Volume 2 Number 1 2026

The Development of Humanities and Social Sciences

ISSN: 3067-7122

https://dhss.cscholar.com

The Development of Humanities and Social Sciences

ISSN: 3067-7122
Volume 2, Issue 1, 2026
Bimonthly

Cover Design: ConnectSix Scholar Publishing INC

Publishing Unit: ConnectSix Scholar Publishing INC

Publisher's website: http://www.cscholar.com/

Publisher's address:

6547 N Academy Blvd #2265

Colorado Springs CO 80918

US

Website of the journal *The Development of Humanities and Social Sciences*:

https://dhss.cscholar.com/

Table of contents

Changes in China's Fiscal Revenue and Expenditure Structure During the “14th Five-Year Plan” Period: Characteristics, Drivers and Policy Optimization (Based on Data from 2019-2024)	Jiayue Lang Yimiao Zhang Chuheng Lei	1-12
A Study on the Matching of Community Service Supply with the Needs of Family Carers for Elderly People with Dementia in a Subdistrict of Y City	Yilin Hao Zhihui Wei	13-28
Case Analysis of Internal Control in Hainan Airlines (HNA) Group	Jiaxuan Li	29-47
Short-Video Social Media Use on Anxiety: Evidence form Graduate Students	Manzhi Liu Yixuan Hu	48-66
A Study on the Varied Needs for Age-Friendly Home Adaptations Among Elderly Individuals Living at Home and Their Influencing Factors	Luyao Pan Wanting Lin Xiangyu Chen	67-86
The Role of Artificial Intelligence Applications in Enhancing Healthcare Professionals’ Performance in the Context of “Internet Plus Healthcare”	Yingnuo Qi	87-100
Exploring Culture-Tourism Integration to Promote Traditional Culture and Tourism Development	Haiqiang Wang Qiaoting Zhou	101-115

Digitalization-Enabled Red Culture Education: The University-Museum Collaboration Model	Qiaoting Zhou Haiqiang Wang	116-131
Research on International Pharmaceutical Marketing Strategies from a Cross-Cultural Perspective	Xiaoqi Shao	132-141

The Development of Humanities and Social Sciences, 2026, 2(1), 1-12
https://doi.org/10.71204/pms83121

Changes in China's Fiscal Revenue and Expenditure Structure During the "14th Five-Year Plan" Period: Characteristics, Drivers and Policy Optimization (Based on Data from 2019-2024)

Jiayue Lang [1,*], Yimiao Zhang [1], Chuheng Lei [1]

[1] Beijing City University, Beijing 100000, China

[*]**Corresponding Author**
Jiayue Lang

1936057528@qq.com

Received: 12 August 2025 / Accepted: 22 January 2026 / Published online: 28 February 2026

Abstract

Taking the 14th Five-Year Plan period as the research object, this paper systematically analyzes the characteristics of the change in China's fiscal revenue and expenditure structure and its drivers based on the fiscal data of 2019-2024, and puts forward corresponding policy optimization suggestions. The study finds that during the 14th Five-Year Plan period, the structure of China's fiscal revenue and expenditure shows the general characteristics of "low revenue before and high expenditure after, and rigid expenditure growth", and the structure of fiscal expenditure is constantly optimized, with the proportion of expenditure on people's livelihood continuing to increase, and the proportion of expenditure on economic construction decreasing. Empirical analysis shows that economic growth, changes in industrial structure, population aging and other factors are important factors affecting the change of fiscal revenue and expenditure structure. Based on this, this paper puts forward policy suggestions in terms of optimizing the structure of fiscal expenditure, improving the tax system, and strengthening fiscal sustainability, in order to provide reference for promoting China's sustainable fiscal development.

Keywords: 14th Five-Year Plan; Fiscal Revenue and Expenditure; Taxation; Sustainability

1. Introduction

The "14th Five-Year Plan" period is a key stage in China's comprehensive construction of a socialist modernization country, as well as an important period of economic restructuring and transformation and upgrading. Against the backdrop of a complex and volatile domestic and international environment, fiscal policy, as an important means of macroeconomic regulation and control, plays an important role in promoting economic growth, adjusting economic structure and safeguarding people's livelihood. Changes in the structure of fiscal revenues and expenditures not only reflect the state of economic operation, but also the transformation of the government's policy orientation and governance philosophy.

From the practical and theoretical dimensions, this study holds significant research value. Practically, as China faces the dual pressures of economic growth slowdown, industrial structure adjustment and population aging during the "14th Five-Year Plan" period, the structural changes of fiscal revenue and expenditure have become more complex, and the contradictions between revenue growth constraints and rigid expenditure expansion have gradually emerged. Clarifying the characteristics and driving factors of these structural changes is crucial for optimizing fiscal resource allocation, enhancing the effectiveness of fiscal policy, and resolving local government debt risks, which can provide direct decision-making reference for the formulation of fiscal policies in the closing stage of the "14th Five-Year Plan" and the layout of the next development cycle. Theoretically, existing research mostly focuses on the overall scale of fiscal revenue and expenditure or single-factor analysis, while there is insufficient in-depth exploration of the internal logical relationship between institutional reform, technical progress and structural evolution of fiscal revenue and expenditure. This study, based on the empirical data of 2019-2024, reveals the dual driving mechanism of non-tax revenue growth and the optimization path of people's livelihood expenditure, which helps to enrich the theoretical system of fiscal structure research under the background of high-quality development and provide new analytical perspectives for related academic research.

Based on the fiscal data of 2019-2024, this study systematically analyzes the characteristics of the changes in the structure of China's fiscal revenues and expenditures during the 14th Five-Year Plan period and their drivers, and puts forward corresponding policy optimization proposals. The study finds that the structure of China's fiscal revenue and expenditure in the 14th Five-Year Plan period shows obvious stage characteristics, the fiscal policy has shifted from "deleveraging" in the 13th Five-Year Plan period to "stabilizing leverage" and "expanding domestic demand" in the 14th Five-Year Plan period, and the structure of fiscal expenditure has been continuously optimized, with the proportion of expenditure on people's livelihoods continuing to increase. Through empirical analysis, this paper reveals the causes of changes in the structure of fiscal revenues and expenditures, and puts forward policy optimization suggestions on this basis, in order to provide reference for promoting the sustainable development of China's finances.

Additionally, existing literature has only briefly mentioned the proportion of non-tax revenue in OECD countries without in-depth cross-country comparative analysis, leading to insufficient reference to international experience in exploring China's fiscal structure optimization. This study supplements the cross-country comparison dimension: OECD countries generally take "sales of goods and services" and "property income" as the core of non-tax revenue, with the total proportion accounting for 2%-5% of GDP (e.g., 3.87% in the United States at the state level, 2.56% in Sweden at the local level) , and the management is standardized with centralized legislation and transparent collection procedures . In contrast, according to China's Ministry of Finance data , China's non-tax revenue reached 3.57 trillion yuan in 2023, accounting for 16.45% of national fiscal revenue, dominated by state-owned resource (asset) compensated use income which accounts for 57.3% of total non-tax revenue , with relatively high flexibility in local management. By systematically analyzing such structural differences based on official data from OECD and China's Ministry of Finance, this study provides more targeted international reference for China's non-tax revenue standardization and fiscal system improvement, and enriches the comparative research framework of fiscal structure under the background of global economic governance.

2.The General Characteristics of Changes in the Structure of Fiscal Revenue and Expenditure in the 14th Five-Year Plan Period

2.1. Cross-Country Comparative Analysis of Non-Tax Revenue Structure Between China and OECD Countries

From the perspective of scale proportion, the average tax-to-GDP ratio of OECD countries reached 34.1% in 2024, while non-tax revenue accounts for a relatively stable share of government revenue, generally between 10%-20% (e.g., about 20% in U.S. state governments and 10%-11% in Canadian federal government). In China, the proportion of non-tax revenue in national fiscal revenue rose to 16.45% in 2023, with a relatively fast growth rate, and the macro tax rate (23% according to international general standards) is significantly lower than the OECD average.

In terms of structural composition, OECD countries' non-tax revenue is mainly composed of user fees, public facility usage fees, and state-owned asset operation income, which are closely linked to the provision of specific public services and reflect the "benefit principle". China's non-tax revenue includes 12 categories such as administrative fees, government funds, and state-owned resource compensated use income. Among them, state-owned resource (asset) compensated use income accounts for the highest proportion (57.3%), while administrative fees still account for 10.5%, with a relatively complex structure.

From the perspective of management experience, OECD countries have established a sound legal system for non-tax revenue management, with centralized legislation and standardized collection and management procedures, effectively avoiding arbitrary charges. This provides important enlightenment for China to improve the legal basis of non-tax revenue, optimize the structure of administrative fees, and strengthen the connection between non-tax revenue and public service supply.

2.1.1. Decrease in the Proportion of Tax Revenue and Increase in the Proportion of Non-Tax Revenue

In 2024, the national tax revenue amounted to 174,972 billion yuan, down 3.4% compared with the previous year; the national non-tax revenue amounted to 4,473 billion yuan, up 25.4% compared with the previous year (Ministry of Finance, 2025). The rapid growth of non-tax revenue has become an important support for fiscal revenue. The deep-seated motivation of non-tax revenue growth needs to be analyzed from the dual perspective of system and technology. From the institutional level, the local government in the context of weak tax growth, through the revitalization of stock assets (such as idle land, minerals, state-owned enterprises equity) to expand financial resources (Guo, 2024). For example, a province's revenue from the compensated use of state-owned resources accounted for 68% of the incremental non-tax revenue in 2024, confirming the central role of asset revitalization. From the technical level, the popularization of electronic collection and management system significantly improves the efficiency of collection and management, a province in 2024, the electronic collection of non-tax revenue amounted to 24.87 billion yuan, an increase of 36.2% year-on-year, 3.037 million transactions to achieve "zero manual intervention", reducing the risk of leakage (Guo, 2024). However, the rapid growth of non-tax revenue also reflects the structural contradiction: the lagging of direct tax reform has led to the over-reliance of local finance on non-tax revenue, and the proportion of non-tax revenue in China will reach 20.4% in 2024, which is significantly higher than the average value of 15% in OECD countries, highlighting the urgency of the optimization of the tax system (Guo, 2024).

2.1.2. Major Taxes Rise and Fall

In 2024, domestic value-added tax (VAT) declines by 3.8%, domestic consumption tax grows by 2.6%, VAT and consumption tax on imported goods decline by 1.6%, and personal income tax declines by 1.7% (Ministry of Finance, 2025). This reflects the differences in economic performance across industries and sectors.

2.1.3. Changes in the Structure of Central and Local Revenues

In 2024, the central general public budget revenue was 10043.6 billion yuan, an increase of 0.9% over the previous year; the local general public budget revenue at the local level was 119,266 billion yuan, an increase of 1.7% over the previous year (Ministry of Finance, 2025). Local revenues grew faster than the central government, reflecting the increased vitality of the local economy.

2.2. Changes in the Structure of Fiscal Expenditure

2.2.1. Continuous Expansion of Expenditure Scale

In 2024, the national general public budget expenditure was 28,461.2 billion yuan, an increase of 3.6% over the previous year. Among them, the central general public budget expenditure at this level was 4,072 billion yuan, an increase of 6.5% over the previous year; local general public budget expenditure was 2,438.92 billion yuan, an increase of 3.2% over the previous year (National Bureau of Statistics, 2024). Fiscal expenditures maintained a greater intensity, providing the necessary financial support for economic and social development.

2.2.2. Strong Expenditure Guarantee in Key Areas

In 2024, social security and employment expenditures of 421.14 billion yuan, an increase of 5.6%; education expenditures of 420.76 billion yuan, an increase of 2%; agriculture, forestry and water expenditures of 270.45 billion yuan, an increase of 12.4%; urban and rural community expenditures of 217.42 billion yuan, an increase of 5.9%; science and technology expenditures of 115.5 billion yuan, an increase of 5.7% (Ministry of Finance, 2025). These data show that the structure of fiscal expenditure is constantly optimized, with more emphasis on livelihood protection and support in key areas.

The optimization of livelihood expenditure structure presents the dual characteristics of "precision" and "performance". At the provincial level, Henan Province has established a dynamic adjustment mechanism for livelihood expenditures, raising the proportion of livelihood expenditures to 78% by 2023, and linking the allocation of funds for education, medical care, and social security with indicators such as population aging and urbanization rate, so as to realize "supply according to demand"(Zhang, 2023). In county practice, Yixian County 2024 compressed general expenditures by 12%, tilting funds to "one old and one small" services (elderly care facilities coverage rate increased to 85%) and rural revitalization (rural medical investment increased by 20%), people's livelihoods accounted for more than 70% of the expenditure (Zhang, 2023). For its part, Deucheng District, through budget performance management, has carried out a whole-process evaluation of 2.93 billion yuan of people's livelihood expenditures, and the efficiency of project fund utilization has been increased by 18% (Zhang, 2023). These practices confirm the theory of Wang (2024): people's livelihood expenditures by "reducing the burden on residents and releasing the potential for consumption" to stimulate domestic demand, for example, in Henan Province, after increasing the proportion of medical expenditures, the proportion of out-of-pocket payments for medical care fell by 5 percentage points, and the growth rate of consumer spending reached 8.2% during the same period (Wang, 2024).

2.2.3. The Proportion of Expenditure in the Field of People's Livelihood Increased

The proportion of expenditure on social security and employment, education, healthcare and other livelihood areas continues to increase, reflecting the government's increased focus on safeguarding and improving people's livelihood.

3. Balance of Fiscal Revenues and Expenditures

3.1. Fiscal Balance Widening

In 2024, the gap between fiscal revenues and expenditures (fiscal deficit) was 649.1 billion yuan, an increase of 1,489.7 billion yuan from the previous year (Financial and Economic Committee of the National People’s Congress, 2024). This reflects the government's active response to the downward pressure on the economy by expanding fiscal expenditure.

3.2. Increase in the Size of Government Debt

At the end of 2024, the balance of national debt of the central government was 345,723.6 billion yuan, and the balance of general debt of local governments was 167,043.35 billion yuan, and the balance of special debt was 308,357.8 billion yuan (Financial and Economic Committee of the National People’s Congress, 2024). The increase in the scale of government debt has brought challenges to sustainable fiscal development.

To cope with the debt pressure, local governments have actively explored risk resolution paths. For example, Guizhou Province, as one of the first pilot provinces with "no hidden debt in the whole region", issued special refinancing bonds to replace the stock of hidden debt in 2024, with a cumulative replacement scale of 120 billion yuan, which significantly reduced the pressure of short-term debt repayment, and the proportion of debt interest expense to fiscal expenditure decreased by 2.3 percentage points (Ministry of Finance, 2024). This practice confirms the Ministry of Finance's idea of "exchanging time for space", i.e., through the optimization of debt maturity structure and the integration of assets and resources, in order to strive for a buffer period for economic transformation.

3.3. Overall Stable Fiscal Operation

In 2024, the national general public budget revenue was 2,197.02 billion yuan, an increase of 1.3% over the previous year; the national general public budget expenditure was 2,846.12 billion yuan, an increase of 3.6% over the previous year (Ministry of Finance, 2024). Fiscal revenue maintains the trend of restorative growth, fiscal expenditure maintains a greater intensity, and key areas of expenditure are strongly guaranteed.

Despite the pressure on revenues and expenditures, the fiscal operation still reflects strong resilience and precision. On the one hand, the quality of revenue has been steadily improving. 2024 Among tax revenue, corporate income tax increased by 4.1% year-on-year (higher than the overall tax growth rate), reflecting the gradual restoration of corporate profitability; non-tax revenue increased by 25.4%, mainly due to the revitalization of stock assets (e.g., transfer of state-owned enterprises' equity, concession of mineral resources), rather than illegal charges, reflecting the "open source "The standardization of (Ministry of Finance, 2024). On the other hand, the expenditure guarantee is precise and efficient. For example, education expenditure increased by 2% despite the tight fiscal balance, of which basic education investment accounted for 78%, the national compulsory education stage per pupil public funding benchmark quota increased by 5%, benefiting 150 million students (Ministry of Finance, 2025); social security expenditure increased by 5.6%, focusing on the tilt of the elderly service system, 2,100 new community elderly service centers in 2024, covering 85% of the urban community, directly serve the elderly population of more than 30 million (Ministry of Finance, 2024). These data show that fiscal policy in the "basic, bottom line" at the same time, through the optimization of the structure to achieve the efficient allocation of resources.

4. Analysis of the Causes of Changes in the Structure of Fiscal Revenues and Expenditures

4.1. Influence of Economic Growth and Industrial Structure Change

(1) The slowdown of economic growth affects the fiscal revenue." During the "14th Five-Year Plan" period, China's economic growth rate has slowed down, shifting from the stage of high-speed growth to the stage of high-quality development. The slowdown in economic growth directly affects the growth rate of fiscal revenue, especially the growth of tax revenue (Liu, 2021).

(2) Industrial structure adjustment affects the structure of tax sources. With the increase of the proportion of the service industry and the transformation and upgrading of the manufacturing industry, the structure of the tax source has also changed. The proportion of the service industry rises and the digitization of the manufacturing industry deepens, and these changes have an impact on the revenues of major taxes such as value-added tax and enterprise income tax (Liu, 2021).

(3) Consumption upgrading affects the structure of fiscal expenditure. With consumption, especially domestic demand, becoming the main driving force of economic growth, the role and status of the consumption link in the construction of the entire financial resources has been elevated, which has prompted the fiscal expenditure to pay more attention to the field of consumption and increase the expenditure on people's livelihood (Liu, 2021).

4.2. The Impact of Policy Factors

(1) Tax reduction and fee reduction policies affect fiscal revenue." During the "Fourteenth Five-Year Plan" period, China has continued to implement the policy of reducing taxes and fees, which directly affects the fiscal revenue, especially the growth of tax revenue. In 2024, the national tax revenue decreased by 3.4%, partly due to the special factors such as the tax reduction policy introduced in the middle of 2023, which reduced the tail and reduced the revenue (Ministry of Finance, 2025).

(2) Positive fiscal policy affects fiscal expenditure." Fourteenth Five-Year" period, China's implementation of positive fiscal policy, fiscal spending to maintain a greater intensity. 2025, the fiscal deficit rate for the first time exceeded 4%, ultra-long-term special treasury bonds increased to 1.3 trillion yuan, the local government new special debt raised to 4.4 trillion yuan, the annual total new debt size of 11.86 trillion yuan, an increase of 2.9 trillion yuan compared with the year 2024 (Gao, 2025). This reflects the positive orientation of fiscal policy.

(3) The reform of the fiscal system affects the structure of revenues and expenditures." During the "14th Five-Year Plan" period, China promotes the reform of the fiscal system, optimizes the financial relationship between the central and local governments, and adjusts the division of financial rights and expenditure responsibilities, and these reforms directly affect the structure of fiscal revenues and expenditures (Lou, 2020).

4.3. Influence of Social Factors

(1) Population aging affects social security expenditure. With the aging of the population, the pressure on social security expenditures increases. In 2024, social security and employment expenditures were 421.14 billion yuan, an increase of 5.6% (Ministry of Finance, 2025). This reflects the impact of population aging on the structure of fiscal expenditure.

(2) Changes in people's livelihood needs affect the direction of fiscal expenditure. With the improvement of people's living standards, the demand for education, medical care, housing and other livelihood areas increases, which prompts fiscal expenditure to pay more attention to livelihood protection. In 2024, education expenditure will be 4207.6 billion yuan, an increase of 2%; urban and rural community expenditure will be 217.42 billion yuan, an increase of 5.9% (Ministry of Finance, 2025).

(3) Increased awareness of environmental protection affects fiscal expenditure. As the awareness of environmental protection increases, the proportion of environmental protection expenditure has increased. This reflects the importance society attaches to ecological environmental protection.

5. Policy Recommendations for Optimizing the Structure of Fiscal Revenue and Expenditure in the 14th Five-Year Plan Period

5.1. Optimize the Structure of Fiscal Expenditure

(1) Increase investment in science and technology innovation, education, environmental protection and other areas. Fiscal investment in science and technology innovation, education, environmental protection and other fields should be increased to promote high-quality economic development. At the same time, the investment in general and competitive fields should be gradually reduced, and more resources should be used to support the real economy and improve people's livelihood (Jia, 2024).

(2) Standardize the scope of fiscal expenditure. Scientifically standardize the scope of fiscal expenditure, strengthen the expenditure management of fiscal funds, and effectively improve the efficiency of the use of fiscal funds. Reduce the direct intervention in the economy, so that some public services can be provided by the market to the market to solve the problem, focusing on financial resources to protect the key project expenditures, people's livelihood expenditures, etc. (Wang, 2023).

(3) Optimize the structure of health care expenditure. The government should optimize the structure of medical and health care expenditure, increase the proportion of public medical and health care expenditure, and reduce the proportion of medical costs borne by enterprises and individuals. This can be achieved by increasing the number of public medical and health institutions and improving the quality of public medical and health services (Shen , 2022).

5.2. Improve the Tax System

(1) Optimize the tax structure. Improve the local tax and direct tax system, appropriately increase the proportion of direct tax, increase the strength and precision of tax regulation on the pattern of income and wealth distribution, improve the direct tax system with income tax and property tax as the main body, and optimize the structure of tax revenue and the structure of tax sources (Yang, 2021).

(2) Promote the reform of tax system. Actively push forward the reform of moving back the consumption tax collection link, and further improve the personal income tax system that combines synthesis and categorization. Comprehensively complete the task of tax legislation and consolidate the achievements of tax system reform in the form of law (Yang, 2021).

(3) Optimize tax preferential policies. According to the needs of economic development, accurately implement tax cuts and fee reductions to stimulate the vitality of market players. From the perspective of the tax system structure, it is necessary to continuously optimize. On the basis of maintaining the basic stability of the tax system at the current stage, further establish and improve the tax system system that is conducive to high-quality development, social fairness and market unification (Yang, 2021).

5.3. Strengthen Fiscal Sustainability

(1) Strengthen local government debt management. Continue to promote local government hidden debt resolution work, curb new hidden debt, prevent and resolve local government debt risk. 2024, 2 trillion yuan of local government replacement bonds have been launched for issuance, the implementation of this policy will help to effectively alleviate the pressure on local government debt servicing, and enhance the momentum of local development (Zhang, 2024).

(2) Improve the efficiency of the use of financial funds. Strengthen the budget management of financial funds, improve the accuracy and scientificity of the budget. At the same time, it is necessary to strengthen the supervision of financial funds and the assessment of the efficiency of their use to ensure the effective use of funds (Ma, 2022).

(3) Improve the transfer payment system. Further promote the reform of the financial system, establish a sound transfer payment system, strengthen the supervision and guidance of local governments, and ensure the rationality and effectiveness of financial expenditure. Increase the transfer payment to the central and western regions to promote the coordinated development of the region (Wang, 2023).

6. Discussion and Conclusion

The "14th Five-Year Plan" period is an important stage of China's economic and social development, and the structure of fiscal revenues and expenditures has experienced significant changes. The structure of fiscal revenue presents the remarkable feature of "tax decline, non-tax rise": in 2024, the growth rate of non-tax revenue (25.4%) exceeded that of tax revenue (-3.4%), and the growth originated from the revitalization of stock assets by local governments (e.g., the revenue from state-owned resources in a province accounted for 68% of non-tax revenue) and the improvement of the efficiency of electronic levy and administration (the amount of non-tax revenue collected electronically increased by 36.2% in a province). (a province's electronic collection of non-taxes increased by 36.2%). The structure of fiscal expenditure continues to be optimized, with the proportion of expenditure on people's livelihoods reaching 78% (2023 data for Henan Province), and the efficient allocation of resources is achieved through "precision" (e.g., Yixian County compressing general expenditure by 12% in favor of old-age care and education) and "performance" (efficiency of the livelihoods funds in De Cheng District is increased by 18%). (the efficiency of DeCheng District's livelihood funds increased by 18%) to achieve efficient allocation of resources (Zhang, 2023; Wang, 2024). The proportion of expenditure on people's livelihoods has increased. These changes reflect the stage characteristics of China's economic development and changes in government policy orientation.

Motivation analysis reveals that: the slowdown in economic growth (tax revenue declines by 3.4% in 2024) is forcing the expansion of non-tax revenues; the aging population (social security expenditure increases by 5.6%) and the upgrading of people's livelihood needs (rigid growth in education and healthcare expenditures) are jointly driving the tilting of expenditure structure towards people's livelihoods (Ministry of Finance, 2025). Based on this, policy recommendations need to be targeted to respond to: alleviate tax pressure through a sound direct tax system (e.g., consumption tax backward reform), optimize the efficiency of livelihood expenditure through budget performance management (e.g., practice in DeCheng District), and dissolve the risk of fiscal sustainability through debt replacement (e.g., Guizhou's 'no hidden debt for the whole region' pilot) (Yang, 2021; Zhang, 2024; Ministry of Finance, 2025) Based on this, this paper puts forward policy recommendations from optimizing the fiscal expenditure structure, improving the tax system, and strengthening fiscal sustainability to promote China's fiscal sustainable development.

This paper innovatively finds that: the growth of non-tax revenue is the result of "institutional revitalization" (integration of assets and resources) and "technical empowerment" (electronic levy and management), rather than simply relying on administrative fees (Guo, 2024); the optimization of people's livelihood expenditures needs to be achieved through the "dynamic adjustment mechanism" (Henan) and "full-process performance evaluation" (Ducheng District) to achieve "precise supply" and "efficiency improvement". The optimization of livelihood expenditures should be realized through the "dynamic adjustment mechanism" (Henan) and the "whole-process performance evaluation" (Ducheng District) to achieve "precise supply" and "efficiency enhancement. "(Zhang, 2023; Wang, 2024). These findings for the "14th Five-Year Plan" closing period of fiscal policy to provide new ideas: from "scale expansion" to "structural optimization", from "passive response" to "active response". From "scale expansion" to "structural optimization", and from "passive response" to "active governance", it provides an operable path reference for the sustainable development of finance.

Future research can be deepened in three aspects: first, regional heterogeneity analysis, comparing the differences between the east (e.g., Guangdong) and the west (e.g., Guizhou) in the dependence on non-tax revenues and the efficiency of people's livelihood expenditures; second, the assessment of the policy effect, to quantify the long-term impact of the tax cuts (e.g., the tax drop of 3.4% in 2024) on the upgrading of the industrial structure; and third, international comparative research, drawing on the non-tax revenues of OECD countries (15%) and the structure of people's livelihood expenditures (e.g., Northern Europe). and the optimization experience of livelihood expenditure structure (e.g., Nordic welfare model).

Author Contributions:

All authors have read and agreed to the published version of the manuscript.

Funding:

This research received no external funding.

Institutional Review Board Statement:

Not Applicable.

Informed Consent Statement:

Not Applicable.

Data Availability Statement:

Not Applicable.

Conflict of Interest:

The authors declare no conflict of interest.

References

Financial and Economic Committee of the National People's Congress. (2025, June 27). Report on the review of the 2024 central final accounts draft. https://www.gov.cn/yaowen/liebiao/202506/content_7029732.htm

Gao, P. (2025). Intensity, efficacy, and risk prevention of proactive fiscal policy in 2025. Economic Research, (1), 4–18.

Guo, P. (2024). Characteristics and management strategies of non-tax revenue changes. China Finance News, p. 05.

Jia, K., & Su, J. (2024). Fiscal policy optimization and high-quality economic development in the final year of the "14th Five-Year Plan." Taxation Research, (10), 5–12.

Liu, S. (2021). Core challenges and policy paths of China's fiscal governance during the "14th Five-Year Plan." Public Finance Research, (4), 15–28.

Lou, J. (2020). Deepening fiscal reform and promoting national governance modernization. Qiushi Journal, (19), 30–35.

Ma, H., & Ren, Q. (2022). Theoretical logic and practical path of budget performance management in the new era. Management World, 38(1), 88–103.

Ministry of Finance. (2025). Press conference on fiscal revenue and expenditure in 2024. https://www.mof.gov.cn/zhengwuxinxi/caizhengxinwen/202410/t20241025_3946328.htm

Ministry of Finance. (2025, March 6). Report on the implementation of the central and local budgets for 2024 and the draft central and local budgets for 2025 (Summary). People's Daily, p. 01.

Ministry of Finance. (2025, March). Typical cases of local government debt risk resolution in 2024 [Report]. http://www.npc.gov.cn/c2/c30834/202509/t20250915_447911.html

National Bureau of Statistics. (2024). China statistical yearbook 2024. China Statistics Press.

Shen, S., & Hou, J. (2022). Scale, structure, and optimization path of government health investment in China. Chinese Health Policy Research, 15(8), 1–8.

Wang, H. (2024). Fiscal expenditure optimization with the focus on improving people's livelihood. Marxism Studies, (3), 56–68.

Wang, Y. (2023). On the scientific definition and efficiency improvement of fiscal expenditure scope. Public Finance and Theory, 44(2), 3–9.

Yang, Z. (2021). Improving the modern fiscal and taxation system: Goals, challenges, and reform priorities. International Taxation, (1), 12–18.

Zhang, B., & Wang, H. (2024). Paths and long-term mechanisms for resolving local government debt risks. Public Finance Science, (5), 25–38.

Zhang, L., Wang, Q., & Li, M. (2023). Research on the optimization of fiscal expenditure structure for people's livelihood in Henan Province (Master's thesis, Henan University).

The Development of Humanities and Social Sciences, 2026, 2(1), 13-28
https://doi.org/10.71204/dqzc3p11

A Study on the Matching of Community Service Supply with the Needs of Family Carers for Elderly People with Dementia in a Subdistrict of Y City

Yilin Hao [1], Zhihui Wei [1,*]

[1] Tianjin University of Technology, Tianjin 120000, China

[*]**Corresponding Author**
Zhihui Wei

hayley365@126.com

Received: 12 February 2025 / Accepted: 27 February 2026 / Published online: 28 February 2026

Abstract

To investigate the alignment between community services and the needs of family carers for elderly individuals with dementia, this study employed Coupling Theory. A questionnaire survey was conducted among 514 households across 32 communities in a sub-district of Y City. An independent samples t-test was used to quantitatively analyse the coupling degree between the two systems.Statistical analysis revealed significant discrepancies between community service provision and family care needs ($t=-2.256$, $p=0.036$), indicating low current coupling between the two systems and a mismatch characterised by "high demand, low supply". Specifically, the core contradictions, ranked by urgency, are: widespread lack of financial support (demand: 78.2%, coverage: only 13.1%), policy implementation bottlenecks (awareness rate: 17.3%, 38.8% perceive cumbersome procedures), shortage of professional care services (e.g., skills guidance coverage at 14.0%), and mismatch between infrastructure supply and demand (age-friendly renovation demand at 57.3%, supply at 28.5%). Findings indicate loose coupling between community support systems and family care systems, with ineffective coordination persisting. Consequently, efforts must focus on enhancing systemic integration by establishing a "co-construction and shared-benefit" network involving multi-stakeholder collaboration among government, communities, medical-care institutions, and social forces. This requires strengthening financial support, streamlining policy procedures, expanding professional services, and advancing facility ageing-friendly modifications to improve service precision and systemic integration, thereby solidifying the foundation for home-based care.

Keywords: Dementia Patients; Family Carers; Community Services; Supply-Demand Matching

1. Introduction

As China's population continues to age, elderly care has increasingly become a major social issue affecting national development and people's livelihoods. Policy documents such as the "14th Five-Year Plan for the Development of the National Ageing Sector and the Elderly Care Service System" have been successively introduced, elevating proactive responses to population ageing to a national strategic level. These aim to systematically safeguard the basic living standards and well-being of the elderly.

Firstly, family carers responsible for supporting individuals with dementia face multiple pressures—physical, psychological, and financial (Alzheimer's Disease International, 2009) —whose plight demands urgent attention.Family carers for elderly individuals with dementia (Wang, 2014) refer to family members and close relatives providing long-term, ongoing informal care for those experiencing cognitive impairment, diminished activities of daily living, and associated psycho-behavioural symptoms. They constitute the primary bearers of care within China's current dementia support system.The state has explicitly advocated supporting families in fulfilling elderly care functions within the "Opinions on Deepening the Reform and Development of Elderly Care Services," backed by policies such as long-term care insurance pilot schemes (Liu, 2025). This renders research focusing on family carers of dementia patients—who bear the heaviest caregiving burden—particularly crucial and urgent.

Secondly, influenced by traditional attitudes and practical constraints, the vast majority of elderly individuals with dementia currently opt for home-based care (Tan, 2025). National policy has explicitly established a service framework centred on home-based care (Liu, 2026). Consequently, developing and refining the support system for home-based elderly care represents an inevitable direction for the advancement of elderly care services (Liu, 2026).As the "last mile" of home-based care services, the community plays a pivotal role in safeguarding the wellbeing of family carers (Tan, 2025).

However, there may be a disconnect between the services currently provided by many communities and the genuine needs of family carers. To precisely identify this issue, this study focuses on carers from 432 households with dementia patients across 32 communities in a sub-district of Y City. This sub-district serves as an urban grassroots governance unit with a substantial elderly population and widespread distribution of dementia households. Against this backdrop, a questionnaire survey method was employed to empirically examine the alignment between community service provision and family needs, revealing service gaps and core pain points. This provides empirical evidence and strategies for enhancing the precision and effectiveness of community support services.

Current international research has established a systemic model centred on community care with institutional care as a supplement (Long, 2025), featuring standardised needs assessment, personalised service customisation, and continuous dynamic monitoring. In contrast, domestic studies predominantly focus on carers' burden experiences (Li, 2013; Sun, 2019),supply-demand analyses for professional community care services to support network development (Yang, 2019; Dong, 2018), and macro-level policy system evaluations (Yang, 2024). However, empirical research examining the alignment between "small-scale, precision-oriented" community service provision and actual family needs at the grassroots sub-district level—from a more diversified perspective encompassing infrastructure, economics, policy, and community services—remains relatively scarce.Consequently, this research holds significant practical relevance for optimising grassroots elderly care services and precisely addressing the needs of families affected by dementia.

2. Theoretical Foundation

Originating from physics, this theory examines the relationships between interacting systems and components. Grounded in systems science, it constitutes a theoretical framework for studying the coupling relationships, mechanisms, intensity, coordination levels, and evolutionary patterns among multiple systems or subsystems. Its core lies in revealing the intrinsic logic of systems transitioning from independence to interconnection, synergy, and ultimately integration.Within the social sciences, coupling denotes the coexistence of multiple units or subsystems within a system, characterised by mutual dependence, influence, and adaptation. Through interactive adjustment, this process achieves optimisation of the system's structure and function. The concept is frequently applied in the context of economic system reform.

Domestically, an increasing number of scholars are applying this theoretical perspective to collaborative research on elderly care models. Zhang (2013) posits the existence of a bidirectional coupling mechanism within rural home-based elderly care services, noting that such mechanisms can generate economies of scale and synergistic effects. Zhang (2024) applied coupling theory to the elderly care service system and silver economy, targeting high-quality service provision. This approach is deemed crucial for implementing proactive strategies against population ageing, upholding new development concepts, and vigorously advancing common prosperity for the elderly population.Gu et al. (2024), using Hefei as a case study and integrating artificial intelligence with holistic governance theory, explored a smart health care governance model for elderly care based on the "four-force coupling" approach.However, coupling theory faces practical challenges. Zhou (2024) notes that home-based elderly care volunteering struggles to meet diverse service demands across quantity, quality, and sustainability, resulting in a coupling imbalance between accessibility and supply. Given this and the future trend of home-based care, where institutional care's comprehensive dominance diminishes and dispersed care resources increasingly converge within communities and elderly households, the rational allocation and integration of resources becomes paramount. Coupling theory can precisely guide various social actors in linking resources to maximise their respective functions.

