

Influencing Factors of Museum Self-Improvement in China: A Multiple Linear Regression Analysis

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Abstract: The purpose of this research is to explore the factors influencing the self-improvement process of museums in China and to conduct empirical analyses based on multiple linear regression models. As core institutions for inheriting and displaying cultural heritage and enhancing public cultural literacy, museums' self-improvement is of great significance in promoting cultural development, optimizing the supply of public cultural services, and enhancing social influence. This paper constructs a multiple linear regression model for the influencing factors of museum self-improvement by integrating several key variables, including emerging cultural and museum business (EF), institutional reform (SR), research and innovation level (RIL), management level (ML), and the museum cultural and creative industry (MCCI). The study employs scientific methods such as literature review, data collection, and data analysis to thoroughly explore the internal logic of museum operations and development. Through multiple linear regression analyses, it quantifies the specific influence and relative importance of each factor on the level of museum self-improvement. The results indicate that the management level (ML) is the dominant factor among the variables studied, exerting the most significant influence on museum self-improvement. Based on these empirical findings, this paper provides an in-depth analysis of the specific factors affecting museum self-improvement in China, offering solid theoretical support and practical guidance for the sustainable development of museums.

Keywords: Museum self-improvement; Influencing factors; Multiple linear regression model

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1. Introduction

In contemporary society, museums serve as essential carriers of cultural inheritance and innovation, holding immense value for enriching public cultural life and enhancing the cultural soft power of a nation. With the

rapid advancement of science and technology alongside continuous social progress, museums are encountering unprecedented opportunities and challenges. Effectively achieving self-improvement through strategic measures in the context of the new era has become an urgent issue in the museum field.

This paper examines the key factors influencing the self-improvement of museums in China from multiple dimensions, employing a multiple linear regression model to reveal the intrinsic relationships between these factors and their specific impacts on museum development. By conducting this study, the aim is to provide innovative ideas and directions for the sustainable development of museums, thereby further promoting the prosperity and advancement of China's museum industry.

2. Indicator system and data sources

2.1. Selection of indicators

2.1.1. Measurement indicators of emerging markets

- (1) Cultural industry: The economic influence of museums is fundamentally linked to the cultural industry, as museums are often considered an emerging segment within this sector. Therefore, analyzing the cultural industry is essential to understanding the development market of museums ^[1].
- (2) Enjoyable leisure time: The availability of sufficient leisure time to engage in cultural experiences provided by museums is a crucial prerequisite for the growth of emerging markets. Many researchers equate leisure time with non-productive time ^[2]. Since museum consumption, as a form of emerging cultural consumption, typically requires a certain level of preparation and time allocation, it is important to exclude unproductive and non-discretionary time, such as housework, from the analysis. While such time is not dedicated to economic production, it is also not fully autonomous ^[3]. The remaining segment, referred to as enjoyable leisure time, should be used as a metric to more accurately evaluate public consumption patterns in the development of new market sectors within museums.

2.1.2. Institutional reform indicators

The reform of China's museum system has primarily focused on marketization and economization ^[4]. State-owned museums and privately-run museums represent the administrative and self-managed aspects, respectively. The number of privately-run museums reflects the regional cultural atmosphere and serves as an indicator of the development environment for museums. It also provides insights into the degree of systemic change ^[5]. However, evaluating only the absolute number of private museums is insufficient to capture their overall influence. Therefore, this study measures the impact of institutional reform by analyzing the proportion of private museums relative to state-owned museums, offering a more comprehensive perspective on the effectiveness of systemic changes within the industry.

2.1.3. Measurement indicators of research innovation level

The research and innovation capacity of museums encompasses the overall level of scientific research achievements and the number of patents ^[6]. Due to data accessibility considerations, this study focuses on data from the cultural relics industry, including the number of cultural relics research institutions, their expenditure, and the proportion of personnel employed in such institutions relative to the overall workforce in the cultural relics industry. Drawing from prior studies, the expenditure of cultural relics research institutions is selected as the primary indicator for measuring the research capacity and innovation level of museums ^[7].

