development of public cultural service systems remains unexplored in this article due to data resource limitations. In light of this, we propose that more nuanced discussions and policies should consider both the potential benefits and limitations of market involvement in public cultural service systems.

In conclusion, our study offers novel insights challenging the traditional dichotomy of the market versus government in constructing public cultural service systems. By advocating for a harmonious blend of market mechanisms and governmental regulation, our research highlights the potential for synergy that could optimize service supply and fulfill citizens' cultural needs more effectively. The insights gleaned also underscore the fact that market forces, despite the functional limitations of government, should not be viewed as competition but as viable contributors that could enhance service accessibility, particularly in areas with insufficient government funding. Going forward, we propose an approach that navigates the intricate interplay between government and market forces, continually focused on maintaining the balance between efficiency and the integral objectives of equity, accessibility, and quality in public cultural services. Our hope is that this study will guide more comprehensive strategies, encouraging nuanced discussions and policies that consider the potential benefits and challenges of market involvement in public cultural service systems.

6. Conclusions

In traditional policy discussions, the government's role is to rectify market failures, in contrast to the market fundamentalist model, which views markets as self-organizing and regards state interventions as detrimental [16]. Our study provides evidence that the introduction of market forces can be beneficial in optimizing the development of a public cultural service system. However, it is essential not to sever the role of the market from its interdependency and adaptation relationship with the government, as this stance is based on unrealistic assessments of how policies function in practice, potentially leading to a public cultural service supply that fails to meet public needs.

This study is, to the best of our understanding, the first to confirm the interdependent relationship between the market and the government in the construction of China's public cultural service system. Furthermore, it underscores the importance of complexity thinking in comprehending the structure and operational mechanisms of such a system, as well as the role of market forces. Consequently, it is necessary to understand and manage such complexity in constructing a public cultural service system. Within the complexity policy frame, the market and the government are viewed as coevolving entities. This more realistic understanding shifts the polarized discussion toward a more nuanced question of how the market and government can synergistically collaborate to address complex issues in building a public cultural service system.

Nevertheless, we must recognize certain limitations in our work. Firstly, although we examined the interaction between the market and the government and the role of market forces in the construction of China's public cultural service system, our analysis did not incorporate other complexity-related mechanisms, such as sensitivity to initial conditions and feedback loops. Secondly, due to data limitations, we have not explored how the interaction and interdependence between the market and the government adapt and evolve over time to meet the constantly changing needs of public cultural services in society. It is important for future research to explore these additional complexities to gain a more comprehensive understanding of the dynamics at play. Future research should aim to address the uncovered aspects of complexity mechanisms and examine the dynamic evolution of market–government interactions in public cultural service systems. By doing so, we can provide a more comprehensive analysis and gain deeper insights into the complexities of constructing and improving public cultural service systems.

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Notes

1 Currently, there is no public data on the number of public and private children's libraries in various prefecture-level cities in China. Some literature reports separate totals for public or private children's libraries, but discrepancies may exist when compared to this study's data. To ensure comparability, a unified standard and operating system must be applied to investigate public and private children's libraries. This study uses Baidu Maps for data collection, and the authors can confirm the data's comprehensiveness within the Baidu Maps database. However, comparing this study's data with other data of inconsistent statistical calibers would be inaccurate.

2 The eastern region includes 11 provinces (municipalities): Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan. The central region includes eight provinces: Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, and Hunan. The western region includes 12 provinces (autonomous regions/municipalities): Sichuan, Chongqing, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Guangxi, and Inner Mongolia.

3 Cited from http://lawinfochina.com/display.aspx?id=26623&lib=law&EncodingName=big5, 25 March 2023.

4 Currently, there is no public data on the number of public and private children's libraries in various prefecture-level cities in China. Some literature reports separate totals for public or private children's libraries, but discrepancies may exist when compared to this study's data. To ensure comparability, a unified standard and operating system must be applied to investigate public and private children's libraries. This study uses Baidu Maps for data collection, and the authors can confirm the data's comprehensiveness within the Baidu Maps database. However, comparing this study's data with other data of inconsistent statistical calibers would be inaccurate.

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