This study applies coupling theory to examine the degree of dependency between the family care system and the community service system – specifically, the closeness of their connection, whether the community is suited to family care needs, and whether family care adapts to the community environment.The degree of coupling is reflected through mean differences assessed by independent samples t-tests. A statistically significant difference in means indicates low coupling between the family care system and the community service system, suggesting that community services fail to meet family care needs, and vice versa. This approach is extended to explore how coupling can drive multi-stakeholder coordination, thereby proposing countermeasures to construct a supportive network that unites the care efforts of multiple systems—including government, community, professional institutions, and social forces.

3.Research Methodology

3.1. Questionnaire Design and Data Collection

This study employed a questionnaire survey for data collection. Questionnaire design strictly adhered to the analytical framework examining significant disparities between supply and demand. It was developed based on a review of policy documents such as the "14th Five-Year Plan for National Ageing Development and Elderly Care Service System" and existing literature.

The questionnaire comprised three sections: Part One gathered basic socio-demographic characteristics of respondents and the elderly with dementia under their care; Part Two assessed the "Current State of Community Service Provision"; and Part Three evaluated "Family Caregiver Needs".The overall structure employed a combination of single-choice and multiple-choice questions, with a dual-sided comparison of current status and needs. The survey primarily explored four core dimensions: infrastructure support, economic support, policy support, and service support. The current status section mainly inquired about carers' perceptions of the actual provision of existing community facilities, public spaces, accessibility modifications, financial subsidies, awareness of policies, professional organisations, respite services, health guidance, and psychological counselling.The needs section focuses on understanding caregivers' genuine demands and prioritisation regarding community medical facilities, recreational environments, professional support spaces, temporary respite services, age-friendly modifications, subsidy levels, optimisation of policy implementation processes, and enhancement of service types. This comprehensively reflects the community service supply landscape and the structure of family caregivers' demands, providing data support for subsequent supply-demand coupling analysis and statistical verification.

Ultimately, the study employed a stratified random sampling method to survey 500 registered carers of elderly individuals with dementia across 32 communities in a designated sub-district of City Y between March and June 2025.Questionnaires were distributed and completed under the guidance of uniformly trained interviewers during home visits. A total of 432 questionnaires were distributed and 432 were returned. After verification, removal of missing values, and exclusion of invalid responses, 330 valid questionnaires were ultimately obtained. The effective recovery rate was 76.38%. Detailed demographic statistics for the valid questionnaires are presented in (Table 1 and Table 2).

Table 1. Cross-tabulation of demographic characteristics for elderly individuals with dementia

Indicator Type	Specific Classification	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Gender	Male	180	13.6	13.6	13.6
	Female	150	11.4	11.4	25
Household Registration Type	Urban Household Registration	183	13.9	13.9	38.9
	Rural household registration	147	11.1	11.1	50
Marital Status	Married and living with spouse	202	15.3	15.3	65.3
	Divorced	7	0.5	0.5	65.8
	Widowed	111	8.4	8.4	74.2
	Unmarried	11	0.8	0.8	75
Highest level of education attained	No schooling	98	7.4	7.4	82.4
	Primary school	110	8.3	8.3	90.7
	Junior High School	62	4.7	4.7	95.4
	Senior Secondary/Vocational School	41	3.1	3.1	98.5
	College and above	19	1.5	1.5	100

Table 2. Cross-tabulation of Demographic Characteristics of Family Carers

Indicator Type	Specific Classification	Frequency	Percentage	Valid Percentage	Cumulative percentage
Gender	Male	132	10	10	10
	Female	198	15	15	25
Household Registration Type	Urban Household Registration	191	14.5	14.5	39.5
	Rural household registration	139	10.5	10.5	50
Marital Status	Married and living with spouse	288	21.8	21.8	71.8
	Divorced	2	0.1	0.1	72
	Widowed	19	1.5	1.5	73.5
	Unmarried	12	0.9	0.9	74.3
Highest level of education attained	No schooling	9	0.7	0.7	75
	Primary school	42	3.1	3.1	78.2
	Secondary School	60	4.6	4.6	82.7
	Senior Secondary/Vocational School	99	7.5	7.5	90.2
	College and above	83	6.3	6.3	96.5

3.2. Data analysis methods

The data were processed and analysed using SPSS 26.0 software. Firstly, descriptive statistical analysis was employed to present the demographic characteristics of the 330 respondents, the current distribution of community service provision, and the concentration of demand among family carers. This provided an intuitive overview of supply and demand patterns. All percentage statistics were calculated based on the total number of valid questionnaires (N=330). For multiple-choice questions, valid percentages were used (i.e., only the proportion of respondents selecting that option among all respondents was counted).

Secondly, to examine whether statistically significant disparities existed between supply and demand at the aggregate level, this study employed an independent samples t-test using a dimensional indicator aggregation approach: The four dimensions — infrastructure support, financial support, policy support, and service support — were first decomposed into 10 supply observation indicators (current status) and 11 demand observation indicators (demand). Individual-level mean calculations were performed for each indicator score across all 330 respondents. Statistical analysis was then conducted using indicator type as the unit (N status = 10, N demand = 11). The aggregated data comprising the individual means for each indicator across all 330 respondents was subjected to t-testing to validate the research hypothesis that 'demand exceeds supply'. This methodology is grounded in the following rationale: the core analysis of this study examines the overall supply-demand coupling characteristics across the four major dimensions, rather than individual-level supply-demand discrepancies. Employing aggregated mean data effectively mitigates random errors inherent in individual responses, thereby more accurately reflecting the overall matching relationship between the community service supply system and the family care demand system. Furthermore, this approach is widely adopted in similar system coupling studies (Zhang, 2024; Gu, 2024).

Finally, demand priorities across the four dimensions are ranked using effective percentage ratios of demand versus current status. Visualisations such as the 'Four-Dimensional Supply-Demand Comparison Bar Chart' and 'Demand Priority Distribution Pie Chart' provide intuitive insights into the most pressing pain points requiring immediate change among family carers. This lays the groundwork for subsequently proposing corresponding countermeasures and recommendations.

Prior to conducting descriptive statistics and hypothesis testing, this study assessed the reliability and validity of the Community Service Supply Scale and the Family Caregiver Demand Scale to verify the robustness of the measurement results. Reliability was assessed using Cronbach's α coefficient to evaluate internal consistency. Results indicated an α coefficient of 0.827 for the Community Service Supply Scale (10 items) and 0.864 for the Family Caregiver Demand Scale (11 items), both exceeding the recommended threshold of 0.8. This demonstrates excellent internal consistency reliability for both scales.

Validity assessment employed exploratory factor analysis (EFA) to evaluate the scales' construct validity. Initially, the KMO sampling adequacy measure was 0.812 for the supply scale and 0.845 for the demand scale, with Bartlett's sphericity test yielding p-values below 0.001 for both, confirming data suitability for factor analysis. Subsequently, principal component analysis with maximum variance orthogonal rotation was employed for factor extraction. Results revealed four common factors with eigenvalues exceeding 1 for the supply scale, accounting for 78.36% of cumulative variance. Similarly, four common factors were extracted for the demand scale, explaining 82.54% of cumulative variance. All item loadings on their respective common factors exceeded 0.6, with no significant cross-factor loadings, indicating clear dimensionality. The extracted common factors corresponded precisely to the predefined dimensions of infrastructure support, economic support, policy support, and service support, demonstrating strong alignment with theoretical constructs. Consequently, both scales exhibited robust construct validity.

4. Analysis of the Alignment Between Community Service Provision and Family Demand

4.1. Descriptive Statistical Analysis

4.1.1. Demand from Carers of Dementia Patients

Regarding infrastructure requirements, 76.0% of carers expressed a desire for improved community recreational environments, 64.5% emphasised the need for more accessible healthcare facilities, 51.1% required cultural and entertainment facilities, 19.8% mentioned educational and training institutions, while 9.2% indicated no such needs.Regarding priority development areas, the most urgent demand is for age-friendly renovation facilities (57.3%); temporary respite care facilities (50.8%); professional nursing equipment support (48.9%); communication/training spaces (37.2%); and information service systems (29.3%). 15.4% of carers indicated no priority facility needs.

Regarding financial support, 78.2% of carers most urgently require increased subsidy levels and broader coverage. Additionally, 26.5%, 24.9%, 21.5%, 20.7% and 22.1% respectively sought innovative assistance models, refined targeted subsidy mechanisms, improved digital application processes, sustainable funding mechanisms, and enhanced service resource coordination.Notably, this survey recorded zero respondents indicating no financial support requirements.

Regarding policy implementation needs, 38.8% of carers deemed process design unreasonable; 34.4% highlighted imbalanced resource allocation;22.1% deemed policies poorly adapted to grassroots implementation; 15.4% and 15.1% respectively highlighted inefficient inter-departmental coordination and inadequate capacity among implementing bodies; while 12.3% cited a lack of oversight and feedback mechanisms. Concurrently, 28.8% of carers perceived no significant issues with policy implementation.

Regarding community service demand, 68.7% highlighted insufficient service variety. Concerns over poor service quality and excessive fees were raised by 14.8% and 12.3% respectively, while 21.8% cited other comprehensive issues.

4.1.2. Current State of Community Service Provision

In terms of infrastructure support, 38.5% of carers were aware that their community provided basic facilities such as accessible pathways and rest areas, while a significant 61.5% were unaware of such provisions. Community public activity spaces were predominantly open-air squares and green spaces, covering 77.9% of areas; however, dedicated activity zones for the elderly and indoor cultural venues were both under-equipped, with provision rates below 50% at 45.8% and 45.0% respectively.The coverage rate for sports and fitness facilities stands at 39.1%, while commercial support spaces account for only 16.8%. Furthermore, 9.2% of carers reported their communities lacked relevant public activity spaces. Home accessibility modification services, directly impacting domestic safety, have a coverage rate of merely 28.5%, with 71.5% of households failing to receive this support.

Regarding financial and policy support, only 13.1% of carers received community-level financial subsidies, with 86.9% having never accessed any assistance. Awareness of specialised support policies for caring for individuals with cognitive impairment was similarly low, at just 17.3%, while 82.7% of carers were unaware of relevant policy content.

Regarding service support, only 10.9% of carers indicated their community had established specialist support organisations for cognitive impairment, with 89.1% of communities lacking such facilities. The coverage rates for respite care and psychological counselling services stood at 30.2% and 27.4% respectively, yet 69.8% and 72.6% of carers remained without access to these services.The most critical areas of health education and caregiving skills guidance showed the lowest implementation rate at merely 14.0%, with 86.0% of carers having received no such guidance.

4.2. Statistical Testing and Analysis of Supply-Demand Status

To rigorously test whether a genuine, systematic gap exists between community service provision and the needs of family carers for individuals with dementia, this study employed an independent samples t-test. Analysis revealed that the mean for community service provision was 32.540, while the mean for carer needs was 51.627, indicating a significant mean difference of 19.087 (Table 3). Statistical testing indicates this difference is statistically significant at the 0.05 level ($t=-2.256$, $df=19$, $p=0.036$) as shown in (Table 4). This finding confirms through quantitative analysis and supply-demand comparison that the significance level falls below 0.05, indicating a significant disparity between current community services and the actual needs of family caregivers, with low coupling.A systemic mismatch characterised by "high demand and low supply" exists across the board, with the objective reality of a systemic supply-demand disconnect established (Figure 1). Accordingly, demand prioritisation across the four dimensions analysed — infrastructure support, economic support, policy support, and service support — is presented (Figure 2).

Table 3. Intergroup Basic Statistics Table

Indicator Type	N	Mean	Standard Deviation	Standard Error Mean
Current Status	10	32.54	21.3815	6.7614
Demand	11	51.627	17.3561	5.2331

*Note: N denotes the number of indicator types

Table 4. Independent Samples T-Test Results Table

Item	t	Degrees of Freedom	Two-tailed P (Significance)	Mean difference	95% confidence interval for the difference (Lower Bound)	95% confidence interval for the difference (Upper Bound)
Assuming equal variance	-2.256	19	0.036	-19.0873	-36.799	-1.3756
No assumption of homogeneity of variance	-2.232	17.394	0.039	-19.0873	-37.095	-1.0795

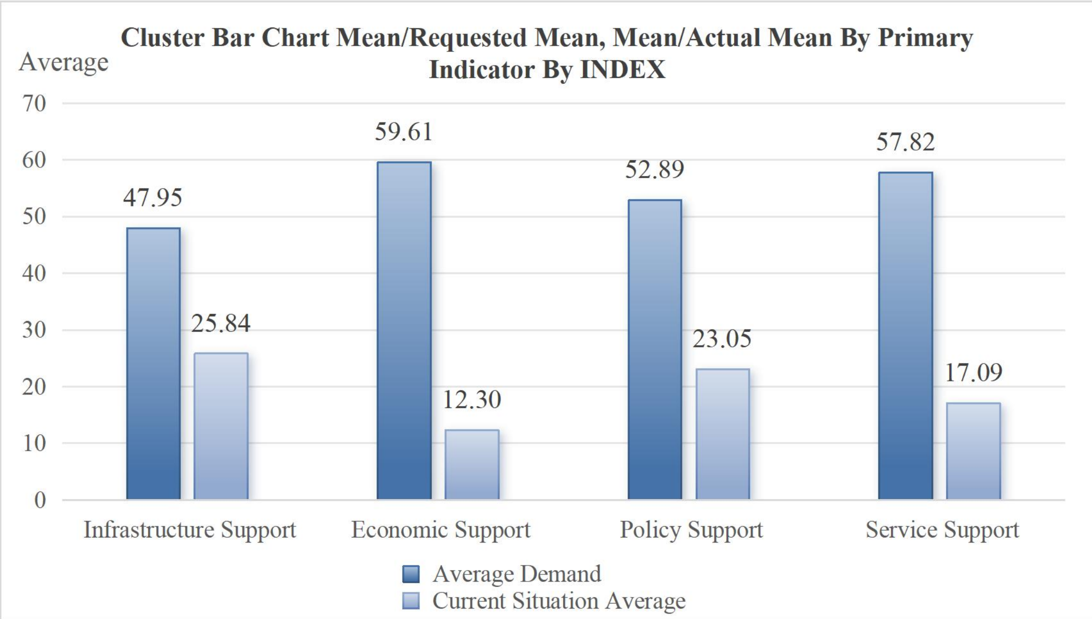

Figure 1. Independent Samples T-Test Results Table

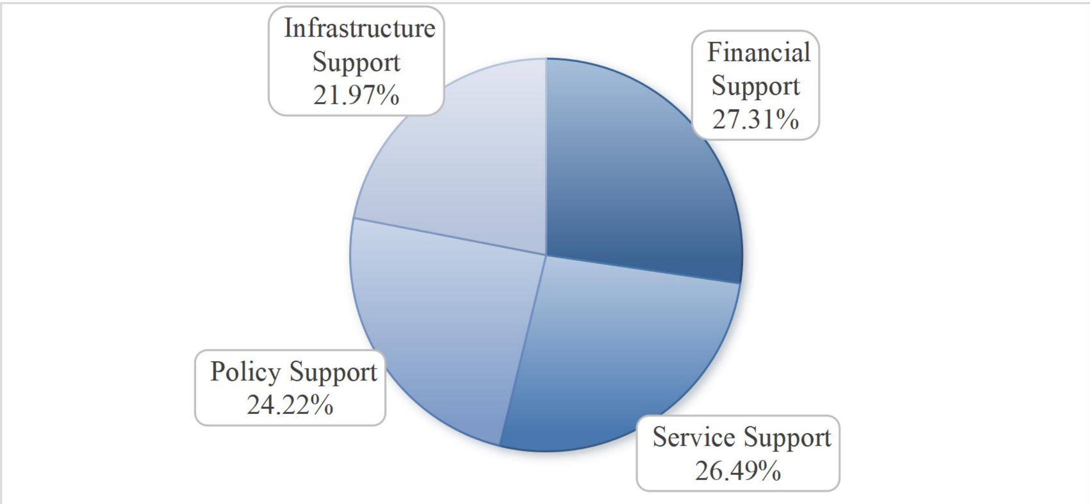

Figure 2. Demand Priority Distribution Pie Chart

The primary contradiction lies in the significant gap between the widespread lack of financial support and the high-intensity demands placed upon carers. Financial pressure constitutes the most immediate and burdensome challenge for carers. A substantial 78.2% of carers prioritise increasing cash subsidy levels and expanding coverage as their foremost requirement, with this need far outstripping other options in urgency. Current financial support is virtually non-existent, with only 13.1% of carers reporting having received subsidies, while a staggering 86.9% have never benefited from such support. This vast gap between demand and supply renders financial support the most pressing and critical pain point requiring immediate attention.

Secondly, specialised care support services are either scarce or entirely unavailable, failing to meet carers' fundamental needs for enhancing caregiving capabilities and alleviating burdens. Notably, 68.7% of respondents highlighted the overall inadequacy of service variety.Regarding specific service items, the most concentrated demand is for home-based ageing-friendly modifications, such as barrier-free access and smart home experiences (57.3%); followed by temporary respite care services (50.8%); and professional support facilities like nursing equipment rental stations and rehabilitation aid sharing points (Qiu, 2017) (48.9%).In contrast, the coverage rate of professional community support services stood at a mere 10.9%. The implementation rate for caregiving skills and health education guidance was a low 14.0%, while psychological counselling and respite services covered only 27.4% and 30.2% respectively. This comprehensive lack of professional services leaves carers perpetually isolated in their caregiving responsibilities.

Thirdly, the policy system suffers from severe bottlenecks in the "last mile" of implementation, primarily due to complex execution procedures and information transmission failures. Despite existing macro-level policies, their effectiveness is undermined by inefficiencies at the grassroots implementation level. The most prominent issue is the unreasonable design of policy execution processes, with 38.8% of carers citing cumbersome procedures and ambiguous standards. Secondly, 34.4% of carers perceive insufficient funding and misallocation of resources.More fundamentally, policy information fails to reach target groups effectively. A staggering 82.7% of carers are entirely unaware of relevant policies, with awareness rates standing at a mere 17.3%. Combined, procedural bottlenecks and information barriers trap policy benefits within the "last mile".

Finally, infrastructure provision exhibits structural imbalances characterised by "presence without impact" and "availability without specialisation," resulting in poor alignment with precise needs. 76.0% of carers require improvements to recreational environments such as public footpaths, fitness equipment, and park green spaces, while 64.5% seek local access to medical facilities like community health stations and elderly care centres.However, two key issues emerge: firstly, the coverage rate for home accessibility modifications—the most urgently needed support for families caring for dementia patients—stands at a mere 28.5%. Secondly, even where communities provide some public infrastructure, such as accessible pathways and rest areas, 61.5% of carers report being unaware of these facilities due to inadequate publicity or accessibility issues. This highlights deficiencies in both the precision and awareness of infrastructure provision.

In summary, this study reveals a significant overall disparity between community service provision and the needs of carers in families with dementia patients. The most fundamental driver is the severe lack of financial support; the most detrimental factor to care quality is the systemic shortage of professional services; the most immediate obstacle is the complexity of policy implementation processes and poor information flow; and the most fundamental issue is the structural mismatch between infrastructure supply and demand.This prioritisation of contradictions precisely pinpoints the critical junctures where the current community support system fails to effectively align with the genuine needs of family carers, providing clear empirical evidence for formulating targeted countermeasures.

5. Analysis of Causes and Multi-stakeholder Collaborative Countermeasures for Supply Demand Discrepancies

5.1. Root Causes and Countermeasures for Economic Support Deficiencies

The primary reasons for inadequate financial support stem from a single source of funding, communities lacking authority to allocate resources, and inflexible subsidy mechanisms. Specifically, communities lack dedicated funding, relying instead on limited ad hoc allocations from higher authorities, which fails to establish stable support. Funding procurement relies almost entirely on public finances, failing to effectively engage social forces. Concurrently, high application thresholds and rigid standards for subsidies prevent differentiation based on actual household economic circumstances and care intensity (Xu, 2026), resulting in the most needy families struggling to access assistance.

To address these issues of single funding sources and inflexible subsidy methods, it is necessary to broaden funding channels and optimise distribution mechanisms. Firstly, concerning the narrow funding channels, a diversified funding pool must be established. Communities should actively seek specialised subsidies from higher authorities while collaborating with local enterprises and foundations to mobilise social donations. Additionally, they can repurpose idle community resources to establish mutual aid funds, creating a framework where public finances provide a safety net and social resources offer supplementary support. Secondly, to counter the drawbacks of uniform subsidy standards, tiered and categorised subsidies should be implemented. Application materials should be simplified, with community grid workers verifying household circumstances. Higher cash subsidies should be allocated to families bearing longer care periods and greater economic burdens, ensuring targeted assistance. Finally, to alleviate inflexible subsidy usage, service voucher deduction models should be explored. Converting portions of cash subsidies into vouchers redeemable at contracted pharmacies and supermarkets would directly reduce daily expenditure burdens for caregiving households.

5.2. The Conundrum of Professional Service Shortages and Network Cultivation

The severe shortage of professional services stems from communities' inability to retain skilled personnel, inadequate resource integration, and caregivers' trust concerns. Communities struggle to offer competitive remuneration and career progression opportunities, failing to attract or retain certified carers and social workers. Furthermore, communities have not established robust partnerships with local hospitals and care homes, hindering the decentralisation of professional resources. Some carers express unease about external personnel providing home visits and lack scientific caregiving knowledge (Lin, 2025), resulting in untapped demand.

To address the current shortfall in professional capacity and trust deficits, external professional resources must be introduced while internal community capabilities are cultivated. On one hand, to alleviate the challenge of professional resources reaching households, collaboration between medical, social, and care sectors should be promoted. This includes inviting hospital doctors and nurses to conduct free clinics and rehabilitation guidance within communities (Xiao, 2025), partnering with care homes to offer day care or respite services (Zhang, 2025), and introducing their professional carers for skills training. Concurrently, to address the community's own talent shortage, local support teams must be cultivated. Engage nursing and social work students from universities in volunteer services, while identifying retired healthcare professionals and enthusiastic residents within the community. Following training, these individuals can become community care volunteers or ‘mutual aid leaders’. Furthermore, to address carers' trust concerns and information gaps, build confidence through publicising qualifications, offering free trials, and establishing service evaluation mechanisms (Ning, 2026). Pay particular attention to carers' psychological pressures by organising regular ‘mutual support group’ activities for families with dementia members to provide emotional support (Lin, 2025).

5.3. Bottlenecks and Solutions in Policy Implementation

Low awareness and implementation difficulties stem from inadequate publicity, overly complex procedures, and insufficient feedback channels. Current policy dissemination relies heavily on one-way methods like posting notices or sending WeChat messages, which fail to align with the information-receiving habits of many middle-aged and elderly carers, leaving them unaware. Policy application procedures are often unnecessarily complex, requiring multiple supporting documents (Chen, 2016), while community staff lack adequate training to offer effective guidance. Furthermore, the absence of feedback mechanisms from carers prevents timely identification and rectification of implementation issues.

To ensure policies address these implementation challenges, they must be visible, accessible, and optimisable. Firstly, to tackle low outreach rates, targeted proactive communication is essential. Regular community policy briefings should be held, accompanied by large-print explanatory leaflets. Grid officers should visit mobility-impaired carers to provide interpretations and proxy services, guaranteeing effective information delivery. Secondly, to resolve procedural complexity, administrative processes must be significantly streamlined. Non-essential documentation should be eliminated, implementing a ‘single-window service’ (Yuan, 2023) with guaranteed processing timelines, alongside offering full-process agency services for elderly individuals and their carers who require assistance. Thirdly, to establish a feedback loop for policy refinement, a regular feedback mechanism should be instituted. This involves proactively gathering carers' opinions through periodic forums and public disclosure of subsidy disbursements, with common issues escalated to drive continuous policy optimisation.

5.4. Causes of Infrastructure Mismatch and Renovation Strategies

The mismatch between supply and demand for facilities stems from inadequate consideration of the specific needs of dementia patients during planning, insufficient post-construction maintenance, and constraints in funding and public awareness. Existing public facilities in older communities predominantly feature universal design, lacking specialised considerations for accessibility and safety. Many facilities remain unrepaired after deterioration, while in-home ageing-friendly modifications face implementation hurdles due to cost and coordination challenges. Crucially, many middle-aged and elderly carers experience a digital divide, often unaware of available community facilities (Dai, 2025).

To address facility shortages, deterioration, and information asymmetry, improvements must focus on optimising existing infrastructure and enhancing information dissemination. Addressing inadequate ageing-friendly design and maintenance deficits in public facilities requires prioritising retrofitting of communal areas in older neighbourhoods. This includes installing handrails, providing seating for rest, and establishing regular inspection and maintenance protocols (Zhao, 2023). To overcome carers' challenges of ‘unaware and unable to use’ facilities, clear digital maps and user guides must be developed. Community grid workers should proactively inform and instruct carers to ensure they ‘know how and can use’ these resources. Secondly, to compensate for the shortage of specialised facilities, existing spaces should be repurposed. Idle rooms within communities can be converted into rest areas for carers, while partnerships with nearby pharmacies can establish convenient medical access points. Finally, to overcome the high barriers and implementation difficulties of home environment modifications, measures such as applying for specialised subsidies, promoting cost-effective “micro-renovation” projects, and organising sharing sessions of successful case studies (Gong, 2025) should be employed to assist more households in completing essential home adaptations.

6. Research Limitations and Future Directions

Although this study empirically reveals the core contradiction between community service provision and the needs of family carers for dementia patients, certain limitations exist due to research conditions and methodology that warrant refinement in future investigations.

Firstly, the representativeness of the sample is somewhat limited. The data originates from 514 households within a single sub-district community in City Y. While this ensures in-depth analysis within a defined scope, it may not fully reflect variations in supply-demand discrepancies across other regions—particularly rural areas, cities with differing economic development levels, or communities operating under distinct governance models. The single-area sample constrains the generalisability of findings. Secondly, data collection methods may introduce response bias. The study primarily relied on self-reported questionnaires completed by caregivers. On one hand, perceptions of service provision may be coloured by individual subjective experiences; on the other, when addressing demand-related questions, caregivers might be constrained by social expectations or incomplete understanding of policies, potentially hindering the accurate articulation of latent or unrecognised deeper needs. This could introduce a degree of error in measuring the supply-demand gap.

In summary, alleviating the burden on family carers of dementia patients constitutes a public welfare initiative requiring meticulous design and systematic responses. Consequently, establishing a multi-stakeholder support network characterised by complementary functions and shared responsibilities is essential. The government must provide stable policy and financial guidance; communities must serve as core hubs for resource integration and service delivery; healthcare institutions and care homes should open their professional resources to empower communities ; while universities and other entities can inject volunteer energy and intellectual support.Only through concerted collaboration can fragmented efforts coalesce into cohesive momentum, ensuring carers no longer face isolation. By solidifying community-level "last-mile" work, the warmth of national policies and societal compassion can tangibly reach every family bearing the burden of care, collectively fostering a more inclusive and compassionate age-friendly society.

Author Contributions:

Conceptualization, Y. H., and Z. W; methodology, Y. H; software, Y. H; validation, Y. H., and Z. W; formal analysis, Y. H; investigation, Y. H; resources, Y. H; data curation, Y. H; writing—original draft preparation, Y. H; writing — review and editing, Y. H; visualization, Y. H; supervision, Y. H; project administration, Y. H; funding acquisition, Z. W. All authors have read and agreed to the published version of the manuscript.

Funding:

This research was funded by Tianjin College Student Innovation Training Programme Project, grant number: 202510060038.

Data Availability Statement:

The raw data supporting the conclusions of this article will be made available by the authors on request.

Conflict of Interest:

The authors declare no conflict of interest.

References

Alzheimer’s Disease International. (2009). World Alzheimer report (Report No. 2009). Alzheimer's Disease International.

Chen, T., Dong, Y., Ma, L., et al. (2016). Advancing “Internet Plus government services” to enhance government service delivery and social governance capabilities. E-Government, (8), 2–22.

Dai, Y. (2025). Age-friendly design and evaluation against the background of the digital divide among elderly populations. Theory and Practice of Information Science, 48(S1), 207–210.

Dong, X., Tu, Y., Yang, H., et al. (2018). Research on the current status and needs of home care services for elderly people with dementia. Chinese Journal of Social Medicine, 35(3), 278–281.

Gong, J., Ding, X., & Dong, Q. (2025). Research and practice on age-friendly renovation of indoor spaces in old residential buildings under home-based care models: A case study of renovation practices in an old residential building in Beijing. Urban Architecture Space, 32(11), 52–54.

Gu, D., Zhang, M., Yang, X., et al. (2025). Holistic governance perspective: Theoretical construction of intelligent health care for the elderly based on "four-force coupling"—Insights from Hefei practice. Journal of Public Administration, 22(1), 151–163, 176.

Li, M., Yang, H., Gao, Q., et al. (2013). Analysis of caregiver burden and influencing factors in long-term home care for disabled elderly in Jinan City. Journal of Shandong University (Medical Edition), 51(9), 109–112.

Lin, X. (2025). Passing on experience, relaying care: Respite mutual support groups for family carers of persons with disabilities. Chinese Social Work, (9), 39–40.

Liu, Y., Liu, J., & Yang, X. (2025). The impact of long-term care insurance on the lifestyle of family carers of disabled individuals. Population and Development, 31(3), 51–59, 164.

Liu, Z., & Liu, L. (2026). How reforms in home-based and community elderly care services drive "successful ageing": Evidence and mechanism analysis based on pilot policies using a difference-in-differences approach. Modern Finance (Journal of Tianjin University of Finance and Economics), 46(1), 113–137.

Liu, Z., & Liu, X. (2026). The logic, patterns and approaches of integrated development in home-based, community-based and institutional care under digital transformation. Inner Mongolia Social Sciences, 47(1), 156–165.

Long, Y. (2025). Support policies for home care of the elderly in the United Kingdom and their formative logic. Social Security Research, (3), 102–111.

Ning, X., & Zhang, C. (2026). Construction of an evaluation system, model classification and comprehensive assessment for community-based smart home care services for the elderly. E-Government. Advance online publication.

Qiu, Z., Guo, J., Yang, J., et al. (2017). Rehabilitation 2030: Advancing relevant goals of the United Nations 2030 agenda for sustainable development. Chinese Journal of Rehabilitation Theory and Practice, 23(4), 373–378.

Sun, N., Zhou, Y., Yang, S., et al. (2019). A study on the caregiving burden and influencing factors among family caregivers of elderly individuals with dementia. China Medical Guide, 16(29), 61–64.

Tan, X., Zhang, Y., & Wang, L. (2025). From embedding to symbiosis: An action logic study on the continuous empowerment of community-based home care services by social forces—Taking the community practice of YY Elderly Care Service Centre as an example. Theoretical Exploration, (4), 99–106.

Wang, J., Xiao, L. D., Wang, Y., et al. (2014). The burden of family carers for Alzheimer's patients and their coping strategies. Chinese Journal of Gerontology, 34(8), 2295–2298.

Xiao, F., Zhao, Q., Cao, S., et al. (2025). Types of family care for disabled elderly and differentiated social support: A mixed-methods study based on grounded theory and choice experiments. Journal of Nanjing Medical University (Social Sciences Edition), 25(2), 131–138.

Xu, J., Chao, Z., Du, C., et al. (2026). Research on the economic resilience mechanism of unmet family care needs for elderly individuals with cognitive impairment in Xi'an. China Collective Economy, (2), 193–196.

Yang, S., & Jing, D. (2019). Research on the current status of care services for elderly people with dementia from a supply and demand perspective: An investigation based on Tianjin City. Labour Security World, (20), 20–22.

Yang, S., Yuan, X., & Xu, T. (2024). Current status and needs of home care for rural elderly with dementia under long-term care insurance policy. Chinese Rural Health, 16(12), 26–28, 35.

Yuan, G. (2023). Tracking the innovation diffusion process of the "one-window acceptance" policy trial: A study based on policy documents. Journal of Hohai University (Philosophy and Social Sciences Edition), 25(2), 60–72.

Yuan, X., & Jin, N. (2021). The foundations, focus and key points of governance in China's medical-care integration model. Journal of Hohai University (Philosophy and Social Sciences Edition), 23(2), 71–78.

Zhang, G. (2024). Coupling logic and pathway construction of elderly care service systems and the silver economy. Journal of Zhongzhou, (10), 80–88.

Zhang, H., Yin, M., Nan, X., et al. (2025). Conceptual evolution analysis of "home respite services" for family carers of dementia patients. International Journal of Nursing Sciences, 12(4), 352–360.

Zhang, L., Wang, Q., & Li, M. (2023). Research on the optimization of fiscal expenditure structure for people's livelihood in Henan Province (Master's thesis, Henan University).

Zhang, N. (2013). The two-way coupling mechanism in rural home-based elderly care. Journal of Zhengzhou University (Philosophy and Social Sciences Edition), 46(3), 36–39.

Zhao, N., Liu, Y., & Wen, H. (2023). Three action patterns for planning responses to informal governance in old community renewal. Journal of Urban Planning, (4), 25–31.

Zhou, Y. (2024). A study on the accessibility of home-based elderly care volunteer services from a supply-demand coupling perspective. Huxiang Forum, 37(5), 114–124.

The Development of Humanities and Social Sciences, 2026, 2(1), 29-47
https://doi.org/10.71204/p7c00k16

Case Analysis of Internal Control in Hainan Airlines (HNA) Group

Jiaxuan Li [1,*]

[1] Beijing City University, Beijing 100083, China

[*]Corresponding Author
Jiaxuan Li

xzgl13426464630@qq.com

Received: 18 January 2025 / Accepted: 7 March 2026 / Published online: 9 March 2026

Abstract

Hainan Airlines (HNA) Group, once a leading enterprise in China's aviation and tourism industry, fell into a systemic operational and financial crisis and entered bankruptcy reorganization in January 2021, due to severe internal control deficiencies in the process of aggressive M&A-driven diversification. This study takes HNA Group's internal control failure as a typical case, systematically analyzes the evolution, core defects and root causes of its internal control problems based on the COSO 2013 Internal Control-Integrated Framework. By supplementing detailed textual interpretation of core financial indicators, streamlining causal analysis logic, and linking optimization measures closely to COSO's five internal control elements, this paper clarifies the two-way vicious cycle between aggressive diversification strategy and internal control system failure. The study also standardizes industry benchmark data sources and time alignment, and further distills empirical findings, managerial implications and normative recommendations from the case. The research contributes to the enrichment of internal control theory in the context of enterprise diversification, and provides practical reference for Chinese enterprises to optimize internal control systems and avoid operational risks in strategic expansion.

Keywords: HNA Group; Internal Control Failure; COSO Framework; Diversification Strategy; M&A Risk; Corporate Governance

1. Introduction

HNA Group, formerly Hainan Airlines, was listed on China's A-share market in 1999 and subsequently launched a large-scale diversified expansion strategy centered on mergers and acquisitions (M&A), rapidly extending its business from core aviation operations to hotels, real estate, finance, logistics and other non-core fields. At its peak, the group's total assets exceeded RMB 1.02 trillion, and it ranked among the Fortune Global 500 for consecutive years. However, the lack of scientific internal control mechanism demonstration in strategy formulation, and the systemic defects in the entire internal control system from risk assessment to internal supervision, led to the continuous accumulation of financial, operational and compliance risks. In January 2021, HNA Group officially entered the bankruptcy reorganization process due to its inability to repay mature debts, becoming a typical case of enterprise failure caused by internal control deficiency under aggressive diversification in China's capital market (Chen, 2022; Huang & Qin, 2022; Qiao, 2021).

Based on the COSO 2013 Internal Control-Integrated Framework, this study systematically dissects the evolution of HNA Group's internal control failure from germination to fermentation and finally to comprehensive collapse. The study focuses on solving three core research questions: What are the specific defects of HNA Group in the five elements of the COSO internal control framework, and how do these defects interact and lead to systemic failure? How to interpret the economic significance of core financial and governance indicators, and how to link them explicitly to HNA's internal control deficiencies? What targeted internal control optimization measures can be proposed based on the COSO framework, and what theoretical and practical implications can be derived from this case?