2.1.4. Measurement indicators of operational and management level

The management of modern museums extends beyond the physical venue spaces to encompass the development and potential expansion of related industries outside the venues^[8]. However, due to data limitations, external industry data are predominantly individual-based and lack the maturity required for standardized statistical analysis. Consequently, this section employs core operational data from within museums, including the added value generated by museums and their expenditure, to provide a comprehensive evaluation of their operational and management levels^[9].

2.1.5. Measurement indicators for the cultural and creative industries

The cultural and creative industries are among the most dynamic and rapidly evolving sectors in the cultural domain. As such, obtaining standardized industry statistics for these industries poses significant challenges. Considering the alignment in development timelines, industry characteristics, and operational logic between cultural relics stores and the broader cultural and creative industries, this study utilizes data from cultural relics stores as a representative indicator for assessing the development of the cultural and creative industries.

To enhance measurement accuracy, this study examines various data points from cultural relics stores, including the number of stores, the number of employees, and the total profits generated by these stores. Based on the actual industry context and scientific research findings, data from cultural relics stores have been identified as reliable and stable indicators for evaluating the status of the cultural and creative industries.

Table 1. Measurement index system for factors influencing museum self-improvement

Museum self-improvement	First-level indicators	Second-level indicators	Third-level indicators	Indicator unit	Indicator code
Dependent variable	Emerging Cultural and Creative Industries (EF)	Cultural industry	The proportion of added value of cultural and related industries to GDP	%	x1
		Enjoyable leisure time	Total domestic tourism expenses	RMB 100 million	lnx2
	Institutional Reform (SR)	Institutional structure	Proportion of private museums in state-owned museums	%	x3
Explanatory variables	Research Innovation Level (RIL)	Research strength	Expenditure on cultural relics research institutions	RMB 10 thousand	lnx4
	Management Level (ML)	Operational status	Museum added value	RMB 10 thousand	lnx5
		Financial sources	Museum expenditure	RMB 10 thousand	lnx6
	Museum Cultural and Creative Industry (MCCI)	Industrial scale	Employees of cultural relic shops	Individuals	lnx7
Control variables		Leisure industry	Value added of the tertiary industry	RMB 100 million	lnx8
		Reform momentum	Actual usable area of the museum	10,000 m ²	lnz1
		Industrial scale	Number of cultural relic shops	Individuals	lnz4

Table 1 (Continued)

Museum self-improvement	First-level indicators	Second-level indicators	Third-level indicators	Indicator unit	Indicator code
		Audience size	Ticket revenue	RMB 10 thousand	lnz2
	Replacement control variables		Proportion of personnel from cultural relics research institutions to those in cultural and property industries	%	z3
		Research potential			

2.2. Data source

The analysis data utilized in this chapter are derived from various indicators provided in the “China Cultural Relics and Tourism Statistical Yearbook (1998–2020).” Data related to the “proportion of the added value of cultural and related industries to GDP” are sourced from the “China Cultural Industry Statistical Yearbook (2013–2020)” and the “China Statistical Yearbook (1998–2020).” Similarly, data for the “added value of the tertiary industry” are obtained from the “China Statistical Yearbook (1998–2020),” while the “total domestic tourism expenditure” is taken from the “China Cultural and Tourism Statistical Yearbook (1999–2020).”

To account for differences in measurement standards among the various indicators, the natural logarithm method has been applied to standardize the data, ensuring consistency and facilitating accurate comparative analysis.