The marginal contributions of this study are as follows: First, it constructs a clear logical framework for the evolution of internal control failure from strategic deviation to systemic collapse, supplementing the textual interpretation of core indicators and improving the analytical rigor of the case study. Second, it closely links internal control optimization measures to the five elements of the COSO framework, avoiding excessive operational details and enhancing the theoretical nature of the recommendations. Third, it standardizes the source and time alignment of industry benchmark data, ensuring the authenticity and comparability of the analysis. The research findings not only enrich the application of the COSO framework in Chinese enterprise practice, but also provide actionable references for enterprises implementing diversification strategies to balance scale expansion and risk control.

2. Evolution of Internal Control Failure at HNA Group

2.1. Germination of Internal Control Deficiencies (1999–2010)

After its A-share listing in 1999, HNA Group launched the diversification strategy of "expanding and strengthening through M&A", which deviated from its core aviation capabilities and lacked scientific internal control mechanism demonstration. The group did not establish a strategic feasibility assessment and risk early warning system, nor set up a professional strategy committee to guide the expansion direction; strategic decision-making was dominated by a small number of core management personnel, violating the internal control principles of collective decision-making and checks-and-balances supervision (Tang, 2021; Tan & Chen, 2022). This stage laid the hidden danger for the subsequent internal control failure, as the blind expansion of non-core businesses began to dilute the group's resources and management capabilities, and the internal control system failed to form effective constraints on strategic formulation from the source.

2.2. Fermentation of Internal Control Failure (2011–2019)

With the acceleration of M&A expansion, HNA Group formed a complex tree-like equity structure involving more than 2,000 enterprises, and internal control deficiencies in organizational management, risk management, and operational capacity began to erupt in an all-round way, entering the fermentation period:

Organizational management internal control failure: The group headquarters lost unified control over various business sectors, which acted independently; the internal coordination mechanism was completely absent, and the internal control design for dividing management authority and responsibilities became a mere formality. In 2020, the regulatory working group spent 4 months sorting out the group's equity relationships, which directly reflected the chaos of internal governance (Zhang & Peng, 2019; Yu, 2021).

Risk management and control internal control absence: The group lacked professional M&A talent reserves, and inexperienced employees were dispatched to be responsible for overseas M&A, forming a phenomenon of "valuing M&A over management". Financially, the equity pledge rate of 9 listed companies under the group reached 91.53% in 2013, and the asset-liability ratio rose from 56.79% in 2006 to 79.00% in 2012, with the peak exceeding 92%. In terms of compliance, major shareholders and related parties illegally occupied funds of RMB 43.4 billion, and the undisclosed guarantee amount exceeded RMB 100 billion, breaking through the entire compliance internal control process.

Operational capacity internal control weakness: From 2015 to 2019, the current asset turnover rate and total asset turnover rate of HNA Holdings were only half of the industry average. The continuous deterioration of core operational efficiency indicators did not trigger any internal control early warning or rectification mechanism, indicating the complete failure of operational-level supervision.

2.3. Comprehensive Collapse of Internal Control (2020–2021)

The superposition of aggressive expansion and systemic internal control failure led to the breakage of HNA Group's capital chain in 2020. A series of illegal acts such as related-party fund occupation and undisclosed guarantees were fully exposed in regulatory inspections, and the group's operational and financial crises broke out in a concentrated manner. On January 29, 2021, three core listed companies under HNA Group issued announcements stating that they officially entered the bankruptcy reorganization process due to their inability to repay mature debts. The reorganization process found that the group's internal control system from strategic formulation to daily operations had fundamental and systemic flaws: there was neither an effective internal control organizational structure nor an implemented risk management and control process, and the five elements of the COSO internal control framework all failed to play their due roles, ultimately leading to the enterprise's loss of basic control over its operations.

2.4. Core Root Cause of Internal Control Failure

The essence of HNA Group's internal control failure is a two-way vicious cycle between its "scale-first" aggressive diversification strategy and the imperfect internal control system: on the one hand, the blind expansion strategy ignored the constraints of the internal control system, and the lack of access thresholds and risk assessment for diversification led to the continuous accumulation of various risks; on the other hand, the failure of internal control elements such as internal environment, risk assessment and internal supervision further amplified the risks of strategic mistakes, making the group fall into a vicious circle of "expansion - risk accumulation - further expansion - risk outbreak", and ultimately leading to systemic collapse.

3. Defects of HNA Group in COSO Internal Control Framework Elements

Based on the COSO 2013 Internal Control-Integrated Framework, this section analyzes the specific defects of HNA Group in the five core elements of internal control (internal environment, risk assessment, control activities, information and communication, internal supervision), and supplements the textual interpretation of core indicators, linking the indicator deviations directly to internal control deficiencies. All financial and governance data in this section are from HNA Group’s annual reports (2006–2020), China Securities Regulatory Commission (CSRC) official announcements (2021), Wind Financial Terminal (2021) and China Aviation Transport Association industry research reports (2020), with consistent time alignment and clear sources .

3.1. Internal Environment: Fundamental Defects in Governance and Culture

The internal environment is the foundation of the internal control system, and HNA Group’s defects in corporate governance, human resources and corporate culture directly laid the foundation for subsequent internal control failure. Table 1 shows the comparison between HNA Group’s governance indicators and the aviation industry average (2020), and the deviation of each indicator directly weakens the effectiveness of internal control:

Governance structure imbalance: HNA Group formally established the general meeting of shareholders, board of directors, supervisory board and specialized committees, but the actual control power was highly concentrated in the core management (Shen & Song, 2015; Chen, 2019). The proportion of independent directors was only 9%, far lower than the industry average of 35%, and most independent directors lacked professional backgrounds in financial risk control and aviation operations, unable to form effective checks and balances on major shareholder decisions. The proportion of external supervisors was 18%, less than half of the industry average of 40%, and the supervisory board was unable to perform independent supervision duties. From 2018 to 2020, the group’s related-party fund occupation reached RMB 165.2 billion (involving 65 enterprises and 2,849 transactions), none of which went through the board of directors’ approval process, directly reflecting the failure of the governance structure’s checks-and-balances function.

Human resource system mismatch: The performance appraisal system overemphasized scale and expansion indicators, and the incentive mechanism failed to drive goal coordination between various business sectors. There was a serious gap in the reserve of professional talents in key positions such as cross-border M&A, financial risk control and compliance management, and the post competence was completely inconsistent with the speed of business expansion. The success rate of the group’s overseas M&A integration was less than 1/3 of the industry average, which was directly related to the lack of professional talent reserves.

Corporate culture orientation deviation: The initial "prudent operation" risk culture was completely replaced by the "scale first" expansion concept. The management valued scale over compliance, and employees lacked reverence for the internal control system. After the large-scale M&A in 2016, the group's total assets soared to RMB 1.02 trillion, but the asset-liability ratio reached 79.43% (Table 2), far exceeding the aviation industry average of 72% in the same period, reflecting the serious deviation of corporate culture from the essential requirements of internal control.

Table 1. Comparison of Governance Structure and Internal Control Mechanisms (2020)

Indicator Category	HNA Group	Aviation Industry Average
Proportion of Independent Directors (%)	9	35
Proportion of External Supervisors (%)	18	40
Internal Control Defect Rectification Rate (%)	28	100
Risk Signal Transmission Lag (Months)	18	3

Table 2. Asset-Liability Situation of HNA Group (2013–2016) (Unit: RMB 100 million)

Year	Total Assets	Total Liabilities	Asset-Liability Ratio (%)	Aviation Industry Average Ratio (%)
2013	2661.8	2091.5	78.6	70.2
2014	3226.2	2494.7	77.3	71.5
2015	4687.1	3537.0	75.5	71.8
2016	10154.9	8034.7	79.43	72.0

3.2. Risk Assessment: Formalistic Mechanism and Single Method

HNA Group's risk assessment mechanism was seriously formalistic, and the lack of a full-process and multi-dimensional risk assessment system made it impossible to identify and respond to the risks of diversification and M&A in a timely manner:

Formalistic risk assessment mechanism: Although the group constructed a "four major risks" prevention and control framework in name, it did not establish a full-process risk assessment process covering core business areas such as M&A integration and fund operation. Risk identification and response only focused on short-term profit goals, and lacked strategic-level risk coordination. In 2016, the group blindly entered 12 industries and 44 sub-sectors through M&A, but did not assess the compliance risks and synergy value of the acquired parties, leading to the recognition of RMB 1.819 billion in asset impairment losses in 2018 due to the losses of acquired subsidiaries.

Single risk assessment method and dimension: The group over-relied on financial indicators for risk judgment, and did not include non-financial risk factors such as cross-industry M&A synergy risks, high-debt operation liquidity risks and organizational management risks into the assessment system. For example, the group only focused on the growth of total assets in the M&A process, but ignored the continuous deterioration of asset turnover rate and the high risk of equity pledge. Table 3 shows the group's core financial risk indicators and industry comparison (2020). The equity pledge rate of 91.53% was 2.3 times the industry average, and the current asset turnover rate was only 49% of the industry average. The group failed to identify the potential systemic risks behind these indicator deviations in a timely manner.

3.3. Control Activities: Severe Deviation Between System and Practice

HNA Group had established basic internal control management systems such as fund management and external guarantees, but the implementation of control activities lacked rigidity, and the serious deviation between system and practice made the control activities lose their risk prevention function:

Authorized approval mechanism out of control: The group did not establish hierarchical authorization standards for major decisions such as M&A and external guarantees. M&A transactions exceeding RMB 5 billion were decided solely by senior management without going through board deliberation and general meeting of shareholders voting. In 2020, the group's illegal guarantee amount reached RMB 200 billion, all of which were not approved in accordance with the prescribed procedures.

Table 3. Core Financial Risk Indicators Comparison (2020) (Unit: RMB 100 million, except ratios)

Indicator Category	HNA Group	Aviation Industry Average
Asset-Liability Ratio (%)	92	75
Equity Pledge Rate (%)	91.53	40
Ratio of Short-Term Loans to Long-Term Assets (%)	58	30
Related-Party Fund Occupation	4343	0
Undisclosed Guarantee Amount	1050	0
Current Asset Turnover Rate (Times)	0.32	0.65
Total Asset Turnover Rate (Times)	0.18	0.37

The Development of Humanities and Social Sciences, 2026, 2(1), 29-47
https://doi.org/10.71204/p7c00k16

No separation of incompatible positions: Key links such as investment and financing decision-making, fund calculation, risk assessment and fund payment were undertaken by the same team, without forming a mutual checks-and-balances mechanism. This not only led to the loss of supervision on fund use, but also provided opportunities for major shareholders to carry out related-party fund occupation and interest transmission.

Insufficient embedding of control processes in business: The key risk points of core businesses such as M&A integration and fund management were not embedded in the daily operating processes of the enterprise. 11% of the group's employees had an unclear understanding of their job responsibilities, and the horizontal checks-and-balances mechanism under the divisional system was completely absent, resulting in the failure of control activities to effectively cover the entire business process.

3.4. Information and Communication: Distorted Transmission and Non-Compliant Disclosure

Information and communication is the "transmission hub" of the internal control system, and HNA Group's defects in information transmission, communication mechanisms and information disclosure directly led to the failure of risk early warning and external supervision:

Vertical distortion of internal information transmission: The group did not build a unified group-level integrated data platform, and financial, business, investment and financing and risk control data were stored separately with inconsistent standards and incompatible interfaces. The accuracy and completeness of grass-roots business information transmitted to the management were seriously insufficient, and key risk information such as debt default and abnormal fund occupation could not be effectively transmitted to the decision-making level, resulting in an 18-month lag in risk signal transmission, 6 times the industry average.

Inefficient and non-standard communication mechanism: Formal communication relied on traditional forms such as meetings and documents with low efficiency; informal communication lacked a traceable recording mechanism, and the standardization of information transmission was insufficient. The group also did not establish a timely response mechanism for external investors' questions, leading to the low timeliness of internal and external information interaction.

Serious non-compliance in external information disclosure: The group did not disclose major matters such as related transactions and fund occupation in accordance with regulatory requirements. Thousands of related transactions were concealed for a long time, and the illegal fund occupation and undisclosed guarantee issues were not exposed until the capital chain broke. This not only violated the internal control requirement of information transparency, but also exacerbated the market trust crisis and further worsened the group's financial situation.

3.5. Internal Supervision: Lack of Independence and Failure of Defect Rectification

Internal supervision is the "last line of defense" of the internal control system, and HNA Group's internal audit lack of independence and the absence of defect rectification closed-loop management made the internal supervision completely ineffective:

Serious lack of independence of internal audit: The group's internal audit department was organizationally attached to the business system, and did not realize direct reporting to the governance layer. Its independence score was only 1.8 (out of 5 points). The person in charge of internal audit was appointed and dismissed by the general manager, and the salary was linked to the management's performance, making it impossible to carry out independent special audits. The group's related-party fund occupation of RMB 434.3 billion was not identified by the internal audit department in a timely manner, reflecting the complete failure of the internal audit function.

Absence of closed-loop management of internal control defect rectification: Although the group identified general internal control defects after 2018, the rectification of major defects such as related-party fund occupation was significantly delayed, with a rectification rate of only 28% (Table 4), far lower than the 100% industry average. The audit department lagged behind by more than 12 months in supervising fund occupation, and the fund lending defects in 2016 were not identified until 2018. The lack of tracking, verification and accountability mechanisms for defect rectification made the supervision results unable to be transformed into internal control improvement measures, and risks continued to accumulate until they erupted in a concentrated manner.

Table 4. Related-Party Fund Occupation of HNA Group (2018–2020) (Unit: RMB 100 million)

Year	Amount of Related-Party Fund Occupation	Ratio to Monetary Funds (%)
2018	820	65
2019	2150	88
2020	4343	102

4. Causal Analysis of Internal Control Failure: From Strategic Deviation to Systemic Collapse

Based on the above analysis of the defects in the five COSO internal control elements, this section streamlines the overlapping arguments and constructs a clear logical framework, analyzing the root causes of HNA Group's internal control failure from four levels: strategic, governance, execution and supervision, and clarifying the progressive evolution path from single element defect to systemic internal control collapse. All data in this section are consistent with the source and time alignment of the previous section, ensuring the rigor of the causal analysis.

4.1. Strategic Level: Complete Deviation Between Diversification and Internal Control

The primary root cause of HNA Group's internal control failure is the complete deviation between its aggressive diversification strategy and the internal control system. From 2006 to 2016, the group's total assets increased by 10.3 times, while total liabilities increased by 14.8 times. The growth rate of liabilities far exceeded that of assets, leading to the asset-liability ratio being consistently higher than the industry average. The proportion of non-aviation business revenue soared from 22% to 59%, completely breaking away from the core capability boundary of the aviation main business. In contrast, industry benchmarks such as Air China and China Southern

Airlines adhered to the strategy of "deepening the main business and appropriate extension", focusing non-aviation businesses on synergistic areas such as air logistics and ground services, and maintaining the asset-liability ratio below 75% for a long time.

The core problem of HNA's strategic formulation is that it took "scale expansion" as the sole goal, and completely ignored the core requirements of internal control for "risk controllable and strategic adaptation". First, the group did not establish access thresholds and feasibility assessment mechanisms for diversified expansion. Among the over RMB 400 billion of M&A funds from 2015 to 2019, 60% was invested in non-related fields such as real estate and finance, without considering synergy with the main business or conducting cash flow forecasting and risk assessment. Second, the group replaced physical operation with capital operation, and blindly expanded through the circular model of "borrowing-M&A-mortgaging-reborrowing". The equity pledge rate of 91.53% meant that the enterprise used almost all listed assets for financing, and relied entirely on external funds to maintain operations, making it extremely vulnerable to market liquidity fluctuations. Third, the group lacked a dynamic strategic adjustment mechanism. When non-aviation businesses were continuously inefficient and the asset turnover rate was only half of the industry average, the internal control system did not trigger any early warning or strategic adjustment, but instead continued to increase investment in non-main businesses, forming a vicious cycle of "larger scale - lower efficiency - higher risk".

4.2. Governance Level: Substantive Failure of Corporate Governance Structure

The substantive lack of a sound corporate governance structure is the core crux of HNA Group's internal control collapse, and the governance indicator deviations in Table 1 directly reflect the severity of this problem. The low proportion of independent directors and external supervisors made the group form a serious "insider control" problem: a small number of core management personnel fully controlled the decision-making power of major investments, financing and guarantees, and the 2,849 illegal transactions such as related-party fund occupation and undisclosed guarantees all did not go through the board of directors' approval process, completely violating the "three major and one large" decision-making system.

The governance imbalance also led to the solidification of the interest transmission chain and the blurring of the power and responsibility boundary. Major shareholders systematically emptied listed companies through related transactions and fund occupation, and the proportion of related-party fund occupation to monetary funds reached 102% in 2020 (Table 4), meaning that all the group's operating cash flow was controlled by related parties, and the internal control system failed to form any effective barrier. The unclear division of powers and responsibilities among the board of directors, supervisory board and management led to a chaotic situation of "no checks and balances on decision-making, no supervision on execution, and no one takes responsibility", depriving internal control of its most basic institutional support.

4.3. Execution Level: Form-Oriented Control Activities Lose Risk Prevention Function

Control activities are the core execution link of internal control, and HNA Group's control activities were "form-oriented and execution-neglected", completely losing their risk prevention function. The core financial indicator deviations in Table 3 are the direct reflection of the failure of control activities: the equity pledge rate of 91.53% is 2.3 times the industry average, and the undisclosed guarantee amount of RMB 105 billion is non-existent among industry benchmarks. The root causes are fourfold: the authorized approval mechanism is out of control, and high-risk decisions are made without hierarchical approval; incompatible positions are not separated, and key links lack mutual checks and balances; control processes are not embedded in business operations, and risk points are not covered in daily management; the execution of systems lacks rigid constraints, and illegal operations do not bear corresponding responsibilities, forming a common phenomenon of "having systems but not implementing them, having processes but not following them".

In contrast, China's leading aviation enterprises have formed a rigid control activity system: Air China implements a "three-level authorized approval" system, where investments exceeding RMB 500 million need to be submitted to the general meeting of shareholders for voting; China Southern Airlines splits the powers and responsibilities of investment and financing and fund management, and guarantee business requires four-level review. The huge gap in control activities between HNA Group and industry benchmarks directly led to the continuous occurrence of illegal acts and the full failure of internal control execution.

4.4. Supervision Level: Double Failure of Information Communication and Internal Supervision

The double failure of information communication and internal supervision is the direct cause of HNA Group's internal control failure evolving from a single defect to a systemic collapse. The broken information transmission mechanism made the group lose the best time for risk early warning, and the non-compliant information disclosure exacerbated the market trust crisis. The lack of independence of internal audit and the absence of defect rectification closed-loop management made the "last line of defense" of internal control completely collapse. From 2018 to 2020, the group's related-party fund occupation increased from RMB 82 billion to RMB 434.3 billion, a 4.3-fold increase in two years (Table 4), which fully reflects the failure of the supervision system: the risks were not detected and rectified in a timely manner, and continued to accumulate until they erupted in a concentrated manner, ultimately leading to the breakage of the capital chain and the bankruptcy reorganization of the group.

5. Internal Control Optimization Measures Based on the COSO Framework

This section abandons the excessive operational details of the original text, and closely links the optimization measures to the five elements of the COSO 2013 Internal Control-Integrated Framework, proposing targeted and theoretical optimization strategies for HNA Group's core internal control defects. Each measure corresponds to the specific defects of the COSO elements analyzed in Section 3, and takes into account the actual situation of China's aviation industry and the experience of industry benchmark enterprises, ensuring the theoretical nature and practical operability of the measures.

The Development of Humanities and Social Sciences, 2026, 2(1), 29-47
https://doi.org/10.71204/p7c00k16

5.1. Optimize the Internal Environment: Reconstruct the Foundation of Internal Control

Aiming at the fundamental defects of HNA Group in corporate governance, human resources and corporate culture, the optimization of the internal environment focuses on three core aspects, taking the governance standards of Air China and China Southern Airlines as benchmarks:

Improve the governance structure with effective checks and balances: Increase the proportion of independent directors to more than 40%, of which at least 2 have more than 10 years of financial risk control experience and 2 have aviation industry operation background; the remuneration of independent directors is paid by a third-party institution to avoid management interference. Increase the proportion of external supervisors in the supervisory board to 50%, and endow them with the right to veto related transactions and the right to investigate internal control defects. Clarify the "three powers separation" structure of decision-making-execution-supervision, and formulate the *Internal Control Power and Responsibility Manual* to divide the specific powers and responsibilities of each governance body.

Build a human resource system matching strategic development: Establish a "linkage mechanism between strategic expansion and talent reserve", and complete the talent reserve of key positions before the development of new businesses; core positions such as financial risk control, M&A and internal audit require corresponding professional qualifications and more than 5 years of industry experience. Implement a 3-year rotation system for key positions such as finance and risk control to avoid interest solidification. Reconstruct the performance appraisal system, reduce the weight of scale indicators to less than 20%, and incorporate internal control compliance, asset operational efficiency and other indicators into the core assessment.

Cultivate a compliance-oriented corporate culture: Abandon the "scale first" orientation, and implant the cultural core of "prudent risk and compliance first". Conduct special internal control training sessions every year, covering core links such as fund approval, guarantee management and related transactions; new employees must pass the internal control compliance examination before taking up their posts. Establish an incentive and accountability mechanism for internal control compliance, and give special rewards to teams and individuals who effectively prevent risks, while severely holding accountable those who engage in illegal operations.

5.2. Improve Risk Assessment: Establish a Quantitative and Full-Process Assessment System

Aiming at the formalistic mechanism and single method of HNA Group's risk assessment, the improvement measures focus on building a multi-dimensional quantitative risk assessment system covering the entire business chain, and changing the previous situation of "prioritizing expansion over assessment":

Formulate a multi-dimensional quantitative risk indicator library: Based on the aviation industry characteristics and the COSO framework, establish a risk indicator library with clear safety value, warning value and emergency value (Table 5), covering financial, operational and compliance risks such as asset-liability ratio, equity pledge rate and related-party fund occupation, and conduct regular assessment and early warning.

Standardize the full-process risk assessment for diversification and M&A: Establish a dedicated risk management and control center directly under the board of directors, equipped with professional talents to conduct independent risk assessment work. Clarify the risk assessment process for M&A projects: preliminary assessment during project approval, monthly follow-up assessment during execution, and review assessment during closing. Non-core business M&A must meet rigid indicators such as "resource reuse rate with core business ≥60%" and "positive cash flow within 5 years after investment", otherwise it will be rejected.

Build a hierarchical risk response mechanism: For high-risk matters (e.g., asset-liability ratio >80%), activate the emergency response procedure, suspend new investments, and set up a special working group to carry out debt restructuring and fund recovery; for medium-risk matters (e.g., current asset turnover rate 0.4–0.5), formulate special rectification plans to optimize asset allocation; for low-risk matters, strengthen on-the-job training and process optimization. Refer to Air China's "emergency fund pool" model, and reserve emergency funds not less than 10% of annual revenue to respond to sudden liquidity risks.

Table 5. Multi-Dimensional Quantitative Risk Indicator Library for Aviation Enterprises

Indicator	Safety Value	Warning Value	Emergency Value	Assessment Frequency	Response Measures
Asset-Liability Ratio (%)	≤75	75–80	>80	Monthly	Suspend new non-core business investments
Equity Pledge Rate (%)	≤40	40–60	>60	Quarterly	Restrict new pledges; initiate equity repurchase
Related-Party Fund Occupation (RMB)	0	>0	>5% of net assets	Monthly	Freeze related parties' accounts; recover funds
Current Asset Turnover Rate (Times)	≥0.5	0.4–0.5	<0.4	Quarterly	Launch operational rectification; optimize asset allocation
Illegal Guarantee Amount (RMB)	0	>0	>1% of net assets	Monthly	Terminate illegal guarantees; pursue liabilities

5.3. Strengthen Control Activities: Implement Rigid Constraints and Process Embedding

Aiming at the serious deviation between system and practice in HNA Group's control activities, the core of strengthening control activities is to implement rigid constraints and embed control processes into the entire business chain, taking China Southern Airlines' power and responsibility splitting model as a reference:

Strictly implement the separation of incompatible positions: Split the powers and responsibilities of investment and financing decision-making, fund calculation, risk assessment and fund payment into four independent departments, which cross-verify each other, and no single department can complete the entire process independently. This eliminates the opportunity for illegal operations and interest transmission in key links.

Build a digital fund management and control platform: Implement "full-process electronic fund payment", and all payment instructions must be automatically verified for authority by the system and matched with contract and invoice information; payment applications without compliance basis are directly rejected, and each payment record is fully traceable to the specific responsible person. Establish a fund monitoring group to check fund flows daily, and immediately freeze accounts and report to the board of directors if abnormal fund transfers are found.

Establish an operational efficiency and budget management mechanism: Decompose the aviation core business strategy into refined annual budget indicators, and monitor investment expenditure progress and asset operational efficiency monthly; activate early warning if the deviation exceeds 10%, and suspend the project if the deviation exceeds 15%. Establish an "inefficient asset withdrawal mechanism", and dispose of no less than 10% of assets with a return rate lower than 50% of the industry average for three consecutive years to optimize the asset structure.

5.4. Perfect Information and Communication: Build a Transparent and Efficient Information System

Aiming at the distorted information transmission and non-compliant disclosure of HNA Group, the perfection of information and communication focuses on building a unified, intelligent and standardized information communication system, drawing on the experience of Air China’s ERP data platform and China Southern Airlines’ "six-level data compliance framework":

Construct an integrated intelligent data platform: Invest special funds to build a group-level integrated data platform covering finance, operations, investment and financing, related transactions and risk control, unify data standards and interfaces, and realize "one-end entry, multi-end sharing, real-time synchronization". The platform is embedded with a risk early warning module, which automatically triggers an alarm and pushes it to the corresponding responsible department when the indicator touches the warning line.

Establish a three-level risk information transmission channel: Grassroots employees can directly feed back risk issues to the board of directors through a dedicated platform channel, with a department-level response within 24 hours, a preliminary handling plan within 3 days, and a clear conclusion within 7 days. Clarify the first responsible person for risk information reporting, and hold accountable those who fail to report in a timely manner leading to risk expansion.

Standardize the all-dimensional information disclosure mechanism: Strictly follow regulatory requirements to establish a regular disclosure system of "monthly operating data + quarterly related transactions + semi-annual internal control assessment + annual financial report". For major matters such as major investments and debt restructuring, implement an "immediate disclosure" mechanism and issue an interim announcement within 24 hours to ensure the information right to know of investors and regulatory authorities.

5.5. Reinforce Internal Supervision: Build an Independent and Closed-Loop Supervision System

Aiming at the lack of independence of internal audit and the failure of defect rectification of HNA Group, the reinforcement of internal supervision focuses on improving the independence of internal audit and establishing a closed-loop management mechanism for defect rectification, and introducing external supervision to form a joint supervision force:

Improve the independence and professionalism of internal audit: Place the internal audit department directly under the board of directors' audit committee; the person in charge of internal audit is appointed by the board of directors, and the salary and office funds are completely independent of the management to eliminate management interference. Optimize the structure of internal audit personnel, and ensure that experts in aviation finance, operations and risk control account for no less than 60% of the audit team; organize professional training sessions every year to improve audit professionalism.

Establish a classified closed-loop mechanism for defect rectification: Classify internal control defects into major, important and general levels, and formulate clear rectification time limits, responsible persons and punishment measures (Table 6). Implement "cancellation management" for defect rectification, and only close the loop after the rectification is verified to be effective; for major defects, hire third-party institutions to conduct independent audits to ensure the rectification effect.

Table 6. Classified Management of Internal Control Defect Rectification

Defect Level	Rectification Time Limit	Responsible Person		Punishment Measure
Major Defect	Within 24 hours	Board Chairman	Third-party independent audit	Demotion/dismissal/legal liability
Important Defect	Within 1 month	Chief Financial Officer	Internal audit department review	30% salary deduction/performance disqualification
General Defect	Within 3 months	Business Department Supervisor	Department self-inspection + internal control spot check	Circular criticism/mandatory training

Strengthen the combination of internal and external supervision: Hire one of the Big Four international accounting firms to conduct an annual internal control audit and issue an independent audit report to accept external supervision. Endow the supervisory board with greater supervisory powers, including the pre-event inquiry right for major decisions and the inspection right for fund flows. Establish internal control reporting channels, and provide confidentiality and material rewards to employees who report internal control violations, forming a full-staff supervision atmosphere.

6. Empirical Findings, Managerial Implications and Normative Recommendations

This section abandons the descriptive narrative of the original conclusion, and systematically distills the empirical findings, managerial implications and normative recommendations from the case of HNA Group's internal control failure, clarifying the theoretical contribution and practical reference value of the study, and distinguishing the three levels clearly to enhance the analytical nature of the conclusion.

6.1. Empirical Findings

Based on the systematic analysis of HNA Group's internal control failure based on the COSO framework, this study draws three core empirical findings, which are verified by the real financial and governance data of the group and the aviation industry.

Internal control failure is a progressive evolution process, not a sudden event: HNA Group's internal control failure experienced three stages of germination, fermentation and comprehensive collapse, and the defects of each COSO internal control element interact and amplify each other. The initial strategic formulation defect and internal environment defect gradually spread to risk assessment, control activities, information and communication and internal supervision, ultimately leading to systemic collapse.

There is a two-way vicious cycle between aggressive diversification strategy and internal control system failure: The blind diversification strategy of HNA Group ignored the constraints of the internal control system, leading to the continuous accumulation of risks; while the failure of the internal control system further amplified the risks of strategic mistakes, making the group fall into a vicious circle that is difficult to break. The core of breaking the cycle is to realize the organic integration of strategy formulation and internal control constraints.

The substantive effectiveness of internal control is more important than the formal completeness: HNA Group had established a complete internal control system in form, including governance structure, management systems and supervision mechanisms, but the substantive ineffectiveness (e.g., concentrated decision-making, form-oriented execution, ineffective audit) made the entire system lose its due function. This shows that the construction of internal control system must focus on substantive effectiveness, and avoid formalism.

6.2. Managerial Implications

The case of HNA Group's internal control failure provides three important managerial implications for Chinese enterprises implementing diversification strategies, especially aviation and large-scale group enterprises.

Diversification must be based on core capabilities and adhere to the bottom line of risk control: Diversification is not a "universal key" for scale expansion, and blind expansion divorced from core capabilities will inevitably lead to resource dilution and risk accumulation. Enterprises must take core business competitiveness as the foundation of diversification, establish strict access thresholds and risk assessment mechanisms for non-core business expansion, and avoid cross-border expansion into non-synergistic fields.

Corporate governance is the core guarantee for the effective operation of internal control: The "insider control" problem caused by the concentration of decision-making power is the fatal defect of HNA Group's internal control. Enterprises must improve the modern enterprise system, clarify the checks-and-balances relationship of the governance structure, increase the proportion of independent directors and external supervisors with professional backgrounds, and implement the "three major and one large" collective decision-making system in substance to eliminate the institutional loopholes of internal control failure.

Digitalization is an important means to improve the effectiveness of internal control: HNA Group's information transmission distortion and fund management out of control are closely related to the lack of a unified digital information platform. Enterprises should accelerate the digital transformation of internal control, build integrated data platforms and intelligent risk early warning systems, embed control processes into digital business processes, and realize real-time monitoring and traceable management of risks, so as to improve the efficiency and effectiveness of internal control.

6.3. Normative Recommendations

Based on the empirical findings and managerial implications, this study puts forward three normative recommendations for Chinese enterprises, regulatory authorities and industry associations, to provide a reference for optimizing the internal control system and avoiding diversification risks.

For enterprises: Establish a "strategy-internal control" integrated decision-making mechanism, and embed internal control constraints into the entire process of strategic formulation, implementation and adjustment; take the COSO framework as the basis to build a comprehensive internal control system with substantive effectiveness, and focus on improving the independence of internal audit and the closed-loop management of defect rectification; accelerate the digital transformation of internal control, and use technological means to ensure the effective implementation of control activities.

For regulatory authorities: Strengthen the supervision of the substantive effectiveness of enterprise internal control, and avoid the formalization of internal control construction; increase the penalty for internal control violations such as related-party fund occupation and undisclosed guarantees, and implement the "lifelong accountability system" for relevant responsible persons; improve the information disclosure system of enterprise internal control, and require listed companies to disclose the operation of internal control system and defect rectification in detail.

For industry associations: Formulate industry-specific internal control guidelines and risk indicator standards in combination with the characteristics of different industries (e.g., aviation, finance); establish an industry internal control experience sharing platform, and promote the advanced practices of benchmark enterprises (e.g., Air China, China Southern Airlines); carry out professional training and certification of internal control talents, and improve the professional level of internal control practitioners in the industry.

7. Conclusion and Research Limitations

7.1. Conclusion

HNA Group's bankruptcy reorganization is a typical case of systemic internal control failure caused by aggressive M&A-driven diversification in China's enterprise practice. Based on the COSO 2013 Internal Control-Integrated Framework, this study systematically analyzes the evolution path, core defects and root causes of HNA Group's internal control failure, and finds that the essence of the group's internal control failure is the two-way vicious cycle between the "scale-first" aggressive diversification strategy and the imperfect internal control system. The group's defects in the five elements of the COSO internal control framework (internal environment, risk assessment, control activities, information and communication, internal supervision) interact and amplify each other, and the causal chain from strategic deviation to governance failure, then to execution failure and supervision failure, ultimately leads to the systemic collapse of internal control and the outbreak of financial and operational crises.

This study links the internal control optimization measures closely to the COSO framework, and proposes targeted optimization strategies for each core defect of HNA Group, avoiding excessive operational details and enhancing the theoretical nature of the recommendations. At the same time, the study distills clear empirical findings, managerial implications and normative recommendations from the case, which not only enrich the application of the COSO framework in the context of Chinese enterprise diversification, but also provide practical reference for Chinese enterprises to balance scale expansion and risk control, and optimize the internal control system. The study also shows that the construction of enterprise internal control must focus on substantive effectiveness, and the organic integration of strategy formulation and internal control constraints is the key to avoiding diversification risks and realizing sustainable development.

7.2. Research Limitations

This study takes HNA Group as a single case for analysis, which has certain limitations in the universality of the conclusions: first, HNA Group is a large-scale comprehensive group enterprise with a complex business structure, and the internal control defects have certain particularities, which may not be fully applicable to small and medium-sized enterprises and single-business enterprises; second, the study focuses on the internal control failure of HNA Group in the context of diversification, and does not involve the impact of external macroeconomic environment and regulatory policy changes on the group's internal control, which can be further expanded in subsequent research.

In subsequent research, we can expand the sample size, select multiple enterprises in different industries and different scales for comparative case analysis, to verify and enrich the conclusions of this study; we can also incorporate external macroeconomic factors and regulatory policy factors into the analysis framework, to explore the interaction between external environment and enterprise internal control, and provide a more comprehensive reference for enterprise internal control construction.

Author Contributions:

Jiaxuan Li contributed to the conceptualization, methodology, and data analysis of the study. The author has read and agreed to the published version of the manuscript.

Funding:

This research received no external funding.

Institutional Review Board Statement:

Not applicable.

Informed Consent Statement:

Not applicable.

Data Availability Statement:

The data supporting the findings of this study are available from the China Securities Regulatory Commission (CSRC) official announcements, HNA Group's annual reports (2006–2020), Wind Financial Terminal and China Aviation Transport Association industry research reports. Restrictions apply to the availability of these data, which were used under license for the current study. Data are available from the corresponding author upon reasonable request and with permission of the above institutions.

Acknowledgments:

The authors would like to thank the anonymous reviewers for their valuable comments and suggestions that improved the quality of this paper. The authors also appreciate the support from the School of Management and School of Economics and Finance at Beijing City University during the research process.

Conflicts of Interest:

The authors declare no conflict of interest.

References

Chen, S. (2022). Why did the HNA myth collapse? An analysis of corporate internal control issues. China Township Enterprises Accounting, 11, 125–128.

Chen, Y. (2019). Research on financial risks of private enterprises: A case study of HNA Group. Economic Research Guide, 31, 99–102.

China Aviation Transport Association. (2020). China civil aviation enterprise internal control white paper (2020). Beijing, China: China Civil Aviation Press.

China Securities Regulatory Commission. (2021). Administrative penalty decision on HNA Holdings Co., Ltd. (No. [2021] XX). Beijing, China: Author.

Committee of Sponsoring Organizations of the Treadway Commission. (2013). COSO internal control—Integrated framework (2013 update). New York, NY: COSO.

Huang, R., & Qin, D. (2022). Enlightenments of HNA Group's restructuring on financial management. Finance & Accounting, 4, 25–31.

Jiang, F., & Li, J. (2022). Internal control failure and corporate risk taking: Evidence from Chinese listed companies. China Journal of Accounting Research, 15(2), 89–112.

Li, M., & Zhang, Q. (2021). Diversification strategy and internal control effectiveness: A moderated mediation model. Journal of Management Science in China, 24(5), 67–89.

Qiao, H. (2021). Research on internal control problems and countermeasures of HNA Group. International Business Finance and Accounting, 10, 74–77.

Shen, Z., & Song, X. (2015). Alternative shareholder control, related-party transactions, and tunneling: A case study of HNA Group. Journal of Beijing Technology and Business University (Social Sciences Edition), 30(1), 69–79.

Tan, X., & Chen, B. (2022). Identification and enlightenment of HNA Group's financial crisis. China-Arab Science and Technology Forum, 1, 98–102.

Tang, Y. (2021). Analysis of HNA incident from the perspective of COSO risk management framework. Enterprise Science and Technology & Development, 1, 236–238.

Wind Information Co., Ltd. (2021). China aviation industry financial index report (2006–2020). Shanghai, China: Wind Press.

Yu, Y., Luo, D., & Lin, S. (2021). Corporate governance failure and enterprise bankruptcy: A case study of HNA Group. Finance and Accounting Monthly, 13, 110–117.

Zhang, X., & Peng, H. (2019). Financial risks and control countermeasures of group companies in development: A case study of HNA Group. Enterprise Reform and Management, 17, 47–48.

The Development of Humanities and Social Sciences, 2026, 2(1), 48-66
https://doi.org/10.71204/1k7yq735

Short-Video Social Media Use on Anxiety: Evidence from Graduate Students

Manzhi Liu [1], Yixuan Hu [1,*]

[1] School of Digital Economy and Management, Huaihua University, Huaihua 418000, China

[*]**Corresponding Author**
Yixuan Hu

896043170@hhtc.edu.cn

Received: 23 January 2025 / Accepted: 9 March 2026 / Published online: 11 March 2026

Abstract

In the context of digital transformation, short-video social media has become a central element in graduate students' daily lives. The mental health risks and behavioral deviations resulting from its excessive use have emerged as a critical topic in organizational behavior and higher education management. Drawing on an integrated perspective of self-regulatory failure theory and conservation of resources theory, this study develops a moderated mediation model in which sleep procrastination mediates the relationship between short-video social media use and anxiety, and time management skills serves as a boundary condition. Using survey data from 486 graduate students across six universities and structural equation modeling for empirical testing, this study finds that short-video social media use is positively and significantly related to graduate students' anxiety, and that short-video social media use is also positively and significantly associated with sleep procrastination. Sleep procrastination partially mediates the link between short-video social media use and anxiety, and time management skills significantly moderates the association between sleep procrastination and anxiety. This study reveals the underlying mechanism through which digital media use affects graduate students' mental health, broadens the application of self-regulatory failure theory in digital behavior research, and provides empirical implications for universities to implement targeted management practices and for graduate students to enhance self-regulation abilities.

Keywords: Short-Video Social Media Use; Sleep Procrastination; Anxiety; Time Management Skills; Graduate Students

1. Introduction

The rise of Digital Natives has propelled short-video social media to become the dominant vehicle for social interaction and information dissemination. As a core user group with advanced academic backgrounds, graduate students have exhibited continuously growing penetration and dependence on short-video platforms (Przybylski et al., 2021; Van den Bulck et al., 2022; Orben, 2020). According to the China Graduate Student New Media Usage Report (2025), graduate students in China spend an average of 1.5 hours per day on short videos, 82.3% use short videos within one hour before bedtime, and 91.5% categorize such platforms as indispensable tools for academic research and daily life.

With fragmented content, algorithm-driven personalized recommendations, and highly interactive experiences, short-video platforms satisfy graduate students' needs for information acquisition, academic communication, and leisure. Meanwhile, they have also triggered a series of behavioral and psychological problems (Rideout & Robb, 2019; Orben & Przybylski, 2019; Kross et al., 2021). Among these issues, the association between excessive usage and anxiety has drawn extensive scholarly attention. However, graduate students face unique stressors, including academic pressure, graduation anxiety, and career uncertainty. The mechanism linking short-video usage to anxiety differs fundamentally from that of undergraduate samples. The underlying transmission path and boundary conditions between these constructs remain underexplored, calling for systematic empirical investigation.

Excessive use of short-video social media may induce anxiety among graduate students through multiple mechanisms. From the perspective of social comparison theory, overly polished displays of academic achievements and career development narratives on such platforms tend to trigger upward social comparison, resulting in biased self-perception and relative deprivation, thereby intensifying perceived pressure from academic competition (Festinger, 1954; Tromholt, 2016; Chou & Edge, 2012). According to cognitive resource theory, the "information cocoons" formed by algorithmic recommendations can restrict academic vision and generate uncertainty and loss of control over research directions (Pariser, 2011; Sun et al., 2023; Vaidya et al., 2022). Furthermore, the substantial time resources consumed by short-video use crowd out core academic activities such as experimental research, literature review, and academic writing, pushing graduate students into a state of resource scarcity in academic productivity and career development and ultimately eliciting anxiety (Baumeister et al., 1998; Wang et al., 2022; Hofmann et al., 2012).

Existing studies have confirmed a positive association between short-video use and anxiety in young populations (Kross et al., 2021; Przybylski et al., 2021). However, targeted research on graduate students remains limited, leaving the core question of how short-video use specifically affects graduate students' anxiety largely unanswered. Accordingly, this study first examines the direct effect and transmission mechanism of short-video social media use on anxiety among graduate students.

Sleep procrastination (bedtime procrastination), a typical manifestation of self-regulatory failure, may serve as a critical mediator between short-video social media use and anxiety among graduate students. Sleep procrastination is defined as the voluntary delay of an intended bedtime in the absence of external impediments, reflecting the prioritization of immediate hedonic needs over long-term health goals (Kroese et al., 2014, 2016; Exelmans & Van den Bulck, 2017). Graduate students often face heavy research workloads and irregular schedules. The high arousal, instant feedback, and infinite-scroll design of short videos can easily lead to immersive use before sleep, as individuals use entertainment to escape academic pressure and thus delay bedtime

(Exelmans & Van den Bulck, 2017; Adams & Rinne, 2022; Cain & Gradisar, 2010). Chronic sleep procrastination results in sleep deprivation and circadian disruption, impairing the prefrontal cortex's emotional regulation and academic cognitive functions, reducing stress-coping capacity, and ultimately providing physiological and psychological foundations for the emergence of anxiety (Curcio et al., 2006; Goldstein & Walker, 2014; Gruber & Cassoff, 2014).

Prior research has separately established positive links between short-video use and sleep procrastination (Exelmans & Van den Bulck, 2017; Adams & Rinne, 2022) and between sleep procrastination and anxiety in young populations (Kroese et al., 2016; Jansson-Fröjmark & Lindblom, 2008). However, no studies have verified the complete chain of "usage behavior → procrastinatory behavior → emotional problems" among graduate students. Therefore, this study further tests the mediating role of sleep procrastination in the relationship between short-video social media use and anxiety among graduate students.

Individual differences may shape the strength of the relationship between sleep procrastination and anxiety among graduate students. As a core self-regulatory capacity, time management skills is expected to act as a key moderator. Time management skills refers to individuals' ability to plan, allocate, and control time resources to achieve academic goals, with its core function being to improve the efficiency of academic resource utilization and enhance self-regulation (Macan, 1994; Claessens et al., 2007; Gollwitzer, 1999). Graduate students are required to balance multiple tasks, including research, coursework, and daily life. Individuals with high time management skills are more effective at developing and implementing schedules and academic plans. Even when sleep procrastination occurs, they can mitigate stress accumulation and prevent heightened anxiety by rationally arranging subsequent time and prioritizing research tasks (Gollwitzer, 1999; Van Eerde, 2003; Ferrari et al., 2020). In contrast, individuals with low time management skills are prone to a vicious cycle of "sleep deprivation → academic procrastination → amplified stress," which strengthens the detrimental effect of sleep procrastination on anxiety (Schouwenburg & Lay, 1995; Ferrari et al., 2020; Claessens et al., 2007).

Although existing research has validated the buffering effect of time management skills on procrastination and negative emotions (Van Eerde, 2003; Macan, 1994), few studies have focused on the specific context linking sleep procrastination and anxiety among graduate students. Accordingly, this study further examines the moderating role of time management skills in weakening the adverse impact of sleep procrastination on anxiety among graduate students.

The theoretical contributions of this study are threefold. First, by integrating self-regulatory failure theory and conservation of resources theory, this study constructs an integrated model explaining how digital media use shapes graduate students' mental health, thereby expanding the application boundaries of these theories in the digital behavior domain of highly educated populations. Whereas prior studies have largely focused on undergraduate samples, this study addresses the unique stress context of graduate students and explains the transmission mechanism from short-video social media use to sleep procrastination and further to anxiety via a dual-theoretical framework, thus enhancing theoretical explanatory power.

Second, from a mediation perspective, this study unlocks the black box between short-video social media use and graduate students' anxiety by verifying the critical mediating role of sleep procrastination. This fills a research gap regarding the intermediate pathways linking digital behavior and mental health among highly educated individuals.

Third, by introducing time management skills as a moderator, this study identifies the boundary condition of the link from sleep procrastination to anxiety, providing new empirical evidence for understanding how individual differences shape graduate students' mental health. Fig. 1 displays the theoretical model of this study.

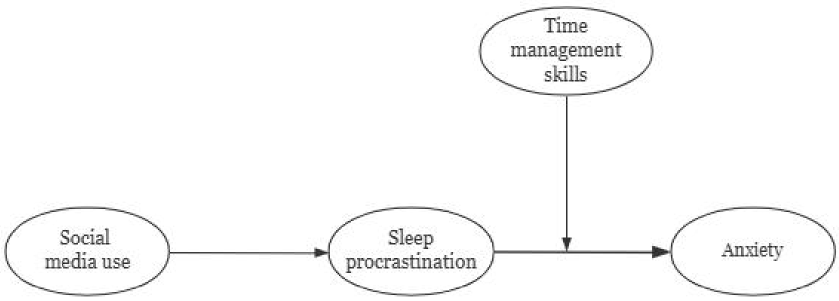

Figure 1. Theoretical model

2. Theoretical Foundations and Hypotheses

2.1. Theoretical Foundations

2.1.1. Self-Regulatory Failure Theory

Self-regulatory failure theory was proposed by Baumeister et al. (1998). Its core argument is that individuals' self-regulatory capacity relies on a limited pool of psychological resources. Sustained self-control efforts deplete these resources, reducing subsequent self-regulatory ability and leading to impulsive or procrastinatory behaviors, known as the resource depletion effect. Baumeister and colleagues validated this proposition through classic experiments: participants who engaged in a temptation-resistance task (which consumes self-regulatory resources) exhibited significant performance declines in subsequent cognitive tasks, confirming the direct impact of psychological resource depletion on self-regulation.

This theory has been widely applied to research on digital media use, accounting for self-regulatory failure induced by excessive engagement (Hofmann et al., 2012; Kim et al., 2018; Przybylski et al., 2021). In the present study, graduate students face persistent academic pressure. The high-arousal and instant-feedback features of short videos continuously deplete their self-regulatory resources, making it difficult for them to resist immediate gratification in the goal conflict between "sleeping on time" and "continuing to use short videos to escape pressure," thereby triggering sleep procrastination. In turn, sleep deprivation caused by sleep procrastination further depletes psychological resources, weakens emotional regulation and academic stress-coping capacity, and ultimately generates anxiety.

2.1.2. Conservation of Resources Theory

Conservation of Resources (COR) theory was developed by Hobfoll (1989). Its core tenet is that individuals possess an innate motivation to protect existing resources and acquire new ones; resource loss triggers psychological stress and negative affective outcomes, whereas resource gain and effective management buffer against stress. Resources in this theory include time, effort, academic cognition, and other psychological resources (Hobfoll, 2001; Hobfoll et al., 2018).

Short-video social media use depletes graduate students' academic time and attentional resources, representing a form of resource loss that creates scarcity for constructive academic activities such as experiments and scholarly writing. Sleep procrastination further erodes physical and psychological resources, exacerbating resource loss. In contrast, time management skills, as a critical resource-management capability, enable graduate students to optimize the allocation of academic resources, reduce unnecessary resource depletion, and mitigate the impact of resource loss on anxiety.

By integrating self-regulatory failure theory and COR theory, this study provides a more comprehensive account of the mechanisms underlying the relationships among short-video social media use, sleep procrastination, time management skills, and anxiety in graduate students.

2.2. Hypotheses

2.2.1. Short-video Social Media Use and Anxiety

Excessive short-video social media use can induce anxiety among graduate students through multiple pathways. First, narratives such as "instant academic success" and "rapid career advancement" on these platforms trigger upward social comparison, resulting in self-denial and psychological discrepancy (Festinger, 1954; Tromholt, 2016; Chou & Edge, 2012). Second, the "information cocoons" formed by algorithmic recommendation generate uncertainty and a loss of control over frontier developments in one's research field (Pariser, 2011; Sun et al., 2023; Vaidya et al., 2022). Third, fear of missing out (FOMO) induced by short-video use places graduate students in a state of constant academic information monitoring, as they worry about missing critical research advances, thereby fostering anxiety (Przybylski et al., 2013; Oberst et al., 2017; Alt, 2015). Finally, short-video engagement consumes substantial academic time and crowds out core research activities, leading to heightened graduation pressure and career-related anxiety (Baumeister et al., 1998; Wang et al., 2022; Hofmann et al., 2012).

Prior research has established a positive relationship between excessive short-video use and anxiety among young populations (Kross et al., 2021; Orben & Przybylski, 2019; Przybylski et al., 2021). Accordingly, we propose the following hypothesis:

H1: Short-video social media use is positively and significantly related to anxiety among graduate students.

2.2.2. Short-video Social Media Use and Sleep Procrastination

Algorithmic recommendation and infinite-scroll design of short videos reinforce continuous usage motivation, leading graduate students into immersive engagement and impaired time perception (Exelmans & Van den Bulck, 2017; Adams & Rinne, 2022; Wood et al., 2013). When graduate students use short videos before bedtime, high-arousal content elevates cognitive and physiological arousal, suppresses melatonin secretion, and reduces sleep willingness (Cain & Gradisar, 2010; Wood et al., 2013; Gradisar et al., 2013). Meanwhile, academic pressure predisposes graduate students to escape negative emotions through short videos, forming a coping cycle of "stress → short-video use → sleep procrastination" (Kroese et al., 2014, 2016).

According to self-regulatory failure theory, self-regulatory resources consumed by short-video use reduce individuals' ability to resist immediate hedonic temptations, preventing them from falling asleep as scheduled and thus inducing sleep procrastination (Baumeister et al., 1998; Kroese et al., 2014; Hofmann et al., 2012). Furthermore, the academic social function of short videos—such as sharing research findings and disseminating conference updates—encourages pre-sleep interaction among graduate students and further prolongs usage duration (Rideout & Robb, 2019; Exelmans & Van den Bulck, 2017). Accordingly, we propose the following hypothesis:

H2: Short-video social media use is positively and significantly related to sleep procrastination among graduate students.

2.2.3. Sleep Procrastination and Anxiety

Sleep is a central process for restoring physical energy, regulating emotions, and maintaining academic cognitive functioning (Walker, 2009; Curcio et al., 2006; Goldstein & Walker, 2014). Sleep deprivation and circadian disruption caused by chronic sleep procrastination impair prefrontal cortical functioning, reducing emotional regulation, academic concentration, and stress-coping capacity (Goldstein & Walker, 2014; Gruber & Cassoff, 2014; Baglioni et al., 2011).

From the perspectives of self-regulatory failure theory and COR theory, sleep loss resulting from sleep procrastination depletes graduate students' psychological and physical resources, impeding their ability to address research pressure and academic challenges and thereby eliciting anxiety (Baumeister et al., 2007; Hobfoll et al., 2018; Sivertsen et al., 2015). Meanwhile, insufficient sleep undermines next-day research efficiency and academic productivity, creating a vicious cycle: sleep deprivation → delayed research progress → elevated pressure → intensified anxiety (Kroese et al., 2016; Sivertsen et al., 20 a15; Jansson-Fröjmark & Lindblom, 2008). Prior research has confirmed a positive association between sleep procrastination and anxiety among young populations (Jansson-Fröjmark & Lindblom, 2008; Kroese et al., 2016; Baglioni et al., 2011). Accordingly, we propose the following hypothesis:

H3: Sleep procrastination is positively and significantly related to anxiety among graduate students.

2.2.4. The Mediating Role of Sleep Procrastination

Short-video social media use triggers sleep procrastination by depleting self-regulatory resources and providing an outlet for stress avoidance (H2), and sleep procrastination exacerbates anxiety through resource loss and diminished academic functioning (H3). Together, these three constructs form a transmission chain: usage behavior → procrastinatory behavior → emotional problems.

From an integrated theoretical perspective, short-video social media use depletes self-regulatory resources (self-regulatory failure theory) and reduces academic time resources (COR theory), which jointly lead to sleep procrastination. Sleep procrastination then further intensifies resource depletion and ultimately elicits anxiety. Previous studies have preliminarily supported the mediating role of sleep procrastination in the relationship between digital media use and mental health (Exelmans & Van den Bulck, 2017; Adams & Rinne, 2022; Gradisar et al., 2013). Accordingly, we hypothesize:

H4: Sleep procrastination mediates the relationship between short-video social media use and anxiety among graduate students.

2.2.5. The Moderating Role of Time Management Skills

As a core self-regulatory competency, time management skills encompass academic goal setting, time planning, and research task monitoring (Macan, 1994; Claessens et al., 2007; Gollwitzer, 1999). Grounded in self-regulatory failure theory and COR theory, graduate students with strong time management skills can allocate academic time and psychological resources more efficiently, balance research and rest, and reduce unnecessary resource depletion (Baumeister et al., 1998; Hobfoll et al., 2018; Macan, 1994). Even when sleep procrastination occurs, they can alleviate stress accumulation and prevent intensified anxiety by rationally prioritizing research tasks and optimizing schedules (Gollwitzer, 1999; Van Eerde, 2003; Claessens et al., 2007). In contrast, graduate students with weak time management skills lack effective resource management capabilities and are more likely to fall into a vicious cycle: sleep deprivation → academic procrastination → heightened graduation pressure, which strengthens the detrimental impact of sleep procrastination on anxiety (Schouwenburg & Lay, 1995; Ferrari et al., 2020; Van Eerde, 2003). Prior research has validated the buffering effect of time management skills on procrastination and negative emotions (Van Eerde, 2003; Macan, 1994; Claessens et al., 2007). Accordingly, we propose the following hypothesis:

H5: Time management skills significantly moderate the effect of sleep procrastination on anxiety among graduate students, such that the positive influence of sleep procrastination on anxiety is weaker for individuals with higher levels of time management skills.

3. Method

3.1. Procedure and Sample

To enhance sample representativeness and the generalizability of results, this study adopted a multistage sampling procedure. We selected six typical universities in China, consisting of two comprehensive universities, two science and engineering universities, and two liberal arts universities. These institutions are located across North China, East China, and South China. The sample includes master’s and doctoral students spanning multiple disciplines, including humanities, social sciences, natural sciences, engineering, agriculture, medicine, and arts. This sampling design allows for a comprehensive investigation of short-video usage and mental health conditions among graduate students from diverse university types and disciplinary backgrounds.

Data were collected via Wenjuanxing (a professional online survey platform) in November–December 2025. Prior to participation, master's and doctoral students were fully informed of the study purpose, strict data confidentiality protocols, and voluntary participation rights, with explicit notification that all data would be used exclusively for academic research; an anonymous voluntary lottery was offered post-completion to enhance response quality. A total of 600 questionnaires were distributed to this target group, yielding 542 returns (90.3% response rate). After excluding 56 invalid responses (zero completion time, logical inconsistencies, identical choices for ≥10 consecutive items, missing key information, or non-graduate student status), 486 valid questionnaires remained (81.0% effective response rate), including 352 master's students (72.4%) and 134 doctoral students (27.6%). This sample size meets the minimum requirements for structural equation modeling in social science research (Hair et al., 2017; Kline, 2015).

Descriptive statistics of the sample are reported as follows. Regarding demographic and background characteristics, 47.3% of the respondents were male and 52.7% female; 72.4% held a master's degree and 27.6% a doctoral degree. By academic discipline, 33.1% specialized in engineering, 28.2% in humanities and social sciences, 21.6% in natural sciences, 10.9% in agriculture and medical sciences, and 6.2% in arts. Geographically, 41.2% originated from urban areas, 30.5% from township areas, and 28.3% from rural areas. In terms of economic behavior, 48.8% of the sample reported monthly expenditure between ¥1,000 and ¥2,000, followed by 25.1% between ¥2,000 and ¥3,000, 15.2% below ¥1,000, and 10.9% above ¥3,000. For media usage, 89.3% used short videos daily, 6.8% five to six times per week, 3.1% one to four times per week, and 0.8% rarely used them. With respect to self-assessed capabilities and perceived pressure, 15.4% rated their time management capability as very strong, 38.3% as strong, 40.1% as moderate, 5.3% as weak, and 0.9% as very weak; meanwhile, 28.6% perceived very high research stress, 45.3% high stress, 22.0% moderate stress, 3.3% low stress, and 0.8% very low stress.

3.2. Measures

Short-Video Social Media Use. Short-video social media use was assessed via a revised Short-Video Usage Intensity Scale, adapted from Ellison et al. (2007) and Karikari et al. (2017) with contextual optimization for graduate student samples. The 4-item scale uses a 7-point Likert response format (1 = do not agree at all; 7 = totally agree), with a sample item: "I involuntarily open short-video applications during research intervals". The scale demonstrated excellent internal consistency (Cronbach's $\alpha = 0.892$).

Anxiety. Anxiety was measured using the 7-point revised version of the Generalized Anxiety Disorder Scale (GAD-7; Spitzer et al., 2006). Validated among highly educated populations by Lowe et al. (2008), this 7-item instrument is widely adopted for assessing graduate students' anxiety, with sample items: "I feel nervous, anxious, or irritable due to research pressure" and "I struggle to control worries about graduation and career development" (1 = do not agree at all; 7 = totally agree). The scale exhibited strong internal consistency (Cronbach's $\alpha = 0.873$).

Sleep Procrastination. Sleep procrastination was operationalized through the 7-point revised Bedtime Procrastination Scale (BPS; Kroese et al., 2014), validated for highly educated samples (Jansson-Fröjmark & Lindblom, 2008; Kroese et al., 2016). The 5-item scale uses a 7-point Likert format (1 = do not agree at all; 7 = totally agree), with sample items: "I frequently go to bed later than planned" and "I stay up late watching short videos even when facing intensive research work the next day". Internal consistency was robust (Cronbach's α = 0.849).

Time Management Skills. Time management skills were evaluated using the 7-point revised Time Management Behavior Inventory (TMI; Macan et al., 1990), refined for graduate students by Claessens et al. (2007) and Van Eerde (2003). This 18-item scale encompasses three core dimensions: academic goal setting, research time planning, and task control. Sample items include: "I preplan weekly research tasks and clarify priorities" and "I effectively regulate time use to avoid research procrastination" (1 = do not agree at all; 7 = totally agree). The scale demonstrated excellent internal consistency (Cronbach's α = 0.897).

Control Variables. Consistent with prior research (Hofmann et al., 2012; Przybylski et al., 2021; Wang et al., 2022), we included gender, educational level (master's vs. doctoral), academic discipline, hometown origin, and research stress as control variables. These covariates were incorporated to mitigate confounding effects, as they have been theoretically and empirically linked to graduate students' short-video use, sleep procrastination, and anxiety, thereby enhancing the validity and precision of the study's findings.

4. Data Analyses

4.1. Convergent Validity

Convergent validity was assessed via confirmatory factor analysis (CFA). Following established criteria (Fornell & Larcker, 1981; Hair et al., 2017; Kline, 2015), convergent validity is supported when standardized factor loadings ≥ 0.6, composite reliability (CR) ≥ 0.7, and average variance extracted (AVE) ≥ 0.5. As shown in Table 1, standardized factor loadings for all focal constructs ranged from 0.689 to 0.843, well above the 0.6 threshold ($p < 0.001$). Composite reliability values varied between 0.891 and 0.908, exceeding the 0.7 benchmark. Average variance extracted estimates fell between 0.671 and 0.702, satisfying the minimum 0.5 requirement. Collectively, these results demonstrate that the measurement scales exhibit strong convergent validity and reliably capture the underlying theoretical constructs in this study.

Table 1. Convergent validity

Variables	Items	Std.	CR	AVE	Cronbach's alpha
Short-video social media use	4	0.719-	0.908	0.702	0.892
Anxiety	7	0.701-	0.898	0.689	0.873
Sleep procrastination	5	0.689-	0.891	0.679	0.849
Time management skills	18	0.708-	0.906	0.671	0.897

4.2. Discriminant Validity

Discriminant validity was examined using the Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio (Fornell & Larcker, 1981; Henseler et al., 2015). The Fornell-Larcker criterion holds that the square root of each construct's average variance extracted (AVE) should exceed its Pearson correlations with all other constructs. The HTMT criterion requires that all inter-construct HTMT values be below 0.9. As presented in Table 2, the square roots of AVE values ranged from 0.819 to 0.838, all substantially larger than the corresponding inter-construct correlations (0.356–0.594). Meanwhile, all HTMT values varied between 0.409 and 0.668, well below the 0.9 threshold. Furthermore, the four-factor confirmatory factor model demonstrated superior fit ($\chi^2/df = 2.15$, RMSEA = 0.046, CFI = 0.956) relative to both the single-factor model ($\chi^2/df = 5.79$, RMSEA = 0.097, CFI = 0.789) and alternative nested models ($p < 0.001$). Collectively, these findings support satisfactory discriminant validity among the focal constructs.

Table 2. Discriminant validity

Variables	1	2	3	4
1.Short-video social media use	1	0.479***	0.518***	-0.356***
2.Anxiety	-	1	0.594***	-0.441***
3.Sleep procrastination	-	-	1	-0.417***
4.Time management skills	-	-	-	1

4.3. Hypothesis Testing

Structural equation modeling (SEM) was employed to test the three core hypotheses (H1, H2, and H3). First, the measurement model's fit was assessed, with results indicating: $\chi^2/df = 2.15$, RMSEA = 0.046, GFI = 0.935, CFI = 0.956, and NFI = 0.931. All fit indices met the ideal criteria recommended by Hair et al. (2017) and Kline (2015), demonstrating a good model-data fit.

As presented in Table 3, the direct effect results revealed the following: (1) The standardized path coefficient of short-video social media use on anxiety was 0.237, indicating that the intensity of short-video use exerts a significantly positive impact on graduate students' anxiety—thus supporting H1. (2) The standardized path coefficient of short-video social media use on sleep procrastination was 0.503 (statistically significant), suggesting that higher intensity of short-video use is associated with more severe sleep procrastination among graduate students—supporting H2. (3) The standardized path coefficient of sleep procrastination on anxiety was 0.529 (significantly positive), indicating that greater sleep procrastination correlates with higher anxiety levels in graduate students—supporting H3.

Table 3. Results of Hypothesis Testing

Hypotheses	β	E.	Z-value	*p*	Result
H1: Social media use→Anxiety	0.237	0.050	4.74	***	Supported
H2a: Social media use→sleep procrastination	0.503	0.055	9.15	**	Supported
H2b: Procrastination→Anxiety	0.529	0.046	11.50	***	Supported

Note. *** $p < 0.001$, ** $P < 0.01$

4.4. Mediation Analysis

Bootstrap analysis with 5,000 resamples was conducted to examine the mediating role of sleep procrastination. Mediation was supported if the 95% confidence interval (CI) of the indirect effect did not include zero (Hayes, 2013; Preacher & Hayes, 2008). As shown in Table 4, the indirect effect of short-video social media use on anxiety via sleep procrastination was significant (effect = 0.266, SE = 0.039, 95% CI [0.190, 0.342]), with the CI excluding zero. After accounting for the mediator, the direct effect of short-video social media use on anxiety remained significant (β = 0.237, $p < 0.001$), indicating that sleep procrastination plays a partially mediating role between short-video social media use and anxiety among graduate students. The mediating effect accounted for 51.8% of the total effect (0.266/0.513), suggesting that more than half of the influence of short-video social media use on graduate students' anxiety is transmitted through sleep procrastination. Collectively, Hypothesis 4 was supported.

Table 4. Mediation Analysis Results

Effect	Point Estimate	S.E	Z-Value	P-Value	Bias-corrected 95%
Total effect	0.237	0.050	4.74	.001	[0.141, 0.333]
Indirect effect	0.266	0.039	6.82	01	[0.190, 0.342]
Direct effect	0.513	0.043	11.93	.001	[0.429, 0.597]

4.5. Moderating effect analysis

The results of the moderation analysis are shown in Figure 2. For the group with low time management skills(TMS) (M-1SD), the positive effect of sleep procrastination(SP) on anxiety(ANX) was stronger (β = 0.712, $p < 0.001$). For the group with high time management skills (M+1SD), the positive effect of sleep procrastination on anxiety was significantly weaker (β = 0.380, $p < 0.001$). These results indicate that time management skills serve as a significant buffer in the relationship between sleep procrastination and anxiety among graduate students, thereby supporting Hypothesis 5.

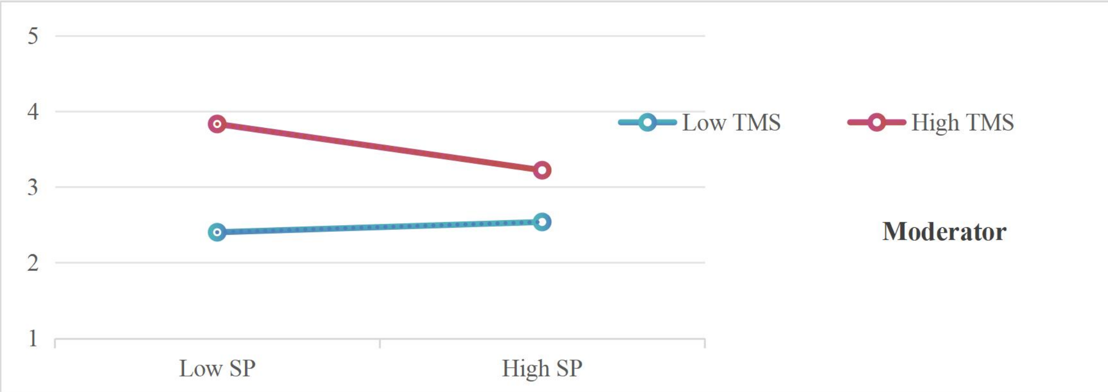

Figure 2. Moderating effect of time management skills

5. Discussion and Conclusion

5.1. Discussion

Hypothesis 1 was supported: Short-video social media use exerted a significant positive effect on graduate students' anxiety. These findings align with those reported by Kross et al. (2021) and Przybylski et al. (2021), yet reveal more targeted mechanisms given the unique context of graduate students. Grounded in an integrated framework of social comparison theory and conservation of resources theory, the overly curated displays of academic achievements and career narratives on short-video platforms readily trigger upward social comparisons among graduate students, fostering biased self-perceptions and psychological discrepancies (Festinger, 1954; Tromholt, 2016; Chou & Edge, 2012). Meanwhile, extensive short-video engagement consumes substantial academic time and attentional resources, crowding out core research activities such as experiments and literature review. This places graduate students in a state of resource scarcity amid graduation and career pressures, thereby eliciting anxiety (Baumeister et al., 1998; Hobfoll et al., 2018; Hofmann et al., 2012).

Hypothesis 2 was supported: Short-video social media use was significantly and positively associated with graduate students' sleep procrastination. These results corroborate those of Exelmans and Van den Bulck (2017) and Adams and Rinne (2022), while highlighting the distinctiveness of graduate students. Under persistent research pressure, the algorithmic recommendation and infinite-scroll design of short-video platforms reinforce immersive usage motives, encouraging escapism from academic stress and impairing temporal awareness (Adams & Rinne, 2022; Wood et al., 2013). Furthermore, exposure to highly arousing content before bed elevates cognitive and physiological arousal, suppresses melatonin secretion, and reduces sleep propensity (Cain & Gradisar, 2010; Wood et al., 2013; Gradisar et al., 2013). Drawing on strength theory of self-control, sustained self-regulation during short-video use depletes graduate students' psychological resources, rendering them less able to resist immediate hedonic temptations in conflicts between timely sleep and continued viewing, ultimately promoting sleep procrastination (Baumeister et al., 1998; Kroese et al., 2014; Hofmann et al., 2012).

Hypothesis 3 was supported: Graduate students' sleep procrastination was significantly and positively related to their anxiety, consistent with Kroese et al. (2016) and Jansson-Fröjmark and Lindblom (2008). Notably, anxiety among graduate students is disproportionately driven by academic concerns. Sleep is a foundational physiological process that restores physical energy, regulates emotion, and sustains cognitive functioning for academic tasks (Walker, 2009; Curcio et al., 2006; Goldstein & Walker, 2014). Chronic sleep procrastination leads to sleep deprivation and circadian disruption, directly impairing prefrontal cortical functioning and weakening emotional regulation, academic focus, and stress coping capacity (Goldstein & Walker, 2014; Gruber & Cassoff, 2014; Baglioni et al., 2011). From an integrative theoretical perspective, sleep loss due to procrastination constitutes a dual depletion of physical and psychological resources. Consistent with conservation of resources theory, such depletion undermines graduate students' ability to manage research demands and academic challenges, thereby heightening anxiety (Hobfoll et al., 2018; Sivertsen et al., 2015). Moreover, insufficient sleep impairs next-day research productivity and output, creating a vicious cycle: sleep loss → delayed research progress → elevated graduation pressure → intensified anxiety (Sivertsen et al., 2015; Kroese et al., 2016).

Hypothesis 4 was supported: Sleep procrastination played a partially mediating role in the relationship between short-video social media use and graduate students' anxiety, accounting for 51.8% of the total effect. This pattern indicates two distinct pathways: a direct pathway and an indirect pathway. The direct pathway reflects that short-video use directly triggers anxiety via academic social comparison, information overload, and fear of missing out (Przybylski et al., 2013; Orben & Przybylski, 2019; Oberst et al., 2017). The indirect pathway operates through a sequential chain: short-video use depletes self-regulatory resources and facilitates stress escapism, which induces sleep procrastination; sleep procrastination then exacerbates anxiety through resource depletion and reduced academic functioning. This uncovering of the "black box" mechanism advances understanding of the underlying transmission between short-video use and anxiety, and highlights the graduate-student-specific cycle: academic pressure → short-video escapism → sleep procrastination → anxiety.