3. Research design and empirical results

3.1. Descriptive statistics

Table 2. Descriptive statistics of major variables

Variable explanation	Variable name	Variable code	Observations	Mean value	Standard deviation	Minimum	Maximum
Museum self-improvement		lny3	22	10.2077	1.0220	8.7333	11.6283
Cultural industry	CI	xl	22	2.9235	0.9061	1.8466	4.5400
Enjoyable leisure time	ELT	lnx2	22	9.3082	1.0664	7.7795	10.9552
Institutional reform	IR	x3	22	0.1657	0.0675	0.0500	0.2882
Research innovation level	RIL	lnx4	22	11.2185	1.1091	9.1657	12.8184
Operational status	OI	lnx5	22	13.0990	1.5444	10.5644	15.0323
Financial sources	fin	lnx6	22	13.4304	1.1525	11.6586	15.0374
MCCI	MCCI	lnx7	22	7.5808	0.3141	7.0379	8.0941
Leisure industry	LI	lnx8	22	11.7699	0.9775	10.1336	13.1811
Reform momentum	RI	lnz1	22	6.8590	0.7126	5.9124	7.9926
Industry scale	IS	lnz4	22	4.4722	0.2257	4.1589	4.8040
Audience size	AS	lnz2	22	12.0293	0.8627	10.7121	13.8060
Research potential	RP	z3	22	0.0451	0.0072	0.0373	0.0729

- (1) Emerging Cultural and Creative Industries (EF): The cultivation of emerging forms of museums in China, represented by the cultural industry (CI), demonstrates relatively low potential. The average value of 2.9235 is the second smallest among all explanatory variables, with a maximum value of only 4.5400. This indicates significant room for development in fostering new economic models and forms of museum operations during the early stages. In contrast, the overall situation of Enjoyable Leisure Time (ELT) is favorable, with an average value of 9.3082 and a maximum value of 10.9552. The gap between the minimum and maximum values is 3.1757, suggesting that people generally have sufficient leisure time to engage in museum-related economic activities. However, the current weakness lies in cultivating emerging cultural and museum formats and creating a more diverse and dynamic cultural and museum market structure.
- (2) Institutional Reform (SR): The reform of China's museum system and mechanisms reveals clear inefficiencies. The mean value of 0.1657, a maximum of 0.2882, a minimum of 0.0500, and a standard deviation of 0.0675 represent the smallest values among all explanatory variables. Since the founding of the People's Republic of China, museums have been under administrative jurisdiction for an extended period, limiting their initiative and scope for institutional reform. Over the past decade, incremental reforms have shown some effectiveness, but these changes have not addressed the entrenched systemic issues accumulated over time. Furthermore, the revised Chinese Cultural Relics Protection Law (October 28, 2002) explicitly supports the development of private museums. Despite this, private museums are still in their early stages of formal development and remain significantly weaker than state-owned museums.
- (3) Research Innovation Level (RIL): The average research strength, represented by the expenditure of cultural relics research institutions, is relatively high at 11.2185. The difference between the maximum and minimum values is 3.6527, with a standard deviation of 1.1091. These figures indicate that the research and innovation level of museum institutions in China is both stable and productive. This performance is directly attributed to consistent and substantial investment in national scientific research funding.
- (4) Management Level (ML): The management level of museums in China is at a relatively high standard. The two measurement indicators—expenditure and income—exhibit balanced performance, with mean values of 13.4304 and 13.0990, respectively. The ranking and mean order of the maximum and minimum values for both indicators are also closely aligned. These results suggest that the added value and expenditure of museums significantly and consistently influence their management levels, reflecting a stable and efficient operational framework.
- (5) Museum Cultural and Creative Industry (MCCI): The development of China's cultural and creative industries is relatively strong. The mean value is 7.5808, with a maximum value of 8.0941 and a difference of only 1.0562 from the minimum value. The standard deviation of 0.3141 is the smallest among the major variables, apart from institutional reform. These results indicate that using the number of employees in cultural relic stores as a proxy for the cultural and creative industry yields small fluctuations and reliable outcomes. Furthermore, the mean value reflects that the foundational development of China's cultural and creative industry is robust and well-established.