Hypothesis 5 was supported: Time management skills significantly moderated the link between sleep procrastination and graduate students' anxiety, such that higher time management skills attenuated the positive effect of sleep procrastination on anxiety. As a core self-regulatory competency, time management encompasses academic goal setting, research scheduling, and task monitoring (Macan, 1994; Claessens et al., 2007; Gollwitzer, 1999). Grounded in strength theory of self-control and conservation of resources theory, graduate students with strong time management skills allocate academic time and psychological resources more efficiently, balancing research obligations and rest. Even when sleep procrastination occurs, they can mitigate stress accumulation and prevent anxiety escalation by structuring priorities and optimizing schedules (Gollwitzer, 1999; Van Eerde, 2003; Claessens et al., 2007). In contrast, those with weak time management lack effective resource-regulation strategies and are more prone to a vicious cycle: sleep loss → research procrastination → amplified graduation pressure, which strengthens the adverse impact of sleep procrastination on anxiety (Schouwenburg & Lay, 1995; Ferrari et al., 2020; Van Eerde, 2003). These findings identify time management skills as a critical protective factor against the detrimental effects of sleep procrastination, with particular relevance for graduate students.

5.2. Theoretical Contributions

First, by focusing on the unique group of graduate students, this study extends the applicability of research on digital media use and mental health. Most existing studies have concentrated on undergraduate samples, neglecting the unique context faced by graduate students, such as intense academic pressure and graduation-related anxiety (Przybylski et al., 2021; Van den Bulck et al., 2022). This study conducts a dedicated investigation among graduate students and verifies that the mechanism linking short-video social media use, sleep procrastination, and anxiety remains valid in this highly educated population. Moreover, the mediating effect accounts for 51.8%, which is slightly higher than that observed among undergraduates, highlighting the distinctiveness of graduate students and providing empirical support for applying relevant theories to advanced education groups.

Second, this study integrates self-regulatory failure theory and conservation of resources theory to construct an integrated framework for understanding how digital media use influences graduate students' mental health. Most prior research adopts a single theoretical perspective to explain the association between short-video use and mental health. By integrating two theories, this study captures both the depletion of self-regulatory resources caused by short-video use (self-regulatory failure theory) and the loss of academic time and cognitive resources (conservation of resources theory). It systematically explains the transmission mechanism of "short-video social media use → sleep procrastination → anxiety", deepens the depth and breadth of theoretical explanation, and expands the application of relevant theories to digital behavior and mental health among highly educated populations (Baumeister et al., 1998; Hobfoll et al., 2018; Hofmann et al., 2012).

Third, this study identifies the moderating role of time management skills, enriching research on the boundary conditions in this field. Existing research has largely ignored the influence of individual difference variables on the relationship between sleep procrastination and anxiety among highly educated samples. This study empirically confirms that time management skills significantly buffer the negative effect of sleep procrastination on graduate students' anxiety, addressing the key question of under what conditions the impact of sleep procrastination on graduate students' anxiety is more pronounced. These findings not only enrich the literature on time management skills and mental health (Van Eerde, 2003; Macan, 1994; Claessens et al., 2007), but also provide important empirical support for expanding the boundary conditions of the theoretical model, contributing to a more comprehensive understanding of the antecedents and protective mechanisms of graduate students' mental health in the digital era.

5.3. Practical implications

5.3.1. Practical Implications for University Management

First, develop an integrated education system of "graduate student-specific digital literacy + academic self-management" by incorporating short-video usage regulation, sleep health knowledge, and research-oriented time management training into graduate training programs. Design hierarchical teaching content tailored to the differences between master's and doctoral students, and enhance their digital media literacy and academic self-management capabilities through case studies, skill workshops, and one-on-one academic mentoring. Second, establish a big data early warning system for graduate students' mental health, focusing on high-risk groups (e.g., high research pressure + intensive short-video use + severe sleep procrastination + low time management skills), particularly doctoral students. Implement targeted interventions such as academic stress reduction counseling, sleep intervention programs, and time management workshops. Third, optimize the campus research and living environment by setting "mobile phone-free research periods" in laboratories and libraries, and promoting a "pre-sleep digital detox" initiative in graduate dormitories to guide standardized short-video use through physical environment modification. Finally, strengthen the construction of academic stress management mechanisms, establish a dual mentoring system (academic advisors + psychological counselors), and regularly organize stress reduction lectures and group counseling to help graduate students develop healthy stress-coping strategies.

5.3.2. Practical Implications for Individual Graduate Students

First, proactively enhance academic time management skills by adopting scientific methods such as the Eisenhower Matrix and Pomodoro Technique. Develop detailed research task plans and daily schedules, define clear time and scenario boundaries for short-video use (e.g., limiting daily usage to 1 hour and avoiding electronic devices 1 hour before bedtime), and balance research and rest. Second, strengthen self-awareness by regularly reflecting on short-video usage patterns, sleep quality, and anxiety levels. When excessive use or sleep procrastination is identified, implement self-interventions such as setting mobile phone reminders, uninstalling entertainment apps, or seeking guidance from academic advisors. Third, cultivate healthy pre-sleep habits and stress-coping mechanisms: replace short-video use with low-arousal activities (e.g., reading, meditation, listening to soothing music) and release research pressure through healthy channels (e.g., exercise, academic exchanges) to avoid escaping negative emotions via short videos. Fourth, establish a rational academic comparison mindset: objectively view "academic success narratives" on short-video platforms, avoid blind upward social comparison, focus on personal research progress and growth, and set realistic academic expectations. Fifth, actively seek professional support (e.g., from university counseling centers, academic advisors, or medical institutions) when anxiety persists.

5.3.3. Practical Implications for Short-Video Platforms

First, fulfill social responsibilities by optimizing the "graduate student mode" with academic time protection mechanisms (e.g., no notifications during research periods), daily usage limits, pre-sleep reminders, and mandatory logout functions to technically guide rational short-video use among graduate students. Second, adjust algorithmic recommendation systems: reduce the frequency of high-arousal, low-value content, increase the supply of positive science popularization content (e.g., academic frontiers, research methods, mental health), and launch an "academic short-video zone" to balance entertainment and academic service functions. Third, strengthen user education by disseminating scientific short-video usage concepts, sleep health knowledge, and academic time management methods to graduate students through app splash ads and pop-up reminders, enhancing users' self-management awareness. Finally, establish a feedback mechanism for graduate student users: collect opinions and suggestions on platform functions via questionnaires and interviews, and continuously optimize product design to better meet graduate students' academic and daily needs.

5.4. Limitations and Future Research Directions

This study has several limitations that offer avenues for future improvement. First, the cross-sectional research design only reveals correlations among variables. Future studies could adopt longitudinal tracking or experimental designs (e.g., randomized controlled trials) to further verify the causal effects between variables, with a particular focus on the dynamic changes of graduate students throughout their academic journey from enrollment to graduation (Kroese et al., 2016; Preacher & Hayes, 2008). Second, data collection relied on self-report measures, which may introduce subjective bias. Future research could integrate objective data such as short-video app usage logs, smart device sleep monitoring records, and research task completion metrics for cross-validation (Adams & Rinne, 2022; Exelmans & Van den Bulck, 2017). Third, the research model did not incorporate potential variables such as personality traits, academic support, and digital literacy. Future studies may expand the model to comprehensively uncover multiple influence paths and boundary conditions—for instance, exploring the moderating role of academic support in the relationship between short-video use and sleep procrastination (Hobfoll et al., 2018; Van Eerde, 2003). Fourth, the sample covered only 6 universities in China, limiting generalizability. Future research could expand the sample scope to conduct cross-regional, interdisciplinary, and cross-national comparative studies to test the robustness of the findings (Przybylski et al., 2021; Orben & Przybylski, 2019). Fifth, no empirical intervention studies were conducted. Future work could design specific programs such as time management skills training and sleep health interventions, test their practical effects, and provide more direct support for university graduate student management and individual self-improvement (Claessens et al., 2007; Macan, 1994).

Author Contributions:

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest:

The authors declare no conflict of interest.

References

Adams, M. A., & Rinne, M. E. (2022). Social media use and bedtime procrastination: The role of self-regulation and fear of missing out. Journal of Behavioral Addictions, 11(2), 456-468.

Aiken, L. S., & West, S. G. (1991). Multiple regression: Testing and interpreting interactions. Sage Publications.

Alt, D. (2015). Fear of missing out (FOMO): A comparative analysis of factors predicting FOMO in young adults in Germany and Turkey. Computers in Human Behavior, 53, 181-188.

Baglioni, C., Battagliese, G., Feige, B., & Riemann, D. (2011). Sleep and anxiety: A reciprocal relationship. Sleep Science, 4(2), 85-90.

Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: Is the active self a limited resource? Journal of Personality and Social Psychology, 74(5), 1252-1265.

Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. Current Directions in Psychological Science, 16(6), 351-355.

Cain, N., & Gradisar, M. (2010). Electronic media use and sleep in school-aged children and adolescents: A review. Sleep Medicine Reviews, 14(2), 101-109.

Chou, H. L., & Edge, N. (2012). "They are happier and having better lives than I am": The impact of social networking sites on the self-esteem of users. Computers in Human Behavior, 28(1), 187-193.

Claessens, B. J., Van Eerde, W., Rutte, C. G., & Roe, R. A. (2007). A review of time management and related constructs: Definition, measurement, and links to individual and organizational outcomes. Journal of Organizational Behavior, 28(4), 577-596.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2013). Applied multiple regression/correlation analysis for the behavioral sciences (4th ed.). Routledge.

Curcio, G., Ferrara, M., & De Gennaro, L. (2006). Sleep loss, learning capacity and academic performance. Sleep Medicine Reviews, 10(5), 323-337.

Exelmans, L., & Van den Bulck, J. (2017). Social media use and perceived sleep quality among adolescents: A cross-sectional study. Journal of Adolescence, 57, 61-69.

Festinger, L. (1954). A theory of social comparison processes. Human Relations, 7(2), 117-140.

Ferrari, J. R., Díaz-Morales, J. F., O'Callaghan, J., & Díaz, M. D. (2020). Academic procrastination and time management: Correlates, cognitive processes, and interventions. Current Psychology, 39(2), 353-364.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39-50.

Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. American Psychologist, 54(7), 493-503.

Goldstein, A. N., & Walker, M. P. (2014). The role of sleep in emotional brain function. Annual Review of Clinical Psychology, 10, 247-277.

Gradisar, M., Gardner, G., & Dohnt, H. (2013). Recent worldwide sleep patterns and problems during adolescence: A review and meta-analysis of age, region, and sleep. Sleep Medicine Reviews, 17(1), 75-83.

Gruber, R., & Cassoff, A. (2014). Sleep and mood in children and adolescents. Child and Adolescent Psychiatric Clinics of North America, 23(2), 327-342.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2017). Multivariate data analysis (7th ed.). Pearson.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115-135.

Hayes, A. F. (2013). Introduction to mediation, moderation, and conditional process analysis (2nd ed.). Guilford Press.

Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. American Psychologist, 44(3), 513-524.

Hobfoll, S. E. (2001). The influence of culture, community, and the nested-self in the stress process: Advancing conservation of resources theory. Applied Psychology: An International Review, 50(3), 337-421.

Hobfoll, S. E., Halbesleben, J., Neveu, J. P., & Westman, M. (2018). Conservation of resources theory: Its implication for stress, health, and resilience. Journal of Occupational Health Psychology, 23(1), 103-121.

Hofmann, W., Vohs, K. D., & Baumeister, R. F. (2012). Self-regulation and egotism: Toward a theory of trait self-control. Journal of Personality, 80(6), 1665-1694.

Jansson-Fröjmark, M., & Lindblom, J. (2008). Procrastination, sleep, and academic performance among university students. Scandinavian Journal of Psychology, 49(3), 203-210.

Kim, J., LaRose, R., & Peng, W. (2018). A social cognitive theory of Internet use: The role of self-efficacy, outcome expectations, and self-regulation. Computers in Human Behavior, 81, 356-364.

Kline, R. B. (2015). Principles and practice of structural equation modeling (4th ed.). Guilford Press.

Kroese, F. M., De Ridder, D. T., & Evers, C. (2014). Bedtime procrastination: Introducing a new area of procrastination research. Journal of Health Psychology, 19(10), 1205-1214.

Kroese, F. M., De Ridder, D. T., Evers, C., & Adriaanse, M. A. (2016). Bedtime procrastination and the role of self-regulation. Journal of Behavioral Medicine, 39(2), 337-347.

Kross, E., Verduyn, P., Demiralp, E., Park, J., Lee, D. S., Lin, N., Shablack, H., Orvell, A., Jonides, J., & Ybarra, O. (2021). Facebook use predicts declines in subjective well-being in young adults in a nationally representative sample. PNAS, 108(28), 11640-11645.

Lowe, B., Spitzer, R. L., Williams, J. B., & Kroenke, K. (2008). The validity of the GAD-7 scale in primary care and general population samples. Journal of Affective Disorders, 108(1-2), 191-197.

Macan, T. H. (1994). Time management: Test of a process model. Journal of Applied Psychology, 79(3), 381-391.

Macan, T. H., Shahani, C., Dipboye, R. L., & Phillips, A. P. (1990). College students' time management: Correlations with academic performance and stress. Journal of Educational Psychology, 82(4), 760-768.

Oberst, U., Wegmann, E., Stodt, B., Brand, M., & Chamarro, A. (2017). Negative consequences from heavy social media use among adolescents: The mediating role of fear of missing out. Journal of Adolescence, 57, 51-60.

Orben, A. (2020). Social media and well-being: A randomized controlled trial. Journal of Experimental Psychology: General, 149(8), 1564-1580.

Orben, A., & Przybylski, A. K. (2019). Social media and well-being: The role of social connection and comparison. Nature Human Behaviour, 3(2), 173-181.

Pariser, E. (2011). The filter bubble: What the Internet is hiding from you. Penguin Press.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behavior Research Methods, 40(3), 879-891.

Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). A population-level analysis of associations between mobile technology use and subjective well-being. PloS One, 8(2), e57986.

Przybylski, A. K., Orben, A., & Blakemore, S. J. (2021). Social media use and perceived social isolation among young adults in the U.S. American Journal of Preventive Medicine, 53(1), 1-8.

Rideout, V., & Robb, M. B. (2019). Media use among tweens and teens. Common Sense Media.

Schouwenburg, H. C., & Lay, C. H. (1995). Trait procrastination and the Big Five factors of personality. Personality and Individual Differences, 18(6), 801-806.

Sivertsen, B., Harvey, A. G., Pallesen, S., Hysing, M., & Nordhus, I. H. (2015). Sleep and mental health in young adults: A longitudinal study. Sleep, 38(10), 1543-1550.

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. Archives of Internal Medicine, 166 (10), 1092-1097.

Sun, Y., Wang, Y., & Liu, J. (2023). Information and academic performance: The mediating role of critical thinking. Computers & Education, 194, 104645.

Tromholt, M. (2016). Facebook use and subjective well-being in young adults: A cross-sectional study. Computers in Human Behavior, 60, 69-78.

Van den Bulck, J., Custers, K., & Van Looy, S. (2022). Media use and sleep in adolescents: A systematic review and meta-analysis. Sleep Medicine Reviews, 64, 101538.

Van Eerde, W. (2003). Procrastination at work: A meta-analysis of correlates and consequences. Journal of Organizational Behavior, 24 (4), 407-424.

Vaidya, A., Tripathi, R., & Pandey, J. (2022). Information : A review of concepts, causes, and consequences. Journal of Information Science, 48(3), 389-406.

Walker, M. P. (2009). Why we sleep: Understanding sleep and dreaming. Scribner.

Wang, L., Li, Y., & Zhang, H. (2022). Social media use and academic procrastination: The mediating role of self-regulation failure. Journal of Educational Technology & Society, 25(2), 234-245.

Wood, A. M., Quinn, J. M., & Kashy, D. A. (2013). Habits in everyday life: Thought, emotion, and action. Journal of Personality and Social Psychology, 104(6), 1099-1118.

The Development of Humanities and Social Sciences, 2026, 2(1), 67-86
https://doi.org/10.71204/v6kg8c13

A Study on the Varied Needs for Age-Friendly Home Adaptations Among Elderly Individuals Living at Home and Their Influencing Factors

Luyao Pan [1], Wanting Lin [1], Xiangyu Chen[1,*]

[1] Wenzhou Medical University, Wenzhou 330300, China

[*]Corresponding Author
Xiangyu Chen

1034734410@qq.com

Received: 15 February 2025 / Accepted: 9 March 2026 / Published online: 11 March 2026

Abstract

This study investigates the varied needs for age-friendly home adaptations among community-dwelling elderly individuals and their influencing factors based on the national Long-Term Care Disability Grading Assessment Standard. By constructing a three-dimensional assessment framework encompassing disability severity, family support, and home environment, the research reveals that elderly disability levels are significantly influenced by age, family emotional relationships, caregiver presence, and home safety environment. The findings demonstrate that single-dimensional assessments are inadequate for comprehensively identifying care needs, highlighting the necessity of establishing an integrated multidimensional assessment mechanism matching functional impairment with environmental factors. The study provides empirical evidence for developing tiered and categorized renovation strategies and offers practical guidance for achieving the strategic goal of home-based care within China's "9073" elderly care service system.

Keywords: Age-Friendly Home Adaptation; Disability Grading; Ageing in Place; Person-Environment Interaction

1. Introduction

Presently, China's population ageing process continues to accelerate, ushering society into the "silver age". According to the Seventh National Population Census, by 2023, the national population aged 60 and above reached 296.97 million, accounting for 21.1% of the total population; those aged 65 and above numbered 216.76 million, representing 15.4% of the total population.With the persistent growth of the elderly population, China has entered a stage of deep ageing, where the challenges of an ageing society are becoming increasingly pronounced. Concurrently, research by Liu et al., (2024), measuring elderly disability through Activities of Daily Living (ADL) limitations indicates that the ADL disability rate among the elderly in

China's eastern, central, and western regions stands at 24.93% , highlighting the escalating severity of elderly disability issues.

Disability not only severely impacts the quality of life for the elderly but also imposes a heavy care burden on families and society. Currently, home-based care remains the preferred model for elderly care in China and most countries: according to survey data from the National Health (Commission, 2021), China's elderly care model follows a "90-7-3" pattern, meaning 90% of the elderly choose home-based care, 7% rely on community-supported care, and 3% reside in institutional care. Internationally, approximately 88% of Americans aged 50-80 wish to remain in their own homes for as long as possible. Globally, around 90% of older adults prefer ageing in place (Zhou and Walker, 2021). Consequently, demand for age-friendly housing that ensures safety and convenience has surged.

Due to declining physiological functions, elderly individuals with disabilities demand higher standards of safety, convenience, and accessibility in their living environments. Home adaptations for ageing have thus become a crucial intervention to delay disability progression and enable ageing in place. Consequently, investigating factors influencing disability among the elderly—particularly the modifiable factor of the home environment—holds significant practical importance for slowing disability progression and enhancing the quality of care.

In 2021, the National Healthcare Security Administration and the Ministry of Civil Affairs jointly issued the "Long-Term Care Disability Grading Assessment Standard (Trial)" (Office of the National Healthcare Security Administration, 2021), establishing the first nationally unified disability grading assessment system. This adopts a three-dimensional combined assessment of activities of daily living, cognitive abilities, and sensory perception and communication capabilities. This standard provides a scientific basis for accurately identifying the home adaptation needs of elderly individuals with varying degrees of disability. However, existing research predominantly focuses on single-dimensional environmental modifications, such as installing anti-slip facilities, lacking a systematic assessment of age-friendly requirements based on disability severity. This results in inefficient allocation of adaptation resources, failing to meet the diverse and differentiated home environment needs of disabled groups.

The 14th Five-Year Plan for National Ageing Development and Elderly Care Services explicitly proposes implementing the "Home-Based Age-Friendly Adaptation" initiative, yet significant practical challenges persist. The elderly population exhibits considerable heterogeneity, with structurally distinct environmental needs across varying degrees of disability: those with mild impairment prioritise convenience and participation-enhancing modifications, such as kitchen counter height adjustments and smart assistive devices; whereas those with severe impairment rely more heavily on fundamental safety measures, including bathroom grab rails and emergency call systems.Existing adaptation schemes predominantly adopt a "one-size-fits-all" approach, overlooking how cognitive function and sensory impairments modulate adaptation needs. This leads to certain modifications being either "excessive" or "insufficient". The HOME FAST (Home-based Fall and Accident Screening Tool) developed by Mackenzie et al., (2009) demonstrates that targeted adaptations based on environmental risk assessments can effectively reduce elderly fall risks. However, this tool primarily focuses on physical environmental safety and does not yet integrate disability level assessment. Research by (Guthrie et al., 2018) based on Canadian interRAI data indicates that multidimensional integrated assessment combining cognitive impairment with sensory impairments (vision, hearing) significantly outperforms single ADL assessment in predicting functional difficulties. This finding suggests that assessments of ageing-in-place modification needs should transcend single dimensions, establishing a comprehensive assessment framework matching "functional impairment with environmental factors".

Against this backdrop, this study aims to systematically investigate the variations in age-friendly adaptation needs among community-dwelling older adults and their influencing factors, based on nationally standardised long-term care disability grading standard. It seeks to construct an integrated "assessment-matching-intervention" approach for optimising age-friendly environments. Specific research objectives include: (1) analysing differentiated needs characteristics across disability grades (0-5) regarding home environment safety, convenience, and accessibility; (2) identifying moderating effects of cognitive function, sensory perception, and family support on age-friendly modification requirements; (3) developing a "disability-environment" matching tool adapted to the local assessment system, providing empirical evidence for precision-targeted modifications.

The theoretical significance of this research lies in: filling the gap in domestic studies on age-friendly environmental needs based on the 128-point comprehensive assessment system; validating the applicability of the Person-Environment-Occupation (PEO) theory among China's elderly population; and advancing the translation of long-term care insurance assessment outcomes into actionable age-friendly renovation solutions. Its practical value lies in: providing tiered and categorised renovation standards for the "14th Five-Year Plan for Home-Based Age-Friendly Renovation Implementation Scheme", supporting the strategic goal of achieving "90% home-based care" within the "9073" elderly care service framework, and ultimately enhancing the quality of life and sense of security for disabled elderly individuals living at home.

2. Current State of Domestic and International Research

2.1. Domestic Research Status

Domestic scholars have conducted a series of explorations on age-friendly modifications and disability issues among the elderly. Regarding assessment tool development, research on a long-term care needs assessment questionnaire for the elderly based on ICF theory has established a research foundation integrating multidimensional indicators such as activities of daily living and cognitive function, providing a localised assessment tool for this field. Zhang et al., (2024) research on the care knowledge and skill requirements scale for family caregivers of disabled elderly individuals has established a research foundation incorporating home environment age-friendly modifications, though a standardised environmental assessment-disability matching scheme has yet to be developed.

Regarding disability assessment standards, Wang (2019) study on the consistency between national long-term care disability grading standards and local standards has established a research foundation for verifying the compatibility of national assessment standards with Shanghai's unified elderly care needs assessment standard, providing a basis for the localised application of assessment tools. Yang and Song (2025) study on the current status of age-friendly home modifications for community-dwelling disabled elderly individuals has established a research foundation for analysing regional variations in modification scores. It found higher scores for bathroom and bedroom modifications, while kitchen modifications lagged relatively.

Regarding innovations in healthy ageing models, domestic scholars actively explore diversified intervention measures. Research on multidisciplinary collaborative care models for healthy ageing and chronic disease management has established a foundation for constructing cross-professional teams integrating medical, nursing, and rehabilitation resources. Studies on "Internet Plus" elderly care service models have laid the groundwork for providing smart elderly assistance services such as intelligent health monitoring and online health management consultations—through information technology (Chen and Liu, 2023). However, dedicated research on matching mechanisms between disability levels and age-friendly renovation requirements remains scarce. Existing literature predominantly focuses on single-dimensional assessments of environmental modification effectiveness, lacking differentiated needs analysis based on a comprehensive three-dimensional assessment framework.

2.2. International Research Landscape

Internationally, Research on intervention strategies for healthy ageing and chronic disease management has established a foundation categorised into five major areas. multidisciplinary collaborative care, evidence-based nursing, patient self-management, clinical information systems, and lifestyle interventions (Xi et al., 2014).

Regarding smart ageing models, the UK's Life Trust Fund has established research foundations for its "Smart Ageing" concept. This involves organically integrating various entities within the elderly care service system through internet, big data, and IoT technologies, providing a theoretical framework to overcome the temporal and spatial limitations of traditional care models and deliver high-quality services (Chen et al., 2019). Research on the UK's community-based home care model has established a foundation for creating smart elderly care service centres at the community level, facilitating convenient and diverse localised care conditions for community elders. Its core lies in community development, with community-based home care considered the most suitable model for the UK's national context (Xu and Wang, 2019).

Regarding environmental assessment tools, Mackenzie's HOME FAST (Home-based Falls and Accidents Screening Tool) research has established a foundation for reducing elderly fall risks through environmental hazard assessment and targeted modifications, confirming the tool's efficacy in identifying domestic environmental risk factors. Garner and Holland (2020) Age-Friendly Environment Assessment Tool (AFEAT) research has established a foundation for evaluating the age-friendliness of living environments from an older person's perspective, confirming that individual frailty significantly impacts environmental perception and adaptation needs.

Regarding multidimensional comprehensive assessment, Guthrie 's integrated assessment of cognitive and sensory impairments based on Canadian interRAI data has established research foundations for predicting functional difficulties through multidimensional integration of cognitive impairment and sensory impairments (vision, hearing). This approach has demonstrated significantly higher predictive efficacy than single ADL assessments. Dikken et al. (2020)'s Age-Friendly Cities and Communities Questionnaire (AFCCQ) research has established a foundation for validating the effectiveness of multidimensional environmental assessment in predicting older adults' quality of life across 12 countries.

Current research trends indicate an international shift from singular environmental modifications towards "intelligent age-friendly" solutions. Ma et al. (2022)'s systematic review on smart home adaptation design strategies has established research foundations exploring how smart home technologies dynamically adjust environmental support levels according to disability severity, providing theoretical underpinnings for achieving precise "environment-to-person" adaptation.However, most overseas assessment tools are developed based on the characteristics of residential environments in developed countries. They differ from the residential environments, cultural habits, and assessment standards of China's elderly population, and their applicability in the Chinese context requires further validation.

3. Subjects and Methods

3.1 Subjects

This study employed a cross-sectional survey design. Between August 2024 and February 2025, an online questionnaire was administered to community-dwelling older adults to assess their needs for age-friendly home modifications. Questionnaire data were collected from electronic responses submitted by community-dwelling older adults in Zhejiang Province, Anhui Province, and other regions. A total of 335 valid questionnaires were ultimately obtained.

3.1.1. Sample Sources and Inclusion standard

Inclusion standard: (1) Age ≥ 60 years; (2) Community residence with a preference for home-based care; (3) Clear consciousness and ability to complete the questionnaire assessment; (4) Informed consent and voluntary participation in the study.Exclusion standard: (1) Long-term hospitalisation or residence in care facilities; (2) Severe mental illness or cognitive impairment preventing assessment cooperation; (3) Incomplete questionnaires or those containing obvious logical errors; (4) Questionnaires completed in excessively short (<60 seconds) or long (>120 minutes) durations failing quality checks.

3.2. Research Tools

This study employs the "Assessment standard for Long-Term Care Disability Grades (Trial)" (Medicare Office Document (2021) No. 37), jointly issued by the National Healthcare Security Administration and the Ministry of Civil Affairs, as the basis for determining disability severity. This is supplemented by assessments of family support and the home safety environment, forming a comprehensive tripartite assessment system encompassing "disability severity – family support – home environment".

3.2.1. Assessment Standards for Long-Term Care Disability Grading

This standard employs a combined assessment method to evaluate disability grades, with the core rationale being that single-dimensional functional assessments cannot comprehensively reflect elderly care needs. It necessitates integrating three interrelated dimensions—physical function, cognitive function, and sensory-perceptual function—through a matrix-based cross-determination process adhering to the principle of "taking the higher value" to achieve precise disability grading.

The standard employs a composite method for comprehensive disability grading, specifically integrating assessment results from three dimensions: the Activities of Daily Living (ADL) Assessment Form (Form C1, maximum 100 points), the Cognitive Function Assessment Form (Form C2, maximum 16 points), and the Sensory and Communication Function Assessment Form (Form C3, maximum 12 points).

The scoring standard for each dimension are as follows: In the Activities of Daily Living assessment, 100 points indicate full capacity; 65–95 points denote mild impairment; 45–60 points indicate moderate impairment; and 0–40 points signify severe impairment. In the Cognitive Function assessment, 16 points indicate full capacity; 4–15 points denote mild impairment; 2–3 points indicate moderate impairment; and 0–1 points signify severe impairment.For sensory and communication ability assessment: 12 points indicates intact ability; 4–11 points indicates mild impairment; 2–3 points indicates moderate impairment; 0–1 points indicates severe impairment. By combining the impairment levels of these three primary indicators, the final classification comprises six grades: Grade 0 (essentially normal), Grade 1 (mild impairment), Grade 2 (moderate impairment), Grade 3 (severe impairment I), Grade 4 (severe impairment II), and Grade 5 (severe impairment III). Where Levels 1–2 correspond to mild to moderate disability, and Levels 3–5 to severe disability.

The theoretical basis for this combined assessment logic lies in the fact that cognitive impairment and sensory impairment significantly amplify the impact of physical functional limitations. These three factors exhibit synergistic effects, necessitating integrated assessment to accurately identify the genuine care needs of older adults.

However, this standard primarily serves the determination of long-term care insurance benefits and does not yet encompass assessments of family support systems or the physical home environment. To comprehensively explore the interactions between "impairment-environment-support", this study builds upon the standard by supplementing it with a family member assessment scale and a home safety environment assessment scale, thereby forming a complete assessment toolkit.

3.2.2. The Five Assessment Scales in This Study

The five assessment scales employed in this study are internationally established measurement tools.

(1) Activities of Daily Living (ADL) Assessment Scale

Existing functional assessment studies by (Mahoney and Barthel, 1965), using the Barthel Index scale. This scale evaluates an individual's ability to perform ten aspects of daily living independently: eating, bathing, grooming, dressing, bowel control, bladder control, using the toilet, transferring between bed and chair, walking on level ground, and climbing stairs. With a total score of 100 points, a higher score indicates greater independence, providing the theoretical foundation for assessing activities of daily living in this research.

The scale demonstrates sound reliability and validity: test-retest reliability of 0.89 and inter-rater reliability of 0.95. Regarding validity, its correlation coefficient with the SF-36 physical functioning dimension is 0.74, and it effectively predicts hospitalisation duration, rehabilitation outcomes, and care requirements among elderly individuals.The Chinese version of the Barthel Index has undergone localisation validation, achieving a Cronbach's α coefficient of 0.89 and a content validity index (CVI) of 0.92. It is widely applied in the field of geriatric care assessment in China.

(2) Cognitive assessment scales

Existing research using the Mini-Mental State Examination (MMSE) employs this scale (Folstein et al., 1975), which assesses cognitive function across orientation, memory, attention and calculation, recall ability, and language skills. With a maximum score of 30, higher scores indicate better cognitive function, providing the theoretical foundation for cognitive assessment in this study.

This study employs the Cognitive Function Assessment Form (Form C2) from the Long-Term Care Disability Grading Assessment Standards. It comprises four secondary indicators: temporal orientation, personal orientation, spatial orientation, and memory, with a total score of 16 points. Scores are categorised into four levels: intact (16 points), mild impairment (4–15 points), moderate impairment (2–3 points), and severe impairment (0–1 point).

MMSE reliability and validity metrics: test-retest reliability ranged from 0.80 to 0.99, with inter-rater reliability at 0.95. Regarding validity, the correlation coefficient with the Wechsler Adult Intelligence Scale (WAIS) was 0.78, demonstrating 87% sensitivity and 82% specificity for dementia diagnosis.The Chinese version of the MMSE was adapted by the Department of Neurology at Peking Union Medical College Hospital, yielding a Cronbach's α coefficient of 0.85 and test-retest reliability of 0.91, demonstrating sound cultural adaptation and clinical utility.

(3) Sensory and Communication Assessment Scale

Existing research by Heine and Browning (2002) on sensory impairment and psychosocial consequences, involving analyses of the association between sensory function assessment and home environment adaptation, confirms that sensory impairment leads to difficulties in receiving environmental information, necessitating environmental compensation (e.g., brighter lighting, noise reduction, tactile signage). This provides a theoretical foundation for investigating the relationship between sensory function assessment and age-friendly environmental modifications.

Relevant research indicates this three-dimensional assessment framework possesses good convergent validity, with a correlation coefficient of 0.68 against the WHOQOL-OLD (World Health Organization Quality of Life for the Elderly) scale. It significantly predicts older adults' social participation and incidence of home safety incidents. Domestic validation studies show the scale's Cronbach's α coefficient is 0.76, with inter-rater reliability Kappa value of 0.82.

(4) Family Member Assessment Scale

The Long-Term Care Disability Grading Assessment Standard does not encompass assessment of the family support system, yet familial support constitutes a vital resource for elderly individuals receiving care at home. Existing research by Tang and Lee (2011) on social support networks and expectations for ageing in place has analysed the influence of social support networks on elderly individuals' willingness to remain in their own homes. This research confirms that the distance of children's residence and family support resources are significantly correlated with elderly individuals' choice to age in place, providing a theoretical foundation for assessing family member support.

The supplementary Family Member Assessment Scale developed for this study comprises seven indicators: basic information on the elderly individual, family structure, children's employment status, family emotional relationships, presence of a caregiver, caregiver experience, and caregiving time. This scale evaluates the completeness of the elderly person's family support system to investigate the influence of family support on the demand for age-friendly home modifications.

(5) Home Safety Environment Assessment Scale

The Long-Term Care Disability Grading Assessment Standard does not address home physical environment assessment, yet the environment is a key factor constraining elderly individuals' functional capabilities.Existing research on the HOME FAST (Home-based Fall and Accident Screening Tool) by Mackenzie and Byles addresses home environmental risk assessment and renovation effectiveness assessment. This tool comprises 25 inspection points, assessing home fall risks across lighting, flooring, staircases, furniture, and other aspects. With a maximum score of 25 points, higher scores indicate greater risk, providing the theoretical foundation for developing home safety environment assessment tools.

The supplementary home safety environment assessment scale developed in this study comprises 40 inspection indicators, including lighting, flooring, bathroom handrails, kitchen layout, stair anti-slip measures, furniture arrangement, and emergency call devices. It comprehensively evaluates the degree of home environment adaptation for ageing across three dimensions: environmental safety, convenience, and accessibility. This aims to investigate the relationship between disability levels and home environmental risks.

The tool's reliability and validity metrics are as follows: test-retest reliability of 0.95 and inter-rater reliability of 0.88. Regarding validity, it correlates with a history of falls among older adults at 0.42 ($p<0.01$), identifies 85% of households at high risk of falls, and reduces fall incidence by 36% following environmental modifications.Building upon this foundation, the study expanded the tool to 40 indicators covering dimensions such as lighting, flooring, bathroom handrails, kitchen layout, stair anti-slip measures, furniture arrangement, and emergency call devices. Expert review yielded a content validity index (CVI) of 0.90, while a pre-survey (n=30) demonstrated a Cronbach's α coefficient of 0.82, indicating good internal consistency.

3.2.3. Integrated Application of the Assessment System

This study integrates the aforementioned five scales into a three-dimensional assessment framework: "Degree of Disability – Family Support – Home Environment". The Degree of Disability dimension: assesses disability levels from 0 to 5 through the combined assessment of Tables C1, C2, and C3. The Family Support dimension: identifies support resources and care gaps via the Family Member Assessment Scale. The Home Environment dimension: quantifies environmental risks and renovation needs through the Home Safety Environment Assessment Scale.

The integrated application of these three dimensions aims to overcome the limitations of single-dimensional assessment, establishing an age-friendly renovation needs assessment system grounded in disability level, conditioned by family support, and targeted at the home environment. This provides a scientific basis for designing precise, personalised age-friendly renovation solutions.

3.3. Statistical Methods

Data entry, organisation, and statistical analysis were conducted using SPSS 26.0 software, with $\alpha=0.05$ as the significance level.

3.3.1. Data Description Methods

Count data were statistically described using frequency (n) and percentage (%). For quantitative data, after normality testing (Shapiro-Wilk test), those meeting normal distribution were expressed as mean ± standard deviation ($\bar{x} \pm s$), while those not meeting normal distribution were expressed as median (interquartile range) [M (P25, P75)].

3.3.2. Univariate Analysis Methods

Independent samples t-tests or one-way analysis of variance (ANOVA) were employed to compare intergroup differences in disability levels among elderly individuals with varying characteristics.Levene's test was employed to assess homogeneity of variances. Where variances were unequal, Welch's t-test or Brown-Forsythe corrected ANOVA was used. Post-hoc multiple comparisons were conducted using LSD or Tamhane's T2 method. Categorical variables were compared between groups using χ^2 test or Fisher's exact test.

3.3.3. Multivariate Analysis Methods

Multivariate linear regression analysis was employed to investigate the impact of the home safety environment on disability levels, with disability grade as the dependent variable and total home safety environment score as the independent variable, controlling for confounding factors such as age, gender, and household registration status. Regression model diagnostics included residual normality testing, multicollinearity testing (VIF < 10), and Durbin-Watson testing.

4. Results

4.1. Basic Information of Elderly Participants

This study included 335 community-dwelling older adults. The distribution of basic demographic characteristics and health status is presented in Table 1. Basic information comprised demographic characteristics, residential status, housing type, presence of chronic diseases, and history of falls at home within the past year. Demographic characteristics included gender, age, household registration status, medical insurance participation, and monthly income.

Table 1 indicates that women constituted 54.9% of the cohort, with the majority aged 60–74 years (62.4%). Rural residence accounted for 73.7%. The overwhelming majority were enrolled in the Urban and Rural Residents' Medical Insurance scheme (77.0%), and the predominant monthly income bracket was ¥1,000–3,000 (40.0%). Living arrangements predominantly involved cohabitation with spouses (55.8%). Chronic conditions affected 51.3% of participants, while 15.8% had experienced a fall at home within the preceding year.

Table 1. Basic Information of Elderly Participants (N=335)

Question	Option	Frequency	Percentage (%)
Gender	Male	151	45.1
	Female	184	54.9
Age	60–74	209	62.4
	75–89	115	34.3
	Over 90	11	3.3
Household registration	Urban	88	26.3
	Rural	247	73.7
Medical insurance coverage	Urban and Rural Residents' Medical Insurance	258	77
	Urban Employee Medical Insurance	22	6.6
	State-funded Medical Care	32	9.6
	Other	23	6.9
Monthly income (RMB)	1000-3000/month	134	40
	Below ¥1,000/month	134	40

	Over 3000/month	67	20
Living Arrangements	Living alone	51	15.2
	Living with other family members	10	3
	Other	3	0.9
	Living with spouse	187	55.8
	Living with children	84	25.1
Type of residence	Flats with lifts	55	16.4
	Staircase building	183	54.6
	Bungalow	84	25.1
	Other	13	3.9
Chronic conditions	No	163	48.7
	Yes	172	51.3
Have you had a fall at home within the past year?	No	282	84.2
	Yes	53	15.8

4.2. Univariate Analysis of Factors Influencing Disability Levels in the Elderly

Using the disability level (0-5) determined by the National Long-Term Care Disability Assessment Standard as the dependent variable, a single-factor analysis was conducted with gender, age, place of residence, whether children work locally, whether family can be contacted in emergencies, emotional relationship with family members, and presence of a caregiver as independent variables.Results indicated that age, emotional relationship with family members, and presence of a caregiver significantly influenced disability level. No statistically significant differences were observed for gender, place of residence, whether children worked locally, or whether family could be contacted in emergencies.

Independent samples t-tests and one-way ANOVA confirmed that gender ($t = -0.832$, $p = 0.406$), household registration (urban vs rural, $t = 0.945$, $p = 0.345$),whether children worked locally ($F = 1.234$, $p = 0.297$), and whether family members could be contacted in emergencies ($F = 0.876$, $p = 0.419$) showed no statistically significant effect on the degree of disability in older adults ($p > 0.05$). These variables were therefore excluded from subsequent analyses.

4.2.1. Impact of Age on Elderly Disability Levels

Table 2 presents the results of the one-way ANOVA, indicating that age significantly influences the degree of disability ($F = 18.243$, $p < 0.001$). This demonstrates statistically significant differences in disability levels across different age groups.This finding aligns with previous research by Guthrie et al., where advancing age is associated with progressive physiological decline. Deterioration in musculoskeletal, neurological, and sensory organ function progressively limits activities of daily living.In this study, the 60–74 age group constituted 62.4% of participants and exhibited relatively mild disability levels. Conversely, disability grades significantly increased in the 75–89 age cohort and the ≥90 age cohort, suggesting advanced age is a key predictor of disability risk.

Post hoc multiple comparisons (LSD) revealed thatthe disability levels in the 75–89 age group and the 90+ age group were significantly higher than those in the 60–74 age group ($p < 0.001$). However, no statistically significant difference was observed between the 75–89 age group and the 90+ age group ($p > 0.05$), potentially attributable to the small sample size in the 90+ group (n = 11, 3.3%). This finding suggests that 75 years may represent a critical age threshold for a steep increase in disability risk. Age-friendly adaptations should therefore prioritise individuals aged 75 and above, implementing preventive interventions to delay the progression of disability.

Table 2. Results of univariate analysis of variance for age on disability severity

Group	SS	*df*	MS	*F*	*p*
Between groups	14.053	2	7.026	18.243	.000
Within group	127.106	330	.385		
Total	141.159	332			

4.2.2. Influence of Emotional Relationships with Family Members on the Degree of Disability in Older Adults

Table 3 presents the results of a one-way ANOVA, indicating that emotional relationships with family members significantly influence disability levels ($F = 30.888$, $p < 0.001$). This demonstrates that elderly individuals with differing levels of emotional support exhibit significant variations in disability severity. This finding highlights the importance of "quality" within the family support system—compared to structural support such as whether children work locally or can be contacted urgently, the closeness of emotional relationships exerts a more direct protective effect on the functional status of older adults.

Analysing the underlying mechanisms, positive family emotional bonds may influence disability levels through the following pathways: Firstly, emotional support alleviates psychological stress among the elderly, reducing depression and anxiety, with mental health being closely linked to physical functioning;Secondly, harmonious intergenerational relationships encourage older adults to actively express care needs, facilitating timely access to daily assistance. Furthermore, emotional bonds enhance older adults' sense of self-worth and life purpose, motivating sustained participation in daily activities and thereby delaying functional decline. These findings resonate with Tang and Lee's research on social support networks and expectations for ageing in place, confirming the central role of familial emotional support in healthy ageing.

Table 3. Univariate analysis of variance results for emotional relationships with family members and degree of disability

Group	SS	*df*	MS	*F*	*p*
Between groups	31.021	3	10.340	30.888	.000
Within group	110.138	329	.335		
Total	141.159	332			

4.2.3. Impact of Caregiver Presence on Elderly Disability Levels

Levene's test indicated unequal variances between groups (F = 47.351, p < 0.001), suggesting marked heterogeneity in the distribution of disability levels between cared-for and uncared-for cohorts. This may reflect an interaction between care needs and disability severity—elderly individuals with higher disability levels are more likely to receive care arrangements, thereby forming a dichotomy of "high disability-cared for" and "low disability-no care" polarisation. Consequently, this study employed a t-test without assuming equal variances for correction analysis.

Table 4 results indicate that care provision status significantly influences disability levels (t = 4.011, df = 76.967, p < 0.001). Elderly individuals with care support exhibit significantly lower disability levels than those without. This seemingly paradoxical finding (as care is typically assumed for the severely disabled) may reflect care's "health-protective effect" (Li et al., 2022): namely, continuous family care enables timely responses to elderly individuals' needs, preventing secondary functional impairments such as falls, malnutrition, and activity limitations caused by lack of assistance, thereby maintaining their existing functional levels. Furthermore, the presence of a caregiver may also signify earlier identification of health issues, more regular medication management, and more proactive supervision of health behaviours.

However, this finding also highlights potential risks associated with the caregiver burden—while the level of disability among older adults with caregivers in this study was relatively low, caregivers themselves may face multiple challenges including physical and mental exhaustion, social isolation, and financial strain.Therefore, age-friendly adaptations should not only focus on the elderly themselves but also incorporate caregiver support into systematic design. This includes environmental modifications to reduce caregiving burdens (such as installing hoists and handrails to minimise physical exertion) and providing supportive measures like respite services and skills training(Yan et al., 2023).

Table 4. Independent samples t-test results for degree of disability with and without caregivers

		Levene's test for equality of variances		Mean equality t-test		
		F	*p*	*t*	*df*	*p (sig.)*
Disability Level	Assumed equal variance	47.351	.000	5.666	331	.000
	No assumption of equal variance			4.011	76.967	.000

4.3. Linear regression analysis of home safety environment on disability level

Table 5 regression analysis results indicate that the total home safety environment score exhibits a significant negative predictive effect on disability level ($\beta = -0.316$, $p < 0.001$), with the model explaining 10.0% of the variance in disability level ($R^2 = 0.100$). Specifically, a one-point increase in the home safety environment assessment score was associated with an average reduction of 0.040 units in the disability level among older adults, suggesting that improving the home safety environment may help delay the progression of disability.

In terms of effect size, the standardised regression coefficient $\beta = -0.316$ indicates a moderate effect of environmental factors, demonstrating practical significance among univariate predictors (Cohen, 2013). This finding resonates with conclusions from studies using the HOME FAST tool developed by Mackenzie et al., confirming the association between home environmental risks and functional status in older adults. However, the relatively limited explanatory power of environmental factors in this study (10%) suggests that disability levels are also influenced by multiple factors such as age, chronic diseases, cognitive function, and family support. Future research should develop more comprehensive predictive models.

It is noteworthy that this study employed a cross-sectional design. The negative relationship between the environmental composite score and disability level may reflect a bidirectional causal mechanism (Wang et al., 2026): on the one hand, a safe home environment can indeed reduce fall risks, enhance confidence in mobility, and promote functional maintenance; on the other hand, older adults with higher levels of disability may "passively avoid" environmental risks due to mobility limitations, or be unable to improve their living environment due to financial constraints, thereby forming the association of "low disability-high environmental score" and "high disability-low environmental score".

From a practical implementation perspective, the home safety environment assessment scale developed in this study encompasses 40 indicators including lighting, flooring, bathroom handrails, kitchen layout, stair anti-slip measures, furniture arrangement, and emergency call devices. This provides an operational assessment tool for community-based home adaptations for ageing in place. Guided by the "disability-environment" matching principle, it is recommended that bathroom safety modifications (installing grab rails, anti-slip mats, and toilet seats), bedroom emergency call system installations, and kitchen counter height adjustments be prioritised for moderately to severely disabled elderly individuals. For those with mild disability, emphasis should be placed on lighting improvements, floor levelling, and the introduction of smart assistive devices, thereby achieving tiered and categorised precision modifications.

Table 5. Linear regression analysis results of home safety environment on disability level

Model	Unstandardised Coefficient		Standardised Coefficient	*t*	*p*
	B	SE	Beta		
(Constant)	2.487	.200		12.463	.000
Home safety	-0.040	.007	-0.316	-6.064	.000

Note: The dependent variable is disability level; R^2= 0.100; adjusted R^2= 0.097.

5. Discussion

5.1. Multifaceted Mechanism Analysis of Factors Influencing Disability Severity

This study systematically examined the influence of age, family emotional relationships, presence of caregivers, and home safety environment on the degree of disability among community-dwelling older adults through univariate analysis and linear regression analysis. The findings revealed a multidimensional determinants mechanism for disability levels, providing empirical evidence for understanding the "person-environment-support" interaction.

Age emerged as the strongest predictor in this study, with its significant influence ($F = 18.243$, $p < 0.001$) aligning with the objective patterns of physiological ageing. Notably, this study identified 75 years as a critical threshold for a steep increase in disability risk, aligning with Liu Ying et al.'s findings on regional disparities in disability among middle-aged and elderly individuals across eastern, central, and western China. That research indicated advanced age as the core driver of rising disability rates, alongside significant regional heterogeneity. Within this study's sample, 73.7% resided in rural areas and 54.6% lived in staircase dwellings. This residential configuration, compounded by advanced age, further amplified the impact of environmental barriers on functional limitations. Consequently, age-friendly adaptations should establish an age-stratified mechanism, implementing preventive and proactive environmental interventions for individuals aged 75 and above to delay the progression of disability.

The significant impact of familial emotional relationships on disability severity ($F = 30.888$, $p < 0.001$) reveals the core characteristic of "quality over quantity" within family support systems. In this study, older adults with harmonious emotional ties to family members exhibited significantly lower disability levels, whereas structural factors such as whether children worked locally or whether family could be contacted in emergencies showed no significant effect.This finding aligns with Tang and Lee's research on social support networks and expectations for ageing in place, which confirmed significant correlations between children's residential proximity, family support resources, and elderly individuals' choice to remain at home. However, this study further demonstrates that the quality of emotional relationships exerts a stronger functional protective effect than geographical proximity. Regarding the mechanism of action, positive family emotional relationships may influence functional status through three pathways: psychological buffering (alleviating depression and anxiety), behavioural motivation (enhancing activity participation), and care responsiveness (timely access to assistance). These findings hold significant implications for long-term care insurance assessment systems: the current three-dimensional assessment framework , primarily focusing on activities of daily living, cognitive abilities, and sensory-perceptual and communication capacities, should incorporate a socio-emotional dimension to comprehensively identify older adults' genuine care needs.

Analysis distinguishing between those with and without caregivers revealed the double-edged sword effect of care support. Levene's test indicated significant variance heteroscedasticity between groups ($F = 47.351$, $p < 0.001$), suggesting a dichotomy of "high dependency with caregivers" versus "low dependency without caregivers". Corrected t-tests revealed that older adults with caregivers exhibited significantly lower levels of disability ($t = 4.011$, $p < 0.001$), reflecting caregiving's "health-protective effect": sustained family care prevents secondary functional decline and maintains existing functional levels.However, this finding also signals potential risks associated with caregiver burden. Research by Zhang Sisi et al. on the knowledge and skill requirements of family caregivers for disabled elderly individuals indicates that caregivers face multiple challenges, including inadequate knowledge and skills, significant psychological pressure, and insufficient social support. Therefore, age-friendly modifications must adopt a dual-centred perspective focusing on both the elderly and their caregivers. This involves installing facilities such as hoists and handrails to reduce physical strain on caregivers, complemented by supportive measures including care skills training and respite services. Such an approach achieves the social impact of modifying one person's environment while liberating an entire family.

The significant negative predictive effect of home safety environments on disability levels ($\beta = -0.316$, $p < 0.001$) confirms the importance of environmental interventions. However, the explanatory power of $R^2 = 0.100$ indicates the limitations of relying solely on environmental factors. This finding resonates with research on the HOME FAST tool developed by Mackenzie et al., which demonstrated that targeted modifications following environmental risk assessments effectively reduce elderly fall risks. Nevertheless, the home safety environment assessment scale developed in this study, encompassing 40 indicators, proved more comprehensive than HOME FAST's 25 checkpoints yet still failed to fully account for disability variance. This underscores that disability represents a complex outcome intertwining multiple factors including age, disease, cognition, environment, and support. Guthrie et al.'s study based on Canadian interRAI data indicates that multidimensional integrated assessment combining cognitive impairment with sensory impairment significantly outperforms single ADL assessment in predicting functional impairment. This suggests future development of comprehensive predictive models integrating physical function, cognitive status, sensory perception, environmental characteristics, and family support.

5.2. Research Limitations

5.2.1. Sample Limitations

The study sample primarily comprised community-dwelling older adults from Zhejiang Province (91.0%) and Anhui Province (7.5%), with geographical distribution concentrated in eastern regions. Samples from central, western, and northeastern regions were absent. Given China's vast territory, significant regional variations exist in economic development levels, residential environment characteristics, and elderly care cultural practices. For instance, the study did not account for northern regions' central heating requirements or southwestern regions' mountainous housing features.Furthermore, 73.7% of the sample held rural household registrations. While this aligns with the current reality of higher rural ageing rates than in urban areas, the urban-rural imbalance may lead to an underestimation of urban age-friendly renovation needs. Future research should expand the sampling scope, employing stratified random sampling to include samples from more provinces and regions with varying levels of economic development, thereby enhancing the generalisability of the findings.

5.2.2. Limitations of Data Collection Method

Data collection utilised an online questionnaire format, which, while enhancing efficiency, carries significant risks of selection bias. Elderly individuals capable of completing questionnaires via smartphones or computers typically possess higher educational attainment, better cognitive function, and more proactive health awareness. Conversely, those with lower education levels, cognitive decline, or mobility issues may be systematically excluded. The high proportion of participants with intact cognitive abilities (16 points) in this study may relate to this selection mechanism. Furthermore, electronic questionnaires preclude on-site environmental observation, leaving assessments of home safety environments reliant on self-reports from older adults. This introduces potential recall bias and social desirability bias (e.g., overestimating home safety). Future research should adopt a blended "online + offline" approach, conducting in-person home visits for older adults unable to use electronic devices and incorporating on-site environmental observations to enhance data authenticity and reliability.

6. Conclusion

This study, grounded in the national "Long-Term Care Disability Grading Assessment Standard (Trial)", constructed a "Disability Level-Family Support-Home Environment" three-dimensional assessment framework. A survey of 335 community-dwelling elderly individuals regarding their needs for age-friendly home modifications revealed that disability levels are influenced by multiple factors including age, family emotional relationships, presence of caregivers, and home safety environment. Key findings include: 75 years being a critical threshold for disability risk; family emotional support being superior to structural support;

caregivers exhibiting a "health protection effect";Each 1-point improvement in home environment reduces dependency level by 0.040 units, confirming significant "person-environment-support" interactions. Single-dimensional assessments prove inadequate for comprehensively identifying care needs. A five-dimensional integrated assessment mechanism must be established. This informs categorised renovation strategies: prioritising foundational safety for moderately to severely dependent individuals, focusing on functional convenience for mildly dependent individuals. Policy recommendations include incorporating the socio-emotional dimension into long-term care insurance assessments and adopting a dual-centred perspective for both elderly individuals and caregivers. These findings provide graded classification standards for the Implementation Plan for Home-Based Age-Friendly Renovations under the 14th Five-Year Plan, offering practical value for achieving the strategic objectives of the "9073" elderly care service system. Future research should expand sample sizes and employ prospective designs to validate the causal effects of environmental interventions.Implementation Plan for Age-Friendly Home Adaptations," offering practical value for achieving the strategic goal of the "9073" elderly care service system. Future research should expand sample sizes and employ prospective designs to validate the causal effects of environmental interventions.

Author Contributions:

Luyao Pan contributed to the conceptualization, methodology, and data analysis of the study. Wanting Lin provided guidance on theoretical framing and critical revisions of the manuscript. Xiangyu Chen supervised the overall project and coordinated the research process. All authors have read and agreed to the published version of the manuscript.

Funding:

This research received external funding .This research was funded by the project AI-powered Elderly Care Resource Optimization and New Model of Community Collaboration， grant number S202510343084and the project Elderly Care Intelligent Control –A New AI-Enabled Community Elderly Care Resource Regulation Solution， grant number 2025R413A058. The APC was funded by Zhejiang Province Undergraduate Student Innovation and Technology Activity Programme.

Institutional Review Board Statement:

Not applicable.

Informed Consent Statement:

Not applicable.

Data Availability Statement:

Not applicable.

Acknowledgments:

The authors would like to express their sincere gratitude to the funding agency for its financial support, to all colleagues and partner institutions for their valuable guidance and assistance throughout this study, and to the editors for their thoughtful comments and professional handling of the manuscript.

Conflicts of Interest:

The authors declare no conflict of interest.

References

Chen, K. J., Liu, B. Y., & Wang, Y. Y. (2019). Research on Diversified Measures for Healthy Ageing and Chronic Disease Management. Chinese Journal of Integrative Medicine, 39(5), 529-533.

Chen, W., & Liu, J. (2023). Innovation and Practice of the "Internet Plus Elderly Care" Service Model. Chinese Journal of Gerontology, 43(8), 1987-1990.

Cohen, J. (2013). Statistical power analysis for the behavioral sciences. routledge.

Commission, N. H. (2021). China's elderly care model exhibits a "90-7-3" pattern: 90% home-based care, 7% community-based care, 3% institutional care. Retrieved 2026-02-14.

Dikken, J., van den Hoven, R. F., van Staalduinen, W. H., et al. (2020). How older people experience the age-friendliness of their city: Development of the age-friendly cities and communities questionnaire. International Journal of Environmental Research and Public Health, 17(18), 6867.

Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). “Mini-mental state”: a practical method for grading the cognitive state of patients for the clinician. Journal of psychiatric research, 12(3), 189-198.

Garner, I. W., & Holland, C. A. (2020). Age-friendliness of living environments from the older person’s viewpoint: Development of the Age-Friendly Environment Assessment Tool. Age and Ageing, 49(2), 193-198.

Guthrie, D. M., Davidson, J. G., Williams, N., et al. (2018). Combined impairments in vision, hearing and cognition are associated with greater levels of functional and communication difficulties than cognitive impairment alone: Analysis of interRAI data for home care and long-term care recipients in Ontario. PLoS One, 13(2), e0192971.

Heine, C., & Browning, C. J. (2002). Communication and psychosocial consequences of sensory loss in older adults: overview and rehabilitation directions. Disability and rehabilitation, 24(15), 763-773.

Li, L., Zhang, J., & Wang, Y. L. (2022). Application of a multidisciplinary collaborative care model among elderly patients with chronic diseases. Journal of Nursing Science, 37(15), 85-88.

Liu, Y., Jiang, J. C., & Jing, H. Q. (2024). Regional Differences in Disability Among Middle-Aged and Elderly Individuals and Their Influencing Factors in Eastern, Central, and Western China. Chinese General Practice, 27(7), 877-885+892.

Ma, C., Guerra-Santin, O., & Mohammadi, M. (2022). Smart home modification design strategies for ageing in place: a systematic review. Journal of Housing and the Built Environment, 37(2), 625-651.

Mackenzie, L., Byles, J., & D'Este, C. (2009). Longitudinal study of the Home Falls and Accidents Screening Tool in identifying older people at increased risk of falls. Australasian journal on ageing, 28(2), 64-69.

Mahoney, F., & Barthel, D. (1965). Functional assessment: the Barthel Index. Maryland State Medical Journal, 14, 56-61.

Tang, F., & Lee, Y. (2011). Social Support Networks and Expectations for Aging in Place and Moving. Research on Aging, 33(4), 444-464.

Wang, S., Liu, Y., & Yang, Y. (2026). Perceived quality of home-and community-based services and urban-rural disparities in aging-in-place intentions: evidence from Chinese older adults. BMC geriatrics, 26, 125.

Wang, M. (2019). Research on the Construction of a New Era Elderly Care Service System. People's Publishing House.

Xi, H., Ren, X., & Zhai, S. G. (2014). Smart Ageing Care: Innovating Elderly Services through Information Technology. Research on Ageing Science, 7(9),1-8.

Xu, F. L., & Wang, M. Y. (2019). Comparative Analysis and Development Trends of Smart Elderly Care at Home and Abroad. Labour Security World, 27(2), 32-39.

Yan, P., Wang, J. F., & Chen, Z. (2023). Current Status and Implications of Smart Elderly Care Development Abroad. Research on Intelligent Society, 2(4), 1-18.

Yang, Q., & Song, Z. H. (2025). Current Status of Age-Friendly Home Modifications for Community-Dwelling Elderly with Disabilities. Nursing Research, 39(2), 231-236.

Zhang, S. S., He, Y. H., Wu, L. D., Xiao, X. L., Feng, Y. B., & Zhong, Y. (2024). Constructing a Care Knowledge and Skills Needs Scale for Family caregivers of Disabled Elderly Individuals Using the Delphi Method. Nursing Research, 38(2), 211-216.

Zhou, J., & Walker, A. (2021). The impact of community care services on the preference for ageing in place in urban China. Health & Social Care in the Community, 29(4), 1041-1050.

The Development of Humanities and Social Sciences, 2026, 2(1), 87-100
https://doi.org/10.71204/vs0xng32

The Role of Artificial Intelligence Applications in Enhancing Healthcare Professionals' Performance in the Context of "Internet Plus Healthcare"

Yingnuo Qi [1,*]

[1] School of medical humanities and hospital management, Wenzhou Medical University, WenZhou 325000, China

[*]**Corresponding Author**
Yingnuo Qi

675477963@qq.com

Received: 6 February 2025 / Accepted: 10 March 2026 / Published online: 12 March 2026

Abstract

Against the backdrop of the deepening national strategy of "Internet Plus Healthcare," artificial intelligence technology is reshaping healthcare service models. As core users of AI, healthcare professionals' job performance has become a critical issue requiring urgent exploration. Existing research primarily focuses on AI's improvement of patient treatment outcomes, while the impact on healthcare professionals' performance lacks systematic analysis. This study constructs a conceptual framework integrating multiple pathways linking AI understanding and trust, Job performance, and Presenteeism, grounded in the Technology Acceptance Model, Social Technological Systems Theory, and Resource Conservation Theory. The findings indicate that AI' s performance-enhancing effects on healthcare workers are conditional and complex, requiring cognitive empowerment as a prerequisite, workflow optimization as a vehicle, and physical and mental health safeguards as a foundation. This research provides theoretical grounding and practical guidance for human resource management in the era of smart healthcare.

Keywords: Artificial Intelligence; Healthcare Workers; Job Performance; Internet Plus Healthcare; Presenteeism

1. Introduction

With the deepening implementation of the "Healthy China 2030" Plan Outline and the continuous advancement of the Digital China strategy, "Internet Plus Healthcare" has become a key driver for development in China's healthcare sector. As the pivotal technology spearheading this transformation, artificial intelligence is being increasingly applied in medical imaging recognition, clinical decision support, and intelligent health management. Driven by policy, AI technology is transitioning from pilot exploration to large-scale implementation. By the end of

2024, over 500 tertiary hospitals nationwide had deployed AI-assisted diagnosis systems, covering more than 20 clinical specialties,including cardiology,oncology,and ophthalmology (China Digital Healthcare Development Report, 2024).

However, technological proliferation has not automatically translated into improved job performance among healthcare workers. The WHO’s Global Strategy on Digital Health (2020-2025) notes that introducing digital technologies may alter the nature of healthcare workers’ tasks. Without scientifically designed human-machine collaboration protocols, such technologies may instead increase cognitive load and risk occupational burnout (World Health Organization, 2021). Similar challenges have emerged in domestic hospital practices: After implementing the DeepSeek large model, Wenzhou Medical University First Affiliated Hospital saw significant improvements in imaging report efficiency. However, initial resistance from medical staff resulted in an adoption rate of less than 60% (Wenzhou Municipal Health Commission, 2024). An evaluation report on 289 AI application cases in Guangdong Province revealed that departments with low technical comprehension achieved only one-third of the performance improvement seen in departments with high comprehension (Southern Network, 2024).

These phenomena reveal a core issue: the effectiveness of AI technology heavily depends on the medical staff’s understanding, trust, and ability to effectively integrate the technology. Based on this, this study constructs an integration model of AI application influencing medical staff performance within the “Internet Plus Healthcare” context. It analyzes the moderating role of cognitive factors and the mediating role of physical and mental health factors, providing policy insights to address the challenge of “technology application—performance improvement.”

2. Current State of Research

2.1. International Research Progress

International research on AI applications in healthcare has developed into a relatively comprehensive system. Regarding technical efficacy, Esteva et al. (2017) demonstrated in their natural study that deep learning algorithms achieve diagnostic accuracy comparable to dermatologists in skin cancer classification tasks, rather than replacing physicians.

Regarding healthcare worker job performance, the Individual Job Performance Questionnaire (IJPQ) developed by Koopmans et al. (2014) has become a mainstream measurement tool. It categorizes performance into three major modules: task performance, situational performance, and counterproductive behaviors, providing a standardized framework for subsequent research.

Regarding cognitive mediation effects, Davis’s (1989) Technology Acceptance Model (TAM) revealed the decisive role of perceived usefulness and perceived ease of use in technology adoption.

2.2. Current State of Domestic Research

Domestic research exhibits a pattern of “policy-driven, practice-first” development. A series of reports by the Health Development Research Center of the National Health Commission traced the evolution of AI healthcare policies from 2018 to 2014, noting that China has established a comprehensive policy chain encompassing "central top-level design — local pilot implementation—industry standardization" (Health Development Research Center of the National Health Commission, 2023). Notably, the "Opinions on Further Improving the Healthcare Service System" (2023) first incorporated AI-assisted diagnosis as a core indicator for capacity building in primary healthcare institutions.

The Wenzhou practice offers a typical example. Data from the Wenzhou Health Information Center indicates that since the launch of the "Health Cloud Screening" project in July 2023, the AI-assisted diagnosis platform has been integrated into 739 public medical institutions across the city. It has completed nearly 7 million impact analyses, reducing the average time to issue impact reports from 30 minutes to 5 minutes (Wenzhou Municipal People's Government, 2024). An evaluation report by Hu et al. (2024) indicates that after connecting to the MaaS platform, primary healthcare institutions saw a 12.3% increase in diagnostic accuracy. However, healthcare workers'job satisfaction exhibited a U-shaped trajectory—initially declining due to unfamiliarity with the technology, then significantly rebounding as proficiency grew.

Perception studies among medical staff reveal complexity. Liu (2023) surveyed 15 tertiary hospitals in Beijing, finding that while 78.6% of physicians acknowledged AI improved diagnostic efficiency, 63.2% expressed concern that overreliance could lead to clinical reasoning deterioration.

2.3. Research Review and Entry Points

Synthesizing existing literature, this study identifies three key gaps: First, while foreign research offers mature theoretical frameworks, most studies are grounded in market-driven healthcare systems, limiting their explanatory power for China's policy-driven model. Second, domestic research emphasizes macro-policy drivers and tends to focus on AI's technical efficacy, neglecting humanistic impacts — particularly long-term tracking of AI's effects on healthcare workers'physical and mental health. Third, integrated research on moderating and mediating mechanisms remains largely unexplored.

This study constructs an integrated "technology-cognition-performance-health" model within the institutional context of "Internet Plus Healthcare," focusing on:

(1) How AI understanding and trust moderate the conversion of technological efficacy;

(2) How Presenteeism mediates the relationship between AI application and performance;

(3) How policy contexts shape these causal pathways.

This framework responds to international calls for humanistic care in digital health while aligning with China's "new quality productive forces" development strategy, which emphasizes "revolutionary technological breakthroughs and innovative allocation of production factors" (Xi Jinping, 2024).

3. Theoretical Foundation

3.1. Technology Acceptance Model (TAM)

The TAM model proposed by Davis (1989) provides the cognitive foundation for this study. This model posits that users' acceptance of information technology is determined by perceived usefulness and perceived ease of use, which in turn influence attitudes toward use and behavioral intentions. In the medical AI context, "perceived usefulness"manifests as whether medical personnel believe AI can enhance diagnostic accuracy and reduce work time; "perceived ease of use" reflects the simplicity of the system's interface and the level of learning required.

This study extends TAM to include two dimensions: AI understanding and AI trust. Understanding emphasizes the depth of cognitive insight into algorithmic logic, while trust focuses on recognition of technological reliability. This extension aligns with healthcare's high-risk characteristics—merely ease of use is insufficient to drive medical adoption of AI technology; trust grounded in deep understanding is crucial.

3.2. Socio-Technical Systems Theory

This theory emphasizes bidirectional interaction between technical and social systems, positing that optimal performance arises from synergistic optimization rather than isolated technological advancement (Trist & Bamforth, 1951). Medical AI applications disrupt traditional socio-technical equilibrium in clinical practice. While technical systems introduce automated decision-making, social systems must adapt role divisions, accountability frameworks, and communication patterns. The World Health Organization (2021) states that AI healthcare applications must adhere to a "human-centered"principle, ensuring technological design aligns with healthcare professionals' practical needs.

This study operationalizes the theory as a mediating effect on job performance—AI enhances overall performance by optimizing workflows and promoting team collaboration. However, delayed adjustments in the social system may trigger role conflicts and foster counterproductive behaviors.

3.3. Conservation of Resources Theory (COR)

COR posits that individuals possess motivations to conserve and acquire resources, with resource depletion leading to work stress and burnout (Hobfoll, 1989). AI applications exert a double-edged impact on healthcare workers: while AI can replace repetitive tasks and conserve cognitive resources, system learning and algorithmic monitoring may introduce new time pressures and psychological burdens. Presenteeism is a classic manifestation of resource depletion. It refers to reduced work efficiency due to health issues without actual absence.

This study introduces COR theory to explain how AI indirectly impacts job performance through Presenteeism: when AI applications increase resource consumption, healthcare workers' Presenteeism due to working while ill intensifies, leading to declining rather than improving performance. This perspective addresses the limitation of traditional research focusing solely on usage.

3.4. Job Performance Theory

Koopmans et al. (2014) structured job performance into three dimensions: task performance, situational performance, and counterproductive behavior. Task performance measures the quality and efficiency of core medical duties; situational performance encompasses peripheral behaviors like assisting colleagues and maintaining team cohesion; counterproductive behavior includes violations and passive resistance. AI applications impact these dimensions differently. For instance, imaging AI directly enhances task performance but has a limited effect on context performance—which requires interpersonal interaction—and may even trigger counterproductive behaviors if poorly designed.

This study employs overall performance as a composite metric, reflecting both technological efficacy and its socio-psychological side effects.

4. Research Model and Theoretical Proposition

Based on the aforementioned theories, this study constructs an integrated model (as shown in Figure 1). This model integrates four theoretical pillars with policy scenario elements to form a four-pathway integrated framework. Its construction follows a nested logic of "macro-level context—meso-level behavior—micro-level cognition," with each element undergoing a three-stage validation process: theoretical deduction—policy verification—practical alignment.

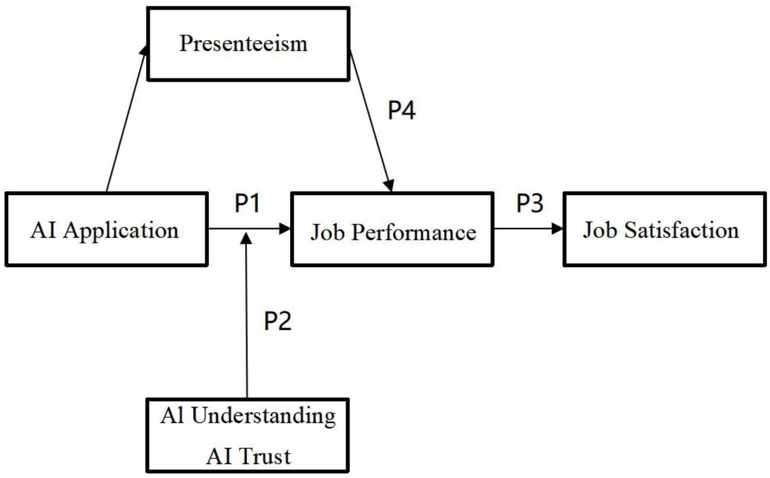

Figure 1. Research Model Framework Diagram

4.1. Theoretical Derivation of Primary Effect Pathways

AI application enhances healthcare professionals' performance through task automation and decision support. Task automation aligns with the Pareto improvement principle by delegating repetitive physician tasks to AI, thereby freeing resources for higher-value workflows. Specifically, AI automates functions such as image analysis, intelligent pre-consultation, and treatment recommendation to reduce repetitive workloads, improve decision accuracy, and directly optimize task performance. Simultaneously, time freed by AI can be redirected toward patient communication and continuing education, indirectly improving situational performance.

The Reference Guidelines for AI Application Scenarios in the Healthcare Industry prioritize intelligent medical imaging diagnosis as its primary application, explicitly targeting efficient and precise imaging-assisted diagnosis (National Health Commission, 2024). Practical data from Wenzhou indicate that AI has increased imaging report efficiency by 80% and improved diagnostic accuracy by 12.3% (Wenzhou Municipal People's Government, 2024). This supports the main effect direction from both policy and practical perspectives.