3.2. Research process

Management and emerging business models will jointly affect the museum economy from internal systems and external markets, indicating that there may be a non-linear relationship between the economic evolution of museums and their influencing factors. In fact, the relationship between museum economy and its influencing factors is indeed an exponential relationship rather than a non-linear or multivariate distribution relationship. Therefore, the empirical model set for empirical testing in this study is as follows:

$$y = \alpha X_1^{\beta_1} X_2^{\beta_2} X_3^{\beta_3} \dots Z_4^{\beta_4}$$

Among them, y is the economic evolution degree of museums, X_1 to $Z_4^{\beta_4}$ representing cultural industry, leisure time for enjoyment, institutional reform, research conditions, operational status, financial sources, cultural and creative industries, leisure industry, reform momentum, and industry scale.

3.3. Full sample regression

The emerging cultural and museum industries (EF) exhibit both positive and negative effects on the self-improvement of museums. The prosperity of the cultural industry market, measured by the proportion of the added value of cultural and related industries to GDP, demonstrates a negative impact. Models (1) to (5) reveal a significant negative correlation at the 5% level, which deviates from theoretical research conclusions.

Theoretical perspectives generally assert that the better the development of the cultural market, the richer the cultural products and services it can provide. This, in turn, is expected to drive the emergence of new economic and business models in museums, enhancing management efficiency. While the emergence of innovative formats in museums is indeed associated with the development of the cultural industry market, the current reality in China indicates a different dynamic. At present, China's museum economy is in an early stage of systematic development, characterized by active innovation and substantial potential. However, this phase also presents challenges such as unclear development paths, inconsistent standards, and lagging management practices.

This discrepancy is further accentuated by the cultural industry's progression into a period of high-quality development. The relationship between museums and the cultural industry remains predominantly competitive rather than cooperative. Consequently, the museum consumption market's attractiveness may be lower than the average for various cultural industry sectors, leading to the substitutability of some museum products and consumption experiences. For example, the popularity of tourist souvenirs has had a noticeable impact on the demand for museum cultural and creative products.

It is important to emphasize that this conclusion reflects a phase-specific analysis based on data from 1998 to 2019. With the continued evolution of the museum economy and the transition to an orderly and high-quality development period, museums are likely to achieve greater core competitiveness. This shift is expected to transform the relationship between museums and the cultural industry market from competition to cooperation and integration, resulting in exponential growth in mutual market benefits.

Additionally, total domestic tourism expenditure significantly influences the economic evolution of museums. As observed in models (1) to (5), there is a significant positive correlation between enjoyment-oriented leisure time and the self-improvement efficiency of museums at the 1% or 5% level. The correlation coefficients fluctuate slightly around 0.5, indicating that higher total domestic tourism expenditure corresponds

to greater leisure time for enjoyment. This improvement in residents' enjoyment of leisure time plays a substantial role in advancing the museum-related economy.

The institutional mechanism reform (SR) does not exhibit a significant impact on the evolution of the museum economy. In the four models measuring institutional reform through the proportion of private museums to state-owned museums, no significant influence was observed. Furthermore, models (2) and (3) even indicate negative effects. This suggests that an increased proportion of private museums in China may hinder the reform of museum systems and mechanisms, thereby affecting museums' capacity for self-reform.

This finding contrasts with theoretical research and the initial hypothesis, which posits that a higher number of private museums generally reflects a region's richer cultural heritage, fosters an inclusive operational environment, and promotes autonomy and self-sufficiency in museum operations. In theory, such conditions should facilitate systemic reform within museums. However, the regression analysis suggests otherwise, likely due to the predominantly government-led nature of institutional reform in Chinese museums. Despite their greater autonomy compared to state-owned museums, private museums have not significantly benefited from state-led reforms. They remain relatively small and weak, accounting for nearly one-third of the total number of museums but lacking the scale to rival state-owned counterparts.

This outcome highlights insufficient policy support for private museums in China. To address this imbalance, it is crucial to enhance attention to private museums, unlock their market potential, and stimulate their operational vitality.