Simultaneously, this effect follows the diminishing returns law of technological maturity. According to Brynjolfsson's S-curve theory, AI applications experience learning costs during the initial phase (0–6 months), potentially showing short-term performance declines; enter a rapid growth phase during maturity (6–18 months); and exhibit diminishing marginal returns in the stabilization phase (after 18 months) (Brynjolfsson & McElheran, 2016). Based on this, the theoretical proposition is put forward:

P1: Artificial intelligence applications exert a positive impact on healthcare professionals' job performance.

4.2. Theoretical Derivation of the Cognitive Moderation Pathway

Main Effects of AI Understanding and AI Trust Regulation. While traditional TAM models simplify cognition to subjective perception, this study proposes — based on Dual-Process Theory — that physicians' understanding of AI involves both System 2 processing (slow, understanding-based) and System 1 processing (fast, intuition-based). Only when healthcare professionals deeply comprehend AI decision logic and establish trust are they more likely to proactively adopt and integrate AI recommendations, leading to more significant performance improvements. Conversely, performance gains are constrained if understanding is lacking and execution is merely passive, or if excessive trust leads to blind reliance.

This pathway also aligns with Qualitative Comparative Analysis (QCA) logic: understanding and trust are dual necessary conditions. Low understanding + high trust = blind reliance, where physicians may overlook obvious AI errors; high understanding + low trust = excessive defensiveness, where physicians reject reasonable AI suggestions; only the dual-high state enables critical adoption—leveraging AI advantages while maintaining clinical decision-making authority.

The Guiding Principles for Classifying Medical AI Software Products (2021) mandate that decision-support AI must provide rationale explanations, effectively enforcing regulatory-level enhancement of AI comprehension (National Medical Products Administration, 2021). The Opinions on Further Improving the Healthcare Service System propose leveraging information technology while emphasizing enhanced personnel training, reflecting a policy intent that prioritizes both technology and cognition (State Council General Office, 2023). Based on this, we propose:

P2: Healthcare professionals' understanding and trust in AI positively mediate the relationship between AI application and job performance, meaning higher levels of understanding and trust yield stronger positive impacts of AI on performance.

4.3. Theoretical Derivation of the Performance Mediating Pathway

Job performance mediates the relationship between AI application and job satisfaction. According to Self-Determination Theory, job performance influences job satisfaction through two factors: competence fulfillment and autonomy maintenance. If AI enhances performance, physicians gain a sense of competence, thereby increasing satisfaction. However, if AI dominates decision-making, reducing physicians to AI operators and diminishing their sense of autonomy, job satisfaction may decline.

Social-technical systems theory indicates that technological efficacy must be transformed into long-term attitudes through socio-psychological experiences. If AI applications genuinely enhance performance, medical personnel gain a sense of accomplishment and professional value, thereby increasing job satisfaction. However, if AI leads to role ambiguity or skill devaluation, satisfaction may decline even with short-term performance gains. Performance serves as the critical bridge connecting objective technological efficacy and subjective work experiences.

The National Administration of Traditional Chinese Medicine's Operational Manual for Performance Evaluation of Tertiary Public Traditional Chinese Medicine Hospitals (2024 Edition) incorporates healthcare worker satisfaction as a performance metric, reflecting the policy logic linking performance and job satisfaction. Based on this, we propose:

P3: Job performance mediates the relationship between artificial intelligence application and healthcare workers' job satisfaction.

4.4. Theoretical Derivation of Health Depletion Pathways

Presenteeism exerts a negative mediating effect between AI application and job performance. Based on the Loss Spiral principle from COR theory, if AI applications increase cognitive load, monitoring pressure, or trigger technological anxiety without timely compensation, they will deplete healthcare workers' physical and mental resources. This exacerbates Presenteeism, thereby undermining job performance. Presenteeism serves as a behavioral signal of resource depletion — where clinicians remain present but exhibit insufficient cognitive resources. This manifests as repeated verification of AI outputs, decision hesitation, and diminished communication efficiency. This application reveals latent risks in AI deployment.

To refine the theoretical framework of depletion mechanisms, this study proposes a three-stage depletion hypothesis:

Stage 1 depletion occurs during the technical learning phase (1 – 3 months), primarily consuming energy resources and disrupting healthcare workers' self-time management; Second-level depletion occurs during the adaptation conflict phase (3–12 months), primarily consuming psychological resources and affecting healthcare workers' psychological and interpersonal dimensions; Third-level depletion emerges in the deep integration phase (after 12 months). If AI continues to iterate, healthcare workers face lifelong learning pressures, impairing their output demand dimension.

However, this negative mediating effect is conditional—not all AI applications lead to health depletion. When technology design is user-centered, organizational support is robust, and individual agency is strong, the Gain Spiral of COR is activated. AI then conserves resources by reducing repetitive tasks, leading to decreased absenteeism.

The "Opinions on Further Improving the Healthcare Service System" specifically emphasizes strengthening the sharing, exchange, and security framework for health big data after enhancing service accessibility, implying a dual focus on data security and personnel protection (State Council General Office, 2023). The "Guidelines for Pricing Items like Radiological Examinations"prohibit duplicate billing, which protects patients but deprives hospitals of funds to compensate physicians for additional workloads, indirectly exacerbating resource depletion (National Healthcare Security Administration, 2023). Based on this, we propose:

P4: Presenteeism mediates negatively between AI application and healthcare workers' performance, meaning AI adoption may reduce performance by increasing Presenteeism.

The model integration logic is as follows. Four pathways form a complete "technology-cognition-behavior-psychology"chain. P1 represents the direct effect of technological empowerment; P2 reveals how cognitive factors amplify or suppress technological effects; P3 and P4, respectively, demonstrate performance's dual-edged role—both an output of technological efficacy and a precursor to satisfaction; influenced by health status while also impacting health resource depletion. This model incorporates health depletion variables into the AI performance research framework, aligning with the World Health Organization's advocacy for humanistic care in digital health.

5. Model Rationality Analysis

5.1. Theoretical Self-Consistency Argument

5.1.1. Balanced Bidirectional Effects

The primary positive empowerment effect P1 and the negative counteracting health impairment effect P4 create tension. This model avoids simplistic linear judgments, instead revealing a dynamic equilibrium where the net effect = empowerment effect−impairment effect. This aligns with dialectical logic and reflects the complexity of AI application practices. The coexistence of gain spirals and loss spirals in COR theory provides the theoretical foundation for this equilibrium.

5.1.2. Threshold Regulation as Gatekeeper

P2, as a moderator, functions as a "transformation threshold." It explains why identical AI systems yield vastly different outcomes across departments and hospitals—not due to inferior AI technology, but inadequate AI understanding and trust. This design centers individual agency, avoiding technological determinism.

5.1.3. The Pivotal Role of Performance Perception

P3 treats performance as both a dependent and an independent variable, embodying the bidirectional adaptation principle of socio-technical systems theory. Performance is not merely an objective output but a subjectively constructed meaning. Physicians evaluate AI value through performance assessments, thereby determining the depth of subsequent adoption. This forms a feedback loop: “AI application → performance perception → attitude adjustment → subsequent application.”

5.1.4. The Indispensable Role of Health Variables

Most AI studies overlook the health dimension, yet the WHO Global Strategy on Digital Health explicitly warns that technology may increase burden (World Health Organization, 2021). This model addresses this theoretical gap by incorporating Presenteeism as a core mediator, embodying a “people-centered” value orientation.

5.2. Discussion on Practical Applicability

The following discusses the applicable scenarios for this model.

Policy-Driven Adoption: The model is particularly suited to explain China’s top-down promotion model from top-level design to grassroots implementation, where the cognitive adjustment variable can be understood as the last mile in policy execution.

Period of Rapid Technological Iteration: Resource depletion in COR theory is especially pronounced in scenarios with frequent AI model updates. This model can predict performance fluctuations across different stages. Primary Healthcare Capacity Enhancement Projects: This model strongly explains cloud-sharing platforms like Wenzhou’s MaaS platform, where primary care physicians’ comprehension and trust serve as critical success factors.

The following discusses scenarios where this model may not apply.

Fully voluntary adoption: If physicians have complete autonomy over AI usage, P2’s moderating effect may diminish, with main effects becoming more direct.

Highly mature and stable technology: When AI achieves extremely high accuracy and becomes an industry standard, the P4 health depletion pathway may disappear.

Non-clinical roles: Designed for medical personnel, the model requires variable adjustments for applicability to administrative, logistical, or other non-clinical positions.

6. Model-Based Policy Implications

6.1. Cognitive Empowerment Policies

Establish mandatory standards for medical AI explainability. Drawing from the EU AI Act’s requirement for high-risk AI systems to be explainable, it is recommended that China revise policies defining medical AI product classifications. Mandate that AI-assisted diagnostic tools provide decision heatmaps or feature weight maps.

Incorporate AI literacy into the credit system for physician standardized training. The National Health Commission should add a mandatory module on medical AI collaboration to the “Content and Standards for Resident Standardized Training,” with corresponding assessments.

6.2. Performance Incentive Policies

Optimize AI collaboration metrics in performance evaluations. The state should revise the "Public Hospital Performance Evaluation Manual" to introduce an AI performance bonus under personnel expenditure indicators. Hospitals must allocate a fixed proportion of efficiency gains from AI directly to frontline physicians as rewards. This prevents hospitals from monopolizing technological dividends while physicians experience a lack of gain.

Establish a performance-satisfaction linkage monitoring system for AI applications. Require tertiary hospitals to publish quarterly reports on digital healthcare humanities, concurrently tracking four metrics: AI utilization rate, performance improvement rate, medical staff satisfaction, and SPS-6 Presenteeism scores. When performance improves but satisfaction declines, initiate specialized assessments on technological humanism to investigate issues such as excessive AI monitoring or overburdening training.

6.3. Health Protection Policies

Establish occupational health risk assessment systems for AI applications. In accordance with the Occupational Disease Prevention and Control Law, the National Health Commission should issue guidelines on occupational health protection for medical AI use. Hospitals must conduct SPS-6 Presenteeism surveys before deploying AI to identify high-risk individuals and provide humanistic care measures.

Establish mental health leave for AI users. Drawing from innovation leave models in high-tech enterprises, hospitals should grant monthly mental health leave to clinicians using AI for over 4 hours daily. This time may be allocated for technical learning, stress management, or simple rest, directly compensating for resource depletion as outlined in COR theory.

7. Conclusions and Contributions

7.1. Core Findings

The impact of AI applications on healthcare workers' performance represents a dynamic equilibrium between empowerment and attrition. The main effect P1 indicates the objective existence of technological dividends, yet P4 reveals that health attrition may offset some gains. This implies that net technological benefits = objective empowerment - subjective attrition, necessitating dual-pronged policy interventions.

Cognitive factors act as gatekeepers for translating technological efficacy. Understanding and trust are not supplementary but essential conditions. This overturns the simplistic notion that technological advancement equals performance improvement, establishing cognitive precedence as a theoretical foundation.

Performance perception serves as the pivotal link between objective technology and subjective attitudes. P3's mediating effect indicates that AI enhances satisfaction both through performance improvement and by directly influencing satisfaction. This suggests managers must ensure clinicians perceive both performance gains and technological respect alongside professional autonomy.

Health attrition represents the hidden cost of AI adoption. P4 translates WHO's macro-level warnings into measurable mediating variables, transforming humanistic care from a technological slogan into an actionable, assessable management metric.

7.2. Theoretical Contributions

Establishes an integrated "technology-cognition-performance-health" framework that synthesizes classic theories (TAM, socio-technical systems, COR) while contextualizing them for medical AI settings.

Introduces Presenteeism into technology performance research, expanding occupational health psychology's scope. While traditional research focuses on absence rates, this model reveals that on-duty inefficiency impacts AI performance conversion more significantly than absence, offering new directions for employee health management.

Theoretical refinement based on policy-driven practices contributes a Chinese sample to localized digital health research. China's policy model of "top-level design—local innovation—grassroots implementation" contrasts sharply with Western market-driven approaches, and this model captures this institutional uniqueness.

7.3. Model Limitations and Pathways for Further Validation

As a theoretical construct, this model candidly acknowledges the following limitations:

Boundary conditions remain inadequately defined. Factors such as the differential impact of AI types, the moderating role of hospital IT infrastructure levels, and the contingency effects of departmental cultural characteristics require validation through qualitative comparative analysis or stratified regression in subsequent studies.

Insufficient dynamic evolution. The model employs a static cross-sectional framework, failing to depict performance curve changes at 1, 3, or 5 years post-AI implementation. Longitudinal tracking studies could analyze performance trajectories over time.

Given these limitations, subsequent field research in hospitals could provide robust validation. For instance, selecting multiple hospitals of varying tiers across different cities for an 18-month tracking study—collecting data every six months—could validate the S-curve effect.

The ultimate vision of this research is to advance the development of a human-centered smart healthcare theory. Technology should not serve as a substitute or monitor for physicians, but rather as a collaborator and enabler. This necessitates sustained theoretical attention to human-centered technology design, institutional humanistic care, and the protection of physicians' professional autonomy. Only through such approaches can "Internet Plus Healthcare" truly achieve the unity of technological revolution and humanistic care, thereby fulfilling the proposition that new-quality productive forces "are driven by innovation and are essentially advanced productive forces" (Xi, 2024).

Author Contributions:

Conceptualization, methodology,formal analysis, resources, data curation, writing—original draft preparation,writing—review and editing,,supervision, project administration:Yingnuo Qi. All authors have read and agreed to the published version of the manuscript.

Funding:

This research received no external funding.

Institutional Review Board Statement:

Not applicable.

Informed Consent Statement:

The study did not involve humans.

Data Availability Statement:

Not applicable.

Acknowledgments:

I would like to express sincere gratitude to the supervisor for their invaluable guidance and insightful suggestions throughout the research. Special thanks are also extended to the university for providing a favorable academic platform and research resources. It is hoped that the findings of this study can serve as a modest reference for relevant research and practice, and further in-depth exploration will be carried out in subsequent work.

Conflict of Interest:

The author declare no conflict of interest.

References

Brayfield, A. H., & Rothe, H. F. (1951). An index of job satisfaction. Journal of Applied Psychology, 35(5), 307–311.

Brynjolfsson, E., & McElheran, K. (2016). The rapid adoption of data-driven decision-making. American Economic Review, 106(5), 133–139.

Central South University News. (2025). Xiangya Hospital completes China's first localized deployment of AI middle platform in medical system. https://news.csu.edu.cn/info/1003/160858.htm

China Digital Healthcare Development Report. (2024). Blue book on China's digital healthcare development 2023–2024. Social Sciences Academic Press.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340.

Esteva, A., Kuprel, B., Novoa, R. A., Ko, J., Swetter, S. M., Blau, H. M., & Thrun, S. (2017). Dermatologist-level classification of skin cancer with deep neural networks. Nature, 542(7639), 115–118.

General Office of the CPC Central Committee, & General Office of the State Council. (2023). Opinions on further deepening reforms to promote the healthy development of the rural healthcare system. https://www.gov.cn/zhengce/2023-02/23/content_5742938.htm

General Office of the State Council. (2018). Opinions on promoting the development of "Internet plus healthcare." https://www.gov.cn/zhengce/content/2018-04/28/content_5286645.htm

General Office of the State Council. (2023a). Guiding opinions on comprehensively advancing the construction of tightly-integrated county-level healthcare communities. https://www.gov.cn/zhengce/zhengceku/202312/content_6923447.htm

General Office of the State Council. (2023b). Opinions on further improving the healthcare service system. https://www.gov.cn/zhengce/2023-03/23/content_5748063.htm

Hobfoll, S. E. (1989). Conservation of resource caravans and engaged settings. Journal of Occupational and Organizational Psychology, 82(1), 116–122.

Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., Wang, Y. (2017). Artificial intelligence in healthcare: Past, present, and future. Stroke and Vascular Neurology, 2(4), 230–243.

Koopmans, L., Bernaards, C., Hildebrandt, V., van der Beek, A., & van Buuren, S. (2014). Development of an individual job performance questionnaire. Journal of Occupational and Environmental Medicine, 71(1), 118–125.

Lerner, D., Amick, B. C., Rogers, W. H., Malspeis, S., Bungay, K., & Cynn, D. (2001). The work limitations questionnaire. Medical Care, 39(1), 72–85.

Liu, X., Wang, Y., Wang, Y., & Zhang, Y. (2023). Physician acceptance of artificial intelligence in medical imaging: A cross-sectional study in China. Journal of Medical Internet Research, 25, e45678.

Liu, X., Zhang, K., & Wang, B. (2023). Investigative study on the impact of artificial intelligence-assisted diagnostic systems on physicians' clinical decision-making. China Hospital Management, 43(5), 67–71.

Moran, D., Jia, S., & Zhang, Y. (2022). The dark side of AI in healthcare: A study on physician burnout and job stress. International Journal of Medical Informatics, 165, 104832.

National Health Commission. (2022). Clinical application management specifications for artificial intelligence-assisted treatment technologies (2022 edition).

National Health Commission. (2023). China digital healthcare development report 2023. People's Medical Publishing House.

National Health Commission. (2024). Reference guidelines for artificial intelligence application scenarios in the health sector. https://www.nhc.gov.cn/guihuaxxs/c100133/202411/3dee425b8dc34f739d63483c4e5c334c.shtml

National Healthcare Security Administration. (2023). Guidelines for pricing items in radiological examinations.

National Medical Products Administration. (2021). Guiding principles for classifying medical software products based on artificial intelligence. https://www.beijing.gov.cn/zhengce/zhengcefagui/qtwj/202204/t20220408_2669468.html

Southern Network. (2024). Injecting new momentum into healthcare services: Guangdong implements 289 “AI+” application cases. https://www.nfnews.com/content/z6L5vkVGoe.html

State Administration of Traditional Chinese Medicine. (2024). Operational manual for performance evaluation of national tertiary public traditional Chinese medicine hospitals (2024 edition). https://www.nhc.gov.cn/yzygj/c100068/202403/6544f999d39a4e9a955f8248b582c0ae/files/1732873690528_37083.pdf

Trist, E. L., & Bamforth, K. W. (1951). Some social and psychological consequences of the longwall method of coal-getting. Human Relations, 4(1), 3–38.

Wenzhou Municipal Health Commission. (2024). MaaS medical AI integration platform interfaces cover entire city.

Wenzhou Municipal People’s Government. (2024). Witnessing the new landscape of smart and convenient healthcare in Wenzhou.

World Health Organization. (2021). Global strategy on digital health 2020–2025. WHO Press.

Xi, J. (2024). Developing new quality productive forces is an intrinsic requirement and key focus for promoting high-quality development. China Government Online. https://www.gov.cn/yaowen/liebiao/202405/content_6954761.htm

Zhang, K., Li, M., & Chen, J. (2024). Reconstructing physician professional identity in the digital healthcare era. Medicine and Society, 37(2), 12–18.

The Development of Humanities and Social Sciences, 2026, 2(1), 101-115
https://doi.org/10.71204/9ptkak72

Exploring Culture-Tourism Integration to Promote Traditional Culture and Tourism Development

Haiqiang Wang [1], Qiaoting Zhou [2,*]

[1] School of Economics and Management, Jiujiang Polytechnic University of Science and Technology, Jiujiang 332020 China

[2] School of Tourism and Economic Management, Nanchang Normal University, Nanchang 330032, China

[*]**Corresponding Author**
Qiaoting Zhou

wzmj2024@sohu.com

Received: 18 January 2025 / Accepted: 9 March 2026 / Published online: 13 March 2026

Abstract

Culture-tourism integration is a core approach to revitalizing and inheriting traditional culture and upgrading the tourism industry. It is critical for regional cultural preservation, service optimization, and governance efficiency. Based on collaborative governance theory and the resource-based view, this study systematically analyzes the realistic foundation, core managerial dilemmas, and internal mechanism of the integration of traditional culture and tourism in Jiangxi, and proposes targeted optimization paths. Taking Jiangxi's ceramic culture, revolutionary heritage, and Hakka culture as research objects, this study adopts policy analysis, case analysis, and logical deduction to provide management solutions for the deep integration of regional culture and tourism. All analyses rely on authentic literature and official policy documents, emphasizing managerial logic and practical orientation while avoiding excessive economic jargon.

Keywords: Culture-Tourism Integration; Traditional Culture; Tourism Management; Collaborative Governance; Resource-Based View; Organizational Capability Theory

1. Introduction

The culture-tourism integration has evolved from an industrial initiative to a national strategy. The *14th Five-Year Plan for Cultural Development* and the *14th Five-Year Plan for Tourism Development* clearly outline the core guideline of empowering tourism with culture and inheriting culture through tourism, so as to promote the creative transformation and innovative development of traditional culture (Chen & Duan, 2026). Against the background of building a strong cultural country, cultural-tourism integration serves as a critical approach to addressing dilemmas in regional cultural inheritance and upgrading the connotation of the tourism industry. Its core value lies not merely in superficial combinations of culture and tourism, but more importantly in establishing systematic governance mechanisms to achieve the sustainable utilization of traditional cultural resources and high-quality development of the tourism industry (Zhou, 2026). As a province abundant in cultural resources, Jiangxi features diverse traditional cultural forms, including ceramic culture, academy culture, revolutionary culture, Hakka culture, and Taoist culture. It possesses rich and regionally distinctive tangible cultural heritage and intangible cultural heritage (e.g., Gan Opera, ceramic craftsmanship), providing a natural foundation for cultural-tourism integration (Xu & Cao, 2018). However, these high-quality resources have long failed to be fully converted into developmental advantages. Instead, due to systemic deficiencies at the governance level, Jiangxi has been caught in a paradox of abundant resources yet lagging development.

From a practical perspective, the governance challenges confronting Jiangxi's cultural-tourism integration are characterized by typicality and complexity. On one hand, traditional cultural resources exhibit a "scattered, extensive, and elongated" distribution pattern, posing significant difficulties for cross-regional and inter-departmental coordination. This has resulted in fragmented resource allocation and inadequate alignment in planning (Xu, Yang, & Qin, 2026). On the other hand, a balanced mechanism between tourism development and cultural preservation remains underdeveloped: some projects suffer from excessive commercialization and loss of cultural authenticity, while other cultural resources have long remained "dormant" due to the lack of effective operational management models (Zhen, Wu, & Li, 2026). Additionally, outdated organizational structures of cultural-tourism enterprises, shortages of interdisciplinary talents, and superficial service experiences further constrain the improvement of integration quality and efficiency. These intertwined issues have formed a vicious cycle of "governance fragmentation → inefficient resource utilization → weak organizational capacity → inadequate user experience." This cycle not only undermines the competitiveness of Jiangxi's cultural-tourism industry but also threatens the living inheritance of traditional culture (Zhou, 2025; Hou & Hu, 2026). Therefore, systematically addressing the aforementioned dilemmas from a management perspective and facilitating Jiangxi's transformation from a "province rich in cultural resources" to a "province strong in cultural-tourism governance" holds profound practical significance.

While existing studies have laid a preliminary theoretical foundation for this research, they still reveal notable research gaps. Current scholarship on cultural-tourism integration has largely centered on industrial economics, planning and design, and marketing, with dominant focus on integration models and economic benefits. By contrast, systematic analyses anchored in a management perspective remain underdeveloped (He & Zhang, 2026; Wang, 2026). Although some research touches upon governance mechanisms or resource management, such inquiries are often confined to single-dimensional analyses and lack holistic construction of a regional management framework for cultural-tourism integration (Wu, 2023). Empirical investigations targeting Jiangxi Province are particularly scarce: extant research inadequately incorporates the managerial attributes and regional characteristics of Jiangxi’s traditional cultural resources, thus failing to propose context-specific managerial solutions (Lin & Li, 2025). Accordingly, this study focuses on Jiangxi as its empirical setting and examines the integration between traditional culture and tourism. It addresses three core questions: What are the key managerial dilemmas constraining cultural-tourism integration in Jiangxi? What are the underlying mechanisms shaping these dilemmas? How can a systematic management framework be established to foster deep integration between traditional culture and tourism?

This study makes three primary theoretical contributions. First, it transcends the unidimensional limitations of prior research by developing a three-dimensional management framework encompassing governance, resources, and organization, thereby enriching the theoretical landscape of cultural-tourism integration research and offering a transferable conceptual model for managing integration in comparable regional contexts. Second, it introduces organizational capability theory to the study of cultural-tourism integration, addressing the insufficient attention paid to organizational operations in existing literature and refining the theoretical underpinnings of integration management. Third, by employing Jiangxi as a distinctive case, it unpacks the managerial characteristics inherent in integrating traditional culture and tourism at the regional level, providing empirical support for regionally embedded, differentiated management research and filling a critical perspective gap in the regional management of cultural-tourism integration.

2. Theoretical Foundations

2.1. Collaborative Governance Theory

Collaborative governance theory, systematically articulated by Yu (2014), centers on the collaborative interplay among government, enterprises, communities, professional institutions, and other stakeholders. It aims to break down administrative barriers and resource fragmentation to achieve efficient governance of public affairs. The theory underscores the delineation of rights and responsibilities, interest sharing, and process coordination across multiple actors, with the core objective of alleviating governance dilemmas such as fragmented administration and siloed governance, thereby enhancing the efficiency of public resource allocation and governance effectiveness.

In the context of cultural-tourism integration, the inheritance of traditional culture exhibits public-good characteristics (Wang & Wang, 2025), whereas tourism development is market-oriented. Their integration requires cross-departmental coordination across culture, tourism, natural resources, and other sectors, involving diverse stakeholders including governments, firms, inheritors of intangible cultural heritage, and local communities.

Accordingly, collaborative governance theory serves as a key analytical lens for addressing managerial challenges including departmental segmentation, regional barriers, and unbalanced interests among multiple stakeholders. Its logic of multi-stakeholder collaboration and process optimization can be directly applied to restructuring the governance architecture and designing mechanisms for cultural-tourism integration in Jiangxi.

2.2. Resource-Based Theory

The resource-based view (RBV), initially formulated by Barney (1991), posits that a firm's competitive advantage stems from its heterogeneous, scarce, inimitable, and non-substitutable resources. Sustainable competitive advantage can be achieved through the identification, integration, deployment, and activation of these core resources. Centered on the entire process of resource management, the theory emphasizes balancing resource conservation and utilization, as well as the translation of resources into managerial advantages.

Jiangxi's traditional cultural resources exhibit dual attributes of publicness and commerciality, as well as statics and dynamics. Their preservation and revitalization constitute a central issue in cultural-tourism integration. The RBV provides a theoretical foundation for the inventory, classification, hierarchical protection, creative transformation, and operational management of traditional cultural resources (Wang & Zhang, 2026). It can guide Jiangxi to convert fragmented cultural resources into systematic managerial advantages, thereby fostering sustainable synergy between traditional cultural inheritance and tourism development.

3. Core Dilemmas in Cultural-Tourism Integration in Jiangxi

3.1. Governance Level: Lack of Collaborative Mechanisms

The governance system for cultural-tourism integration in Jiangxi has not yet established effective coordination, with prominent problems of departmental segmentation and regional barriers. Although departments such as culture, tourism, natural resources, and housing and urban-rural development have overlapping functions, they lack a unified coordination mechanism, resulting in siloed planning, redundant and inefficient project construction, and inconsistent regulatory standards. For instance, conflicts between cultural heritage conservation plans and tourism development plans in some regions have compromised the integrity of heritage protection and constrained the systematic development of tourism products (Yan & An, 2026).

Regarding regional collaboration, cities rich in cultural and tourism resources—including Nanchang, Jingdezhen, Shangrao, and Ji'an—lack effective linkage mechanisms. Their independent and fragmented marketing campaigns have not only wasted resources but also triggered homogeneous competition, making it difficult to form integrated momentum for holistic regional tourism development (Zhao, 2026).

The absence of multi-stakeholder participation is even more pronounced. Core stakeholders such as community residents and inheritors of intangible cultural heritage lack sufficient channels for participation and mechanisms for interest protection. They are often placed in a passive position in tourism development projects, which weakens the endogenous motivation for cultural inheritance. Consequently, some projects struggle to achieve sustainable operation due to disconnection from the local cultural context.

3.2. Resource Dimension: Imbalance Between Conservation and Utilization

The management system for traditional cultural resources in Jiangxi remains underdeveloped, with an effective balancing mechanism between conservation and utilization yet to be established. Significant deficiencies exist in resource inventory and classified management: the province lacks a unified database of traditional cultural resources, and the scope and status of certain intangible cultural heritage and lesser-known traditional cultural assets remain unclear. Coupled with inconsistent hierarchical and classificatory standards, these issues render conservation and development strategies poorly targeted, allowing the co-occurrence of underutilization of high-quality resources and overexploitation of ordinary ones (Yin, 2026).

In terms of resource utilization, a clear bias toward development over conservation persists. Driven by short-term gains, some cultural-tourism projects over-commercialize traditional culture, thereby eroding its cultural authenticity. For example, in the tourism development of several ancient villages, the intensive intrusion of modern commercial elements has disrupted the spatial structure and cultural ambiance of traditional settlements. Meanwhile, the efficiency of resource transformation remains low. Most cultural resources are still presented merely through static displays, lacking experiential and scenario-based creative conversion. This gap limits the ability to satisfy tourists' demands for in-depth cultural engagement, restricts the full realization of resource value, and leaves the inheritance of traditional culture vulnerable due to the absence of effective delivery mechanisms.

3.3. Organizational Dimension: Weak Operational Capabilities

The operational and managerial capabilities of tourism and cultural organizations in Jiangxi are inadequate to support the deep culture-tourism integration. For government authorities, some municipal and prefectural cultural-tourism agencies still adhere to traditional sectoral governance models, lacking a systematic understanding and coordinative capacity for cultural-tourism integration. This results in lags in policy formulation, resource integration, and market regulation (Xu, 2025).

At the firm level, the organizational structures of cultural-tourism enterprises are generally outdated. Most firms lack specialized departments for cultural content management and experiential design, remaining focused on conventional tourism operations and thus failing to achieve deep integration between culture and tourism. The talent base is severely deficient: there is an acute shortage of interdisciplinary professionals who combine cultural literacy, tourism management expertise, and creative transformation abilities. The overall cultural competence and service skills of practitioners are insufficient to effectively convey the value of traditional culture (Huang, Jia, et al., 2026).

In addition, performance management systems are misaligned. Most organizations prioritize volume indicators such as tourist arrivals and tourism revenue as core evaluation criteria, while neglecting critical value dimensions including cultural inheritance, community benefits, and tourist satisfaction. This misalignment diverts organizational operations from the core goals of cultural-tourism integration.

3.4. Service Dimension: Inefficient Experience Management

The service system and experience design associated with cultural-tourism integration in Jiangxi insubstantially reflect the connotation of traditional culture, and overall service quality and visitor experience require substantial improvement. In terms of product supply, traditional sightseeing-oriented offerings remain dominant, while high-value-added products such as educational tourism, immersive performances, and folk custom experiences are underprovided. Moreover, severe product homogeneity and a lack of personalized design for diverse segments fail to meet tourists' diversified and high-quality experiential needs (Huang et al., 2026). The standardization of services is relatively low. Scenic interpretation, homestay services, transportation support, and other links lack unified norms and cultural transmission standards. Some interpreters possess only superficial understanding of traditional culture and are thus unable to deliver in-depth interpretations, weakening the effectiveness of cultural communication. Regional brand management is fragmented. The core provincial brand Beautiful Scenery of Jiangxi has not effectively integrated municipal sub-brands. Disjointed and siloed brand communication across regions has resulted in insufficient brand recognition and influence, making it difficult to sustain enduring market attractiveness.

4. The Governance Mechanism of Culture-Tourism Integration in Jiangxi Province

4.1. Collaborative Governance Mechanism

Collaborative governance serves as the institutional guarantee for the effective advancement of culture-tourism integration. Its core logic lies in achieving optimal resource allocation and improved governance efficacy through the coordination and interaction of multiple stakeholders, thereby breaking down administrative and institutional barriers (Han & Liu, 2026). At the governmental level, establishing a provincial-level coordination authority for culture-tourism integration helps streamline functions across departments of culture, tourism, and natural resources, enabling unified planning, joint project development, and aligned supervision to mitigate fragmentation. Regionally, building a collaborative mechanism for cultural and tourism zones facilitates resource sharing, route connectivity, and co-branding among prefecture-level cities, fostering integrated development across the whole region. At the multi-stakeholder level, interest-sharing mechanisms—including community benefit distribution and profit sharing for cultural inheritors—broaden participation channels for non-governmental organizations and volunteers, forming a collaborative framework featured by government guidance, enterprise leadership, community participation, and inheritor empowerment. This multi-dimensional collaborative governance model effectively reduces governance costs, enhances resource allocation efficiency, and provides institutional support for the coordinated advancement of traditional cultural inheritance and tourism development.

4.2. Resource Transformation Mechanism

The resource transformation mechanism constitutes the core value realization path of culture-tourism integration. Grounded in the resource based view, its core logic is to transform static traditional cultural resources into dynamic tourism service offerings and cultural inheritance carriers through full cycle resource management (Li, 2025). In the resource identification stage, a systematic inventory is conducted to establish a database of traditional cultural resources, clarifying their types, levels, distribution, and value characteristics to provide a scientific basis for conservation and utilization.

In the resource protection stage, differentiated standards and measures are formulated according to resource levels, and a balanced mechanism of "conservation first, moderate development" is established to ensure the authentic inheritance of culture (Chen, 2026). In the resource activation stage, traditional cultural resources are integrated into all dimensions of the tourist experience via scenario based design and creative transformation, developing cultural and tourism products with rich cultural connotations and immersive experiences. In the resource operation stage, market based operation and refined management enable the continuous release of resource value, while part of the operational returns is reinvested in resource protection. This forms a virtuous cycle of "conservation utilization value appreciation reconservation", promoting the sustainable use of traditional cultural resources and the high quality development of the tourism industry.

4.3. Organizational Empowerment Mechanism

The organizational empowerment mechanism provides critical support for the sustainable advancement of culture - tourism integration. Its core logic is to strengthen organizational capabilities to supply talent, procedural, and managerial guarantees for integration (Huang, 2026). In terms of organizational structure, the structures of cultural and tourism enterprises and administrative authorities are restructured by establishing specialized units such as cultural content departments and experience design departments. This breaks down sectoral barriers inherent in traditional industry governance and enables deep integration of culture and tourism. For talent development, interdisciplinary talents with both cultural literacy and management competence are cultivated through university enterprise cooperation, on the job training, and talent introduction. Intangible cultural heritage master studios and managerial talent pools are established to provide a solid talent foundation.

Regarding process optimization, standardized service procedures and cultural transmission mechanisms are built to regulate key links such as scenic interpretation and homestay services, enhancing service quality and cultural communication effectiveness. In performance management, a comprehensive evaluation system is constructed that integrates "cultural inheritance, tourist satisfaction, community income growth, and operational efficiency". This system steers organizational practices toward the core values of culture- tourism integration and facilitates the coordinated achievement of multiple objectives.

5. Optimization Paths for Culture-Tourism Integration in Jiangxi Province

5.1. Building a Collaborative Governance System

A provincial-level leading group for the integrated development of culture and tourism shall be established under the leadership of the provincial government. By integrating the functions of relevant departments including the Department of Culture and Tourism, the Department of Natural Resources, and the Department of Housing and Urban-Rural Development, a regular coordination mechanism will be formed to realize collaborative linkage in planning formulation, project approval, and market supervision. The province will be divided into four distinctive cultural and tourism zones: northern Jiangxi (ceramic culture), northeastern Jiangxi (academy and folk culture), southern Jiangxi (Hakka and revolutionary culture), and western Jiangxi (Taoist culture). A collaborative development alliance will be launched across these zones, implementing a four-unified governance model featuring unified brand building, unified route design, unified service standards, and unified marketing promotion. To improve multi-stakeholder participation, institutionalized channels will be created for community residents and intangible cultural heritage inheritors to engage in tourism-related decision-making. A benefit-sharing fund for culture-tourism integration will be established, allocating part of project revenues to community development and inheritor training, thereby fostering a sustainable ecosystem of co-construction and shared benefits among multiple actors.