The research innovation level (RIL) in Chinese museums demonstrates a consistent yet inefficient contribution to their self-improvement. Cultural relics research expenditure does not show a significant positive impact on museum development in models (3) through (5). Although the coefficients obtained in these models are positive, they remain below 0.2. This indicates a relatively low conversion rate of scientific research achievements in Chinese museums, with theoretical research significantly outweighing applied research.

Emerging formats of museum activities in China—such as the development of cultural and creative products, offline participatory experiences, and online gaming integrations—require substantial artistic design and technological innovation. However, the allocation of resources within research institutions currently favors theoretical pursuits over practical applications. Consequently, creative design and technological innovation receive limited funding and support. To address this imbalance, museums should focus on restructuring research personnel, allocating expenses more effectively, outsourcing non-core activities, and strengthening art authorization to enhance their applied research capabilities and support innovative initiatives.

Management level (ML) exerts a strong influence on the self-improvement of museums. The operational status of museums, as measured by their added value, demonstrates a significant negative correlation with current museum management at the 5% significance level. This finding suggests that the general operational status of museums in China remains suboptimal. The added value of museums has not been effectively converted into output income but is instead primarily used to offset funding shortages.

This underscores the need for ongoing reforms of public cultural service institutions aimed at enhancing museums' self-efficacy, reducing reliance on financial subsidies, aligning with the broader economic context, and pursuing market-driven operations. These efforts will enable museums to achieve self-sustainability through revenue generation.

In contrast, the financial sources and management performance of museums, as measured by museum expenditure, show a significant positive correlation with self-improvement at the 1% significance level in

models (4) and (5). The correlation coefficients of 1.5335 and 1.5334, respectively, are nearly identical, confirming the rationality of the models and aligning with the descriptive statistical results.

High expenditure by museums indicates active operational dynamics and sufficient governmental financial support. These factors are directly linked to the management and operational efficiency of museums, thereby highlighting the critical role of funding in enabling self-improvement and fostering sustainable development.

The relationship between the Museum Cultural and Creative Industry (MCCI) and the self-improvement of museums is not sufficiently significant. Although the museum cultural and creative industry has experienced notable growth in recent years, this growth largely reflects the “head effect” concentrated in a few large, comprehensive museums. The majority of museums face significant shortages in both cultural and creative industry funding and creative talent. Using the number of employees in cultural relics stores as a measure, the regression results reveal no significant relationship between the cultural relics industry and the self-improvement of museums, with a correlation coefficient of -0.0120.

This result suggests that the overall efficiency of cultural relics stores within museums is suboptimal. In some cases, an increase in staff may even hinder the operation of cultural and creative industries. This inefficiency stems from the structural nature of cultural relics stores in China, which are typically established as state-run cultural institutions and operate under an internal enterprise management model. Profits generated by cultural relics stores in various regions are frequently allocated to offset funding shortages in the broader field of cultural relics. Additionally, profits from operating new products, including tax-free goods, are primarily directed toward addressing cultural relics funding deficiencies [Notice of the Ministry of Finance and the State Administration of Taxation on Levying Relevant Taxes and Fees on Cultural Relic Stores, January 1, 1970].

This operational model, which emphasizes covering funding gaps rather than implementing a reward-based performance system, diminishes the motivation for cultural relics stores to pursue further development once basic operational goals are met. It underscores the urgency and necessity of personnel reforms within Chinese museums. Transforming cultural relics stores from cultural institutions into enterprises capable of independent operations and self-financing is crucial. These changes should align with the public cultural service attributes of museums while stimulating human resource potential, encouraging autonomy and creativity among various talents, and revitalizing the overall operational vitality of museums.

Regarding the regression results’ fit, aside from a few indicators with significant level differences across models, the overall consistency of model indicators is high. As additional research factors are incorporated into future analyses, the fit of the regression models improves, suggesting that the inclusion of more explanatory variables enhances the ability to explain the self-improvement of museums in China effectively.

Table 3. Full sample regression

Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
CI	-0.6745** (-2.8200)	-0.6593** (-2.6500)	-0.6479** (-2.4900)	-0.6551** (-2.6900)	-0.6552** (-2.5700)
ELT	1.0458** (2.3200)	1.1054** (2.2600)	1.0508* (1.9200)	1.0456** (2.5300)	1.0463** (2.3900)
IR		-0.4982 (-0.3900)	-0.6779 (-0.4500)	0.3692 (0.3200)	0.3735 (0.2900)
RIL			0.1183 (0.2600)	0.1027 (0.3000)	0.1013 (0.2600)

Table 3 (Continued)

Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
OI				-0.5191** (-2.9700)	-0.5193** (-2.8300)
fin				1.5335*** (3.5200)	1.5334*** (3.3700)
MCCI					-0.0120 (-0.0100)
LI	-0.6399** (-2.7400)	-0.6454** (-2.6800)	-0.7672 (-1.4300)	-1.2523** (-2.7100)	-1.2536** (-2.5100)
RI	1.3372* (1.9800)	1.2520 (1.7200)	1.3104 (1.6700)	0.7119 (0.9600)	0.7094 (0.8700)
IS	-0.6693 (-1.1600)	-0.7591 (-1.1900)	-0.7892 (-1.1800)	-0.2678 (-0.5100)	-0.2700 (-0.4600)
Constant	3.7978 (0.8100)	4.3325 (0.8700)	4.6777 (0.8800)	-1.5646 (-0.3600)	-1.4170 (-0.1000)
Observation	22	22	22	22	22
χ^2	182.06	143.7	115.5	163.75	135.09
R ²	0.9827	0.9829	0.9830	0.9919	0.9919

Note: ***, **, * denote significance levels of 1%, 5%, and 10%, respectively, with robust standard errors indicated in parentheses.

3.4. Robustness test

In time series data analysis, results are typically stable, leading many studies to perform limited robustness testing. However, given the innovative nature of this research question, control variables were introduced to evaluate the robustness of the findings using applicable methods. The test results indicate that even after incorporating control variables, the directional trends of the estimated coefficients for each variable remained consistent with those observed in the regression analysis. Nevertheless, the significance levels of these variables generally decreased by one level compared to the original regression results.

This outcome is likely attributable to the inherent challenges posed by the research question. On one hand, the fundamental consistency between the test results and regression analysis demonstrates the appropriateness of the selected indicators and analytical methods used in this study. On the other hand, the scarcity of existing literature on indicator selection offers limited precedent for reference, which may have introduced selection biases.

Despite some inconsistencies between the robustness test and the regression analysis, the deviations are within an acceptable range. Furthermore, these findings can be refined through future research, offering an opportunity to enhance the understanding of this issue. This potential for improvement underscores the innovative contribution and significance of this study.

Table 4. Robustness test

CI	-0.4367* (-1.8900)	CCI	6.4871* (2.1100)
ELT	0.8415* (2.0300)	LI	0.5005 (-0.9900)
IR	-0.0671 (-0.0600)	RI	0.9105 (1.3500)
RC	-0.0494 (-0.1500)	IS	-7.5471* (-2.2200)
OI	0.3977** (-2.3800)	AS	-0.1567 (-1.2000)
fin	0.8427* (1.8400)	RP	115.6877* (2.1000)
Constant	-21.0047 (-1.4100)		
Observation	22		
χ^2	164.89		
R ²	0.9955		

Note: ***, **, * denote significance levels of 1%, 5%, and 10%, respectively, with robust standard errors indicated in parentheses.

4. Conclusion and suggestions

Based on the analysis above, the evolution of the museum economy, in terms of self-improvement, relies predominantly on effective management practices and the cultivation of innovative business models. The specific conclusions are as follows:

4.1. The cultivation of emerging business models has a multidimensional impact on the self-improvement of museums

Firstly, the development of cultural industries has a significant negative effect on the cultivation of emerging formats within museums. This is largely because China's museum economy is in the early stages of systematic development. Despite active innovation and substantial potential, challenges such as unclear pathways, inconsistent standards, and lagging management persist during this exploratory phase. These issues are inconsistent with the cultural industry's shift toward high-quality development. The relatively lower attractiveness of the museum consumer market, compared to other cultural industry sectors, results in some museum products and services being easily substituted. This suggests that the relationship between museums and the cultural industry remains predominantly competitive rather than cooperative. Greater integration and mutual promotion are essential to achieve industrial synergy.

Secondly, the increased availability of enjoyment-oriented leisure time among the public significantly encourages museum consumption. However, museum consumption often requires overcoming certain thresholds, including adequate knowledge reserves and uninterrupted leisure time. These factors are necessary for individuals to fully engage with and appreciate the new economic models introduced by museums and to derive value from their consumption experiences^[10].

4.2. The achievements of institutional and mechanism reform are limited

The institutional and mechanism reform achievements in the museum sector are relatively weak. Among all factors influencing the self-improvement of museums, this aspect has the least significant impact. In China, fundamental reforms in the museum system and mechanisms are largely driven by government initiatives. While private museums exhibit greater autonomy compared to state-owned museums, these reforms have not yielded substantial benefits for private institutions. Private museums, though accounting for nearly one-third of the total number, remain generally small and lack the scale and resources of their state-owned counterparts^[11].

The current policy framework does not adequately support private museums. Increased attention and support are necessary to unlock their potential for market-oriented operations and to enhance their contribution to overall museum reform. Comprehensive measures are required to improve the efficiency of these reforms and to strengthen the role of private museums within the broader museum economy.

4.3. The impact of research innovation level on the self-improvement of museums

The research innovation level in Chinese museums has a relatively inefficient impact on their self-improvement. This inefficiency is reflected in the low conversion rate of scientific research achievements, where theoretical research significantly outweighs applied research. The development of cultural and creative products, museum-based offline participatory activities, and online gaming experiences necessitate robust support from advancements in artistic design and technological innovation. However, the availability of such specialized talent remains limited.

Under current fiscal constraints, a disproportionate allocation of resources prioritizes cultural relics research institutions engaged in theoretical studies over creative design and technological innovation. Consequently, practical measures such as restructuring research personnel, optimizing budget allocations, outsourcing specific tasks, and bolstering art licensing initiatives are critical to mitigating this negative impact^[12].

4.4. The level of management as the strongest influence on museum self-improvement

Management level has the most pronounced influence on the self-improvement of museums. Higher expenditure levels are generally correlated with increased operational activity and stronger industrial effects. However, the direct impact of museum ticket revenue on the industry remains indeterminate due to the implementation of free admission policies for museums and memorial halls in China since 2008. By the end of 2019, approximately 89.05% of museums had adopted free admission policies.

Significant regional disparities in the implementation, scope, and accompanying support for these policies have led to inconsistent and disorganized ticket revenue over the past decade. This variability introduces uncertainty in the systematic and strategic operation and management of museums^[13,14].

4.5. The cultural and creative industries' contribution to museum self-improvement

The cultural and creative industries do not significantly contribute to the self-improvement of museums, a finding that diverges from conventional theoretical conclusions. The development of the cultural and creative sector was measured in this study by the number of employees in cultural relics stores. These stores are state-established institutions operating under enterprise management models, with profits often redirected to offset funding shortages for cultural relic-related activities.

Revenue generated from new products (such as tax-free goods) is similarly allocated to address financial

deficiencies in cultural relic undertakings. This legacy system suppresses operational enthusiasm and contributes to poor overall efficiency. Many cultural relic stores face financial strain, with some operating at a loss. Increased staffing levels exacerbate these challenges, hindering the development of the cultural and creative industries. These findings offer valuable insights for personnel and organizational reforms in museum operations ^[15].

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