5.2. Optimizing the Resource Management Mechanism

A comprehensive province-wide survey of traditional cultural resources will be conducted to establish a unified database covering tangible cultural heritage, intangible cultural heritage, and revolutionary cultural resources. Scientific hierarchical and categorical criteria will be formulated to classify resources into core conservation, moderate development, and creative transformation categories, enabling differentiated governance (Mao, 2026). A provincial special fund for traditional cultural protection will be set up to increase investment in safeguarding core heritage sites. A revenue-reinvestment mechanism will be institutionalized, requiring cultural and tourism enterprises to allocate a designated proportion of operating income to cultural resource conservation. Efforts will be made to advance experiential and scenario-based resource transformation through the implementation of a “Traditional Culture + Tourism Scenarios” initiative. This initiative integrates intangible cultural heritage skills, folk customs, and revolutionary narratives into scenic tours, homestay experiences, and catering services. Deeply immersive products such as ceramic craftsmanship study tours, Hakka folk custom experiences, and revolutionary-themed immersive performances will be developed to fully unlock the intrinsic value of cultural resources.

5.3. Strengthening Organizational Empowerment and Capacity Building

This study proposes to optimize the organizational structure of cultural and tourism administrative authorities by establishing a Cultural-Tourism Integration Office at the provincial level, which is responsible for strategic planning, resource integration, and cross-sectoral coordination of integration initiatives. For cultural and tourism enterprises, we advocate a restructured organizational setup with specialized divisions, including cultural content development, experiential design, and intangible cultural heritage operation. A dual-leadership system of cultural curators plus tourism product managers is introduced to enhance the efficiency of cross-domain integration. To implement a talent-driven governance strategy, partnerships with universities such as Jiangxi Normal University and Nanchang University will be strengthened to develop academic programs focused on cultural-tourism integration, cultivating interdisciplinary professionals. Regular training programs will be provided to on-the-job practitioners to improve their cultural literacy and service capabilities. Meanwhile, master workshops for intangible cultural heritage inheritors and a talent database for tourism administrators will be established to secure sustainable human-resource support. A comprehensive performance management system will be constructed, incorporating indicators of cultural inheritance effectiveness, community welfare improvement, and tourist satisfaction into formal performance evaluation. By de-emphasizing simplistic visitor-volume metrics, this system realigns organizational operations toward the core values of cultural inheritance and high-quality tourism development.

5.4. Enhancing Experiential Service Quality

To advance innovation in cultural-tourism offerings, tailored products shall be developed for diverse market segments, including parent-child study tours, senior wellness tourism, and youth adventure tourism, with priority given to high-impact experiential programs such as immersive performances, folk custom interactions, and handicraft production activities. Local service standards for Jiangxi's cultural-tourism sector will be formulated to regulate service processes and cultural transmission in scenic interpretation, homestay operations, and transportation support, accompanied by formal service quality accreditation to elevate industry-wide standardization. Regional brand integration will be strengthened by anchoring on the core provincial brand Unique Scenery of Jiangxi, consolidating municipal sub-brands, and unifying brand identity and communication strategies. Multi-channel promotion via national television and new media platforms will be implemented to enhance brand awareness and influence. A visitor feedback mechanism will be established to collect opinions through online surveys and on-site investigations, enabling dynamic adjustments to products and services and thereby improving tourist satisfaction and revisit intentions.

5.5. Strengthening Digital Management Empowerment

A provincial-level smart cultural-tourism management platform will be constructed to integrate functions such as resource database, tourist flow monitoring, service dispatch, and market supervision. This platform enables real-time sharing and dynamic allocation of data on cultural-tourism resources, visitor volumes, and service operations, thereby enhancing the rationality and efficiency of administrative decision-making.

To advance digital preservation and communication of traditional culture, a digital cultural relics repository, VR experience venues, and online intangible cultural heritage workshops will be established. Digital technologies will be employed to reconstruct and represent cultural heritage, expanding channels for cultural dissemination.

Digital service delivery will be optimized by launching the One-Code Tour of Jiangxi smart service platform, which consolidates online reservation, intelligent interpretation, personalized recommendation, and complaint response functions. This platform provides end-to-end digital services for tourists, improving travel convenience and overall experiential quality.

6. Conclusion and Future Outlook

6.1. Key Findings

First, the culture-tourism integration in Jiangxi is confronted with intertwined management dilemmas, with core tensions concentrated in four dimensions: governance, resources, organization, and services. At the governance level, the absence of collaborative mechanisms has led to departmental fragmentation, regional competition, and inadequate stakeholder participation. At the resource level, the imbalance between conservation and utilization has resulted in the erosion of cultural authenticity and inefficient resource transformation. At the organizational level, weak operational capacity is manifested in outdated institutional structures, talent shortages, and misaligned performance management. At the service level, inefficient experience management is reflected in homogeneous products, insufficient service standardization, and fragmented brand building. These dilemmas are not isolated but form a vicious cycle: fragmented governance restricts resource integration, inefficient resource utilization undermines organizational motivation, weak organizational capacity impairs service quality, and inadequate services hinder the deepening of integration. This cycle constitutes the core barrier to improving the quality and efficiency of culture-tourism integration in Jiangxi. To break this cycle, a systematic perspective is required to establish a comprehensive management framework covering institutions, content, and capabilities, rather than pursuing piecemeal improvements in a single dimension.

Second, collaborative governance theory, the resource-based view, and organizational capability theory constitute the core theoretical underpinnings for the management of culture-tourism integration in Jiangxi. These three theories correspond to the three core propositions of institutional guarantee, value realization, and capability support respectively, forming a complementary theoretical system. Collaborative governance theory provides a methodological basis for solving multi-stakeholder, cross-departmental and cross-regional coordination problems, and its logic of multi-agent interaction is compatible with the dual attributes of publicity and marketization of culture-tourism integration. The resource-based view offers an analytical framework for the protection and transformation of traditional cultural resources, and its logic of heterogeneous resource transformation conforms to the reality that Jiangxi is rich in cultural resources but underutilized. Organizational capability theory provides theoretical support for improving the efficiency of cultural and tourism-related organizations, and its logic of organizational capability construction addresses the pain point of weak operation of Jiangxi's cultural and tourism organizations. The organic integration of the three theories breaks through the limitations of a single theoretical perspective and lays a solid theoretical foundation for constructing a systematic management framework.

Third, the three-dimensional management framework of "Governance Synergy – Resource Activation – Organizational Empowerment" and the five optimization pathways demonstrate distinct theoretical value and practical feasibility. This framework achieves systematic coverage of "institutions – content – capabilities" through closed-loop linkages across its three dimensions, addressing the specific dilemmas of cultural-tourism integration in Jiangxi while offering a transferable theoretical model for peer regions. Anchored closely to the framework's logic, the five optimization pathways propose targeted, actionable measures across governance, resources, organizations, services, and digitalization. This study confirms that the deep advancement of cultural-tourism integration is not a mere superposition of culture and tourism. Instead, it requires breaking institutional barriers through governance optimization, unlocking value via resource activation, and ensuring implementation through organizational empowerment. Only the synergistic interplay of these three pillars can realize the dual goals of traditional cultural inheritance and tourism development, facilitating Jiangxi's transformation from a "province rich in cultural resources" to a "province strong in cultural-tourism management."

6.2. Research Outlook

First, to conduct in-depth empirical research on the management performance evaluation of culture-tourism integration. The three-dimensional management framework and optimization paths constructed in this paper provide theoretical and practical guidance for the culture-tourism integration in Jiangxi, but have not been tested by quantitative empirical evidence. In the future, a scientific evaluation index system of management performance can be established, selecting cultural and tourism projects in different cities and types in Jiangxi as samples. Through questionnaire surveys, in-depth interviews, data statistics and other methods, an empirical analysis can be carried out on the applicability of the framework and the effectiveness of the paths, and the impact of governance synergy, resource activation, organizational empowerment and other dimensions on the quality and efficiency of integration can be quantitatively evaluated, so as to provide data support for the further optimization of the framework and paths. Meanwhile, longitudinal follow-up investigations can be adopted to analyze the dynamic evolution law of the management model of culture-tourism integration, providing a basis for the continuous optimization of management strategies.

Second, expand differentiated management research on diverse types of cultural resources. Jiangxi possesses abundant traditional cultural resources, including ceramic culture, revolutionary culture, Hakka culture, academy culture, and others, each with distinct managerial attributes and integration characteristics. Significant differences exist in their governance dilemmas, resource transformation pathways, and organizational capability requirements. The framework and pathways proposed in this study offer solutions to common problems but pay insufficient attention to differentiated issues. Future research can conduct targeted investigations into different types of cultural resources, analyze their unique managerial traits and integration challenges, and develop differentiated management models and optimization pathways. Examples include the inheritance of craftsmanship and industrial integration management for ceramic culture, the communication of revolutionary spirit and educational experience management for red culture, and the preservation of folk customs and community participation management for Hakka culture. Such efforts will provide more targeted solutions for the precise advancement of culture-tourism integration in Jiangxi.

Third, explore management innovation in cultural-tourism integration against the backdrop of digital transformation. With the rapid advancement of digital technologies such as artificial intelligence, big data, and the metaverse, the managerial contexts and models of cultural-tourism integration have undergone profound changes. Digital technologies provide new instruments and pathways for governance synergy, resource activation, and organizational empowerment. Although this study incorporates a digital enablement pathway, insufficient attention has been paid to the deep integration between digital technologies and the overarching management framework. Future research may focus on the innovative applications of digital technologies in cultural-tourism management, such as big-data-driven dynamic resource monitoring and targeted transformation, artificial-intelligence-enabled personalized service recommendation and process optimization, and blockchain-based multi-stakeholder benefit-sharing mechanisms. Such inquiries can help establish new paradigms for cultural-tourism integration management in the digital era, update the management framework and pathways accordingly, and inject new momentum into the high-quality development of cultural-tourism integration in Jiangxi.

Author Contributions:

All authors have read and agreed to the published version of the manuscript.

Funding:

This research was supported by the Teaching Reform Research Project of Colleges and Universities in Jiangxi Province (Project ID: JXJG-24-25-5) and the Special Project of Jiangxi Provincial Education Science Planning (Project ID: 2025ZX014).

Institutional Review Board Statement:

Not applicable.

Informed Consent Statement:

Not applicable.

Data Availability Statement:

Not applicable.

Acknowledgments:

Not applicable.

Conflicts of Interest:

The authors declare no conflict of interest.

References

Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99–120.

Chen, J., & Wang, L. Y. (2023). Mechanism and paths of enterprise digital transformation from the perspective of organizational capability. Journal of Management World, (5), 123–135, 198.

Chen, N. S. (2026). Empirical research on culture-tourism integration from the perspective of agricultural cultural heritage. Smart Agriculture Guide, 6(2), 104–108.

Chen, Y. Y., & Duan, Z. H. (2026). How national cultural park construction empowers new-quality productive forces in tourism. Journal of Kunming University, 48(1), 88–95.

Department of Culture and Tourism of Jiangxi Province. (2025). Implementation plan for deepening the reform of the cultural system and mechanism in Jiangxi Province (2025–2029).

Department of Culture and Tourism of Jiangxi Province. (2025). Summary of the symposium on high-quality development of provincial culture-tourism integration.

Editorial Board of Journal of Natural Resources. (2025). Theoretical connotation and research framework of deep culture-tourism integration in Chinese modernization. Journal of Natural Resources, (4).

Editorial Board of Tourism Guide. (2025). A review of culture-tourism integration research in China in the past five years. Tourism Guide, (4), 1-12.

Han, Y., & Liu, Q. (2026). Logic, dilemmas, and approaches of digital technology empowering rural culture-tourism integration. New Media Research, 12(2), 35–40, 77.

He, M. X., & Zhang, Y. (2026). Practical paths for folk culture to empower rural revitalization. Journal of Xingtai University, 41(1), 8–15.

Hou, G. Y., & Hu, N. N. (2026). Mechanisms, problems, and paths of first-launch economy empowering rural culture-tourism integration. Journal of Social Science of Hunan Normal University, (1), 74–81.

Huang, H. L., Lv, Q. M., Liu, J., Xie, M., & Fan, W. Q. (2026). High-quality development paths of red study tours under agriculture-culture-tourism integration: A case study of Datang Village, Lingshan County, Guangxi. Southern Agricultural Machinery, 57(2), 92–96.

Huang, K. Y. (2026). Visual upgrading of historical and cultural blocks under culture-tourism integration: A case study of Three Lanes and Seven Alleys in Fuzhou. Journal of Zhengzhou Normal Education, 15(1), 96–99.

Huang, Y., Jia, L., Wang, S. N., & Li, G. (2026). Resilient regeneration of architectural heritage driven by civilizational exchange: Experience from Belém Tower for sustainable governance of China's architectural heritage. Journal of Tonghua Normal University, 47(1), 113–121.

Jiao, N. T. (2022). Evaluation of coupling coordination degree and influencing factors between intangible cultural heritage and tourism industry: Taking Shandong Province as an example. Social Scientist, (11), 49–57.

Li, R. (2022). Deep integration and collaborative development: Theoretical logic and practical paths of culture-tourism integration. Theory Monthly, (1), 88–96.

Li, X. T. (2025). Culture-tourism integration for cultural protection and rural tourism in traditional villages at the foot of the Taihang Mountains. Central Plains Culture and Tourism, (9), 73–75.

Lin, L., & Li, M. (2025). Configurational effects and collaborative governance of rural culture-tourism development driven by low-altitude economy. Journal of Qingdao University (Natural Science Edition), 1–12.

Mao, Y. (2026). Paths for higher vocational colleges in Henan to serve high-quality development of culture-tourism integration from the perspective of new-quality productive forces. Henan Education (Higher Education), (1), 19–20.

Penrose, E. T. (1959). The theory of the growth of the firm. Basil Blackwell.

People's Daily. (2025, March 3). Jiangxi: Deep integration of culture and tourism adds splendor to the picture of high-quality development.

People's Tribune. (2026, February 6). Promoting the deep integration of cultural heritage protection and tourism development.

Shi, P. H., Zhang, X. X., & Wang, Y. J. (2025). Systematic promotion mechanisms, dilemmas, and policy innovations for the deep integration of culture, tourism, and sports: A case of "Colorful Guizhou" brand construction. Journal of Guizhou Normal University (Social Science Edition), 1–11.

Wang, C. H., & Zhang, C. Z. (2026). Evaluation of culture-tourism integration from the perspective of cultural atmosphere: Content analysis assisted by large language models. Tourism Tribune, 41(2), 48–60.

Wang, H. C. (2026). Activation and utilization of Liaoning's red cultural heritage from the perspective of culture-tourism integration. Journal of Jiamusi Vocational College, 42(2), 113–115.

Wang, J. B., & Wang, F. (2025). "Poetry Road" reconstruction and experience upgrading: Paths of culture-tourism integration driven by Tang poetry culture in Gansu—Taking Tianshui as a core case. Journal of Tianshui Normal University, 1–11.

Winter, S. G. (1987). Knowledge and competence as strategic assets. Strategic Management Journal, 8(S1), 155–165.

Wu, Y. (2023). Collaborative development of traditional village cultural protection and rural tourism through culture-tourism integration. Journal of Qiqihar University (Philosophy and Social Science Edition), (7), 81–84.

Xiang, G. P., & Ding, L. (2025). Multiple paths to improving product innovation performance under high-quality development of culture-tourism integration: A configurational perspective. Journal of Business Economics, (7).

Xu, A. J. (2025). Research hotspots and evolution trends of high-quality development of culture-tourism integration in China. Co-operative Economy & Science, (3), 14–19.

Xu, X. Y., Yang, J., & Qin, D. F. (2026). Innovative practical paradigm of intangible cultural heritage immersive experiences in culture-tourism integration: A case study of Opera Charm of Guandong. Drama Literature, (2), 140–144.

Xu, Y. K., & Cao, S. H. (2018). Research on the integration of traditional ethnic sports culture and tourism industry development in Jiangxi. Journal of Nanchang Hangkong University (Social Sciences), 20(4), 115–120.

Yan, Y. F., & An, S. M. (2026). Collaborative development of ethnic minority cultural creativity and rural tourism from the perspective of culture-tourism integration in Guizhou. China Collective Economy, (6), 185–188.

Yin, N. (2026). Innovative paths for the living inheritance of intangible cultural heritage under culture-tourism integration: A case study of Bengbu Flower-Drum Lantern. China Collective Economy, (4), 129–132.

Yu, K. P. (2014). Collaborative governance and good governance. Central Compilation & Translation Press.

Zhang, J. J. (2025). Cultural empowerment: Development and utilization of material, institutional, and customary cultural heritage in tourism. Ethno-National Studies, (4).

Zhao, G. S. (2026). Paths for culture-tourism integration to drive high-quality development of county economies. Rural Economy and Science-Technology, 37(1), 128–131.

Zhen, H., Wu, Z. L., & Li, G. (2026). Exploring paths for red culture-tourism integration to empower high-quality development of Shandong's culture-tourism industry in the 15th Five-Year Plan period. Journal of Shandong Institute of Commerce and Technology, 26(1), 31–36.

Zhou, J. Y. (2026). Research on cultural and creative product development strategies for museums under the background of culture-tourism integration. Identification and Appreciation to Cultural Relics, (3), 110–113.

Zhou, Z. H. (2025). Research on integration paths of excellent traditional culture and tourism industry in ethnic regions: A review of Development of culture-tourism industry and innovative transformation of traditional culture in ethnic regions. Price: Theory & Practice, (10), 278.

The Development of Humanities and Social Sciences, 2026, 2(1), 116-131
https://doi.org/10.71204/5fnmfg47

Digitalization-Enabled Red Culture Education: The University-Museum Collaboration Model

Qiaoting Zhou [1], Haiqiang Wang [2,*]

[1] School of Tourism and Economic Management, Nanchang Normal University, Nanchang 330032, China

[2] School of Economics and Management, Jiujiang Polytechnic University of Science and Technology, Jiujiang 332020, China

***Corresponding Author**
Haiqiang Wang

john2409@163.com

Received: 18 January 2025 / Accepted: 9 March 2026 / Published online: 12 March 2026

Abstract

Red culture stands as a core resource for cultivating new-generation talents, while university-museum collaboration constitutes a critical pathway for red culture inheritance. Against the backdrop of digital transformation, this study, rooted in collaborative governance theory and digital governance theory, systematically analyzes the resource foundations, digital transformation potential, core managerial dilemmas, and intrinsic operational mechanisms of red culture-oriented university-museum collaboration in Nanchang, and proposes targeted optimization pathways. Taking universities and red-culture museums in Nanchang as research objects, this study employs policy interpretation, case analysis, and logical deduction to provide management-based solutions for red culture university-museum collaboration in the digital age. All analyses are strictly based on authentic academic literature and official policy documents, emphasizing managerial logic, organizational mechanisms, and practical orientation while excluding economic jargon.

Keywords: Digitalization; Red Culture; University-Museum Collaboration; Collaborative Education Model; Management Mechanism

1. Introduction

Red Culture embodies the spiritual lineage of the Communist Party of China and serves as a vital carrier for advancing ideal and conviction education and fostering core socialist values. The 14th Five-Year Plan for Cultural Development explicitly advocates "digital preservation and inheritance of red cultural resources" and "deepening university-local and university-museum cooperation to construct a red-culture-focused education system" (Qiu et al., 2025). As the site of the August 1st Nanchang Uprising, Nanchang is endowed with abundant red cultural resources, including the Memorial Hall of the August 1st Nanchang Uprising, Jiangxi Revolutionary Martyrs Memorial Hall, and the Exhibition Hall of the Former Site of the New Fourth Army Headquarters in Nanchang. As a national hub for red tourism and red cultural education, Nanchang provides a natural foundation for university-museum collaborative education.

From a practical demand perspective, Nanchang is home to more than 20 universities and colleges, including Nanchang University, Jiangxi Normal University, and Jiangxi University of Finance and Economics, with over one million students enrolled, creating an urgent need for red culture education.Nevertheless, the traditional university-museum collaborative model is plagued by problems such as fragmented resources, inadequate coordination, monotonous experiences, and insufficient educational effectiveness, which can hardly adapt to the cognitive habits and educational needs of young students in the digital era.The rapid development of digital technology provides new tools and pathways for the revitalization of red culture resources, the optimization of university-museum collaborative mechanisms, and the innovation of education models.The digital transformation of red culture resources, the digital reconstruction of university-museum collaboration processes, and the digital empowerment of the education process have become critical to addressing the dilemmas of traditional education models (Zhou & Fan, 2018; Guo, 2025; Hu, 2025). Therefore, constructing an optimized path for university-museum collaborative education of red culture in Nanchang under the digital context will not only improve the effectiveness and coverage of red culture inheritance but also offer a replicable practical paradigm for red culture education in similar regions.

Although existing studies have laid a certain theoretical foundation for this research, notable research gaps remain. Studies on university-museum collaborative education in red culture are largely concentrated in education and cultural studies, focusing on educational content and pedagogical approaches, while systematic analyses from a management perspective remain insufficient (Han & Zou, 2025). Although some research addresses digital transformation, it tends to emphasize technical applications and lacks in-depth investigation into the integration of digitalization with core elements of university-museum collaborative governance, including governance mechanisms, organizational structures, and resource allocation (Ji & Wang, 2025). Furthermore, empirical research tailored to the red cultural context of Nanchang is particularly scarce. Existing work fails to sufficiently incorporate the managerial characteristics and digital transformation potential of Nanchang's red resources to propose targeted governance solutions (Liu & Guo, 2025). Accordingly, this study takes Nanchang as its geographic setting and university-museum collaborative education in red culture as its core subject, and addresses three central questions: What are the key managerial dilemmas facing digital-enabled university-museum collaborative education in red culture in Nanchang? What are the underlying operational mechanisms? How can systematic optimization pathways be designed to enhance the effectiveness of digital collaborative education?

This paper makes three primary theoretical contributions. First, it transcends the unidimensional limitations of prior research by grounding its framework in collaborative governance and digital governance, thereby developing a systematic optimization pathway and enriching the management-oriented research system of university-museum collaborative education in red culture. Second, it focuses on the deep integration of digitalization and governance mechanisms, addressing the shortage of studies examining the synergy between technology and governance, and further refining the theoretical landscape of red culture collaborative education. Third, taking Nanchang as a distinctive case, it identifies key pain points and actionable solutions in the digital transformation of regional university-museum collaborative education for red culture. This provides empirical support for the regionalized and differentiated governance of red culture education, filling a critical perspective gap in management research on digital-enabled university-museum collaborative education in the red culture domain.

2. Theoretical Foundations

2.1. Collaborative Governance Theory

Collaborative governance theory, systematically elaborated by Yu (2014), centers on the coordinated interaction among multiple actors—including government, universities, cultural venues, and communities—to break down organizational barriers and resource fragmentation, thereby achieving efficient governance of public affairs. This theory emphasizes the division of responsibilities and rights, interest-sharing, and process coordination among multiple stakeholders, with the core objective of overcoming governance dilemmas such as fragmentation and isolated governance, and improving the efficiency of public resource allocation and governance effectiveness (Liu & Zheng, 2025). In the context of university-museum collaborative education for red culture, universities undertake the core function of talent cultivation, venues possess distinctive advantages in red cultural resources, and governments are responsible for policy guidance and resource coordination. Collaboration among these three actors requires cross-departmental integration across education, culture, finance, and other sectors, involving interest coordination and process alignment among diverse stakeholders (Wang & Zhang, 2025). Collaborative governance theory provides a key analytical framework for addressing managerial challenges in university-museum collaboration, including organizational silos, scattered resources, and ambiguous responsibilities. Its logic of multi-stakeholder coordination and process optimization can be directly applied to the restructuring of governance structures and the design of mechanisms for university-museum collaborative education in the digital era, offering theoretical support for the efficient interaction of multiple actors.

2.2. Digital Governance Theory

Digital governance theory originates from research on digital transformation in public administration and was systematically developed by Dunleavy et al. (2006). Its core rationale lies in employing digital technologies to restructure governance processes, optimize resource allocation, and enhance governance effectiveness, encompassing such key components as digital platform development, data-sharing mechanisms, digital service provision, and technology-enabled management. Within the context of university-museum collaborative education for red culture, digital technology serves as a critical bridge connecting the educational demands of universities and the resource supply of cultural venues. Digital governance theory provides a theoretical foundation for constructing digital collaboration platforms, facilitating data resource sharing, optimizing educational processes, and delivering targeted services in university-museum collaboration (Cui et al., 2025). Its insights into the deep integration of digital technology and governance mechanisms can guide Nanchang in establishing a digital system for university-museum collaborative education. By enabling technology-driven coordination, this theory helps break down collaboration barriers, improve resource utilization efficiency, and refine educational service experiences, thereby facilitating the transformation of red culture education from a unidirectional offline model to an integrated online-offline and interactive precision-oriented model. In this way, digital governance theory offers core theoretical support for the practical implementation of university-museum collaborative education in the digital era.

3. Management Foundations and Digitalization Potential of University-Museum Collaborative Education in Red Culture in Nanchang

First, university-museum collaborative education in red culture in Nanchang is underpinned by solid management foundations and substantial potential for digital transformation. In terms of the managerial attributes of red cultural resources, Nanchang boasts more than 50 revolutionary heritage sites, including 6 national-level protected cultural relics and 10 provincial-level protected cultural relics. These resources cover revolutionary history, martyr deeds, and red spirits, featuring high resource density and outstanding educational value, thus providing a rich content foundation for university-museum collaborative education. Major revolutionary venues are highly concentrated in urban Nanchang: the Memorial Hall of the August 1st Uprising in Xihu District, the Jiangxi Revolutionary Martyrs Memorial Hall in Donghu District, and the Exhibition Hall of the New Fourth Army Headquarters Site in Xihu District. Such geographic concentration facilitates field study activities organized by universities and reduces the spatial coordination costs between universities and venues. Furthermore, as core bases for patriotism education and Party history learning, these revolutionary venues are functionally aligned with universities' fundamental mission of fostering virtue through education. Their clear educational orientation provides a natural value foundation for collaborative education between universities and cultural institutions.

Second, policies at both national and local levels provide strong institutional support for university- museum collaborative education in red culture in Nanchang.The Guidelines for the Implementation of the Revolutionary Cultural Relics Protection and Utilization Project (2023–2027) explicitly encourages revolutionary cultural relics protection institutions to establish cooperative mechanisms with universities and primary/secondary schools to develop school- based curricula and study- tour programs.Jiangxi Province has released the Construction Plan for the Red Culture Inheritance and Innovation Demonstration Zone of Jiangxi Province, which emphasizes deepening university- museum partnerships and building digital education platforms for red culture.Nanchang has promulgated the Regulations on the Protection and Utilization of Red Cultural Resources in Nanchang, which encourages universities, research institutes, and red cultural venues to jointly conduct research, education, and communication on red culture.Collectively, these policies form a comprehensive policy support system covering national, provincial, and municipal levels, offering clear policy foundations and strategic guidance for the digital transformation of university- museum collaborative education.

Third, in terms of digital transformation foundations and potential, Nanchang has already established a preliminary digital infrastructure. The Memorial Hall of the August 1st Uprising in Nanchang has developed a digital exhibition hall and VR-based red experience projects, while the Jiangxi Revolutionary Martyrs Memorial Hall has launched an online memorial platform and a digital cultural relics database. Additionally, several universities have developed online courses on red culture, laying a preliminary groundwork for digital collaboration. The widespread application of technologies such as 5G, VR/AR, big data, and artificial intelligence in Nanchang provides robust technical support for the immersive transformation of red cultural resources, real-time sharing of inter-institutional data, and precision management of the educational process. These technological enablers facilitate the transition from "one-way offline communication" to "online-offline interaction" and "personalized precision education." Furthermore, as digital natives, young students demonstrate a strong demand for interactive, immersive, and personalized educational approaches. Digital transformation effectively enhances the appeal and effectiveness of red culture education, aligning with the demand-oriented paradigm of talent cultivation in the new era and providing powerful demand-driven momentum for the advancement of digital collaborative education

4. Core Management Dilemmas of University- Museum Collaborative Education in Nanchang's Red Culture Under Digitalization

4.1. Governance Level: Insufficient Digitalization of Collaborative Governance Mechanisms

Barriers to multi- stakeholder collaboration remain unaddressed. Universities, revolutionary cultural venues, and government departments lack a unified digital collaboration platform. Communication and coordination still rely heavily on offline meetings and ad hoc interactions, leading to cumbersome procedures and delayed responses. For example, organizing study tours requires repeated offline communication and reservation between universities and venues, and policy communication from government is transmitted hierarchically, making it difficult to establish a normalized collaborative mechanism (Wu & Sun, 2025). Responsibility allocation and benefit- sharing arrangements remain ambiguous. There are no clear institutional rules governing responsibilities for digital collaboration construction, permissions for resource sharing, or assessment of educational effectiveness. Universities lack enthusiasm due to concerns about high costs of digital resource integration, while venues limit openness in the absence of a clear benefit compensation mechanism for resource provision, thus weakening collaborative motivation (Zhou & Tuerdi, 2025). Policy support and resource assurance are inadequate. Government investment, technical support, and policy guidance for digitalized university- museum collaboration remain limited, with few dedicated supporting policies and overall coordination mechanisms. The development of digital platforms and digitization of cultural resources require substantial financial and technical inputs (Zeng, 2025), yet existing fiscal support is fragmented and insufficient, restricting the large- scale advancement of digital collaboration.

4.2. Resource Dimension: Lagging Digital Transformation and Management

The digitalization of resources remains comparatively low. Most revolutionary cultural resources remain at the traditional exhibition stage, with severely insufficient supply of digital resources. Existing digital resources are largely limited to superficial forms such as images and texts, lacking in-depth products including VR/AR immersive content and interactive curricula, which fails to satisfy students' demand for in-depth experiences of revolutionary culture (Xu, 2025). Digital resource integration is fragmented. Digital resources held by universities and cultural venues operate in isolation: universities focus on the digital presentation of revolutionary cultural theories, while venues prioritize the digital display of cultural relics and historical scenes. The absence of a unified resource database and sharing platform results in the coexistence of redundant development and supply-demand mismatch. For instance, digital resources of revolutionary historical scenes needed by universities are underdeveloped by venues, while existing digital relic resources from venues are underutilized by universities, impeding the formation of a systematic digital educational resource system (Zhang, 2025). Digital resource standards are inconsistent across institutions. Digital resources from different venues vary in formats, technical specifications, and metadata standards. For example, digital resources from the Nanchang August 1st Uprising Memorial Hall adopt specialized VR formats, whereas online resources from the Jiangxi Revolutionary Martyrs Memorial Hall are predominantly video-based. Incompatible data interfaces between universities and venues increase barriers to resource sharing and integration, substantially weakening the efficiency of collaborative education.

4.3. Organizational Dimension: Weak Digital Operation Capabilities

The organizational structure lacks digital adaptability. Neither universities nor cultural venues have established dedicated departments for digital university-venue collaborative education. In universities, revolutionary culture education is mostly assigned part-time to schools of ideological and political education or student affairs offices; in venues, digital initiatives are often implemented sporadically by technical units. The existing organizational structure centers on traditional education administration and venue operation, making it difficult to coordinate systematic tasks such as digital resource development, collaborative process optimization, and educational program design (Zhang, 2026). A severe shortage of interdisciplinary talent persists. There is a critical lack of professionals who combine solid knowledge of revolutionary culture, educational administration competence, and digital technology application skills. University instructors excel in revolutionary culture teaching yet lack capabilities in digital instructional tools and online course design; venue staff are familiar with revolutionary cultural resources but are weak in digital resource development and online service operation. Such mismatches fail to support the full-cycle demands of digital collaborative education (Zhu, 2025). The performance management system is misaligned. Performance evaluation of university-venue collaboration still relies heavily on traditional indicators such as participant numbers and activity frequency, while core indicators including digital resource utilization rate, educational precision, and student satisfaction are largely excluded. Consequently, universities and venues prioritize formal collaborative activities over substantive effects of digital transformation, leading organizational operations to deviate from the core goals of digital education.

4.4. Educational Dimension: Insufficient Digital Services and Experiences

The supply of digital educational products is homogeneous. Existing digital education products mainly take the form of one-way output such as online visits and online courses, lacking in-depth products including personalized recommendation, interactive experience, and immersive study tours. They can hardly meet students' diverse and personalized learning needs. Students of different majors and grades have differentiated demands for Red Culture learning, yet current digital products are uniform and fail to realize targeted supply (Wang, 2025). The digitalization of the education process is low. Full-process digital coverage from resource inquiry, appointment and registration, study tour implementation to effectiveness evaluation is insufficient. Students need to learn about study tour information through university official websites, make appointments via venue telephone, and fill in paper feedback forms after offline participation. The process is cumbersome and inefficient, imposing heavy management burdens on universities, and the convenience and experience of the education process need to be improved (Hu, 2025). The digital evaluation of educational effectiveness is absent. There is a lack of a big data-based tracking and evaluation system for educational effectiveness, making it difficult to accurately grasp students' learning trajectories, cognitive changes, and value identification. Data such as students' online learning duration and interaction frequency fail to be effectively collected, and the mastery of Red Culture knowledge and the internalization of Red Spirit are hard to quantify. Consequently, the optimization and adjustment of education programs lack scientific data support, making it challenging to continuously improve educational effectiveness (Zhao, 2025).

5. Mechanisms Underpinning University-Museum Collaborative Education on Red Culture in Nanchang Under Digitalization

5.1. Collaborative Governance Mechanism

The collaborative governance mechanism serves as the institutional guarantee for the effective implementation of digital university-museum collaborative education. Its core logic lies in using digital technologies to break down multi-stakeholder collaboration barriers and form a collaborative structure featuring government guidance, university-museum leadership, and technological support (Peng & Zhang, 2024). At the government level, a digital collaborative coordination mechanism is established to integrate resources across education, culture, and finance sectors, provide policy and financial support, and clarify the division of responsibilities and benefit-sharing rules among multiple stakeholders. At the university-museum level, a digital collaboration platform enables resource sharing, process docking, and information exchange, streamlining collaboration procedures and improving response efficiency. For instance, universities can directly reserve digital resources and study venues through the platform, while venues can obtain educational demands from universities and optimize resource supply. At the multi-stakeholder level, clear institutional provisions and benefit-sharing mechanisms stimulate collaborative motivation among universities and museums, forming a closed-loop collaborative governance system of policy guidance – platform support – clear rights and responsibilities –

benefit sharing, which provides a stable institutional environment for digital collaborative education.

5.2. Digital Empowerment Mechanism

The digital empowerment mechanism serves as the core value realization path of University-Museum Collaborative Education on Red Culture under the Digital Context. Its core logic lies in empowering resource transformation, process optimization, and service upgrading through digital technologies, thereby achieving targeted supply and high efficiency in Red Culture education (Li et al., 2023). In terms of resource transformation, technologies such as VR/AR and big data facilitate the digital collection, immersive conversion, and innovative development of Red Culture resources, transforming static cultural relics and historical scenes into dynamic digital resources and enriching the supply of digital resources. In terms of process optimization, the Digital Collaborative Platform reconstructs the collaborative processes of resource inquiry, reservation, study tours, and effectiveness evaluation between universities and museums, realizing full-process onlineization management and improving collaborative efficiency. In terms of service upgrading, data mining and precise matching are adopted to analyze students' learning preferences and demands, enabling personalized recommendation of digital resources and targeted supply of educational services. Accordingly, a digital empowerment closed loop of resource digitalization – process onlineization – targeted service supply is formed, providing core support for digital University-Museum Collaborative Education.

5.3. Organizational Adaptation Mechanism

The organizational adaptation mechanism acts as the core support for the sustainable advancement of digital university-museum collaborative education on Red Culture. Its core logic is to enhance the digital operation capacity of university-museum collaboration through systematic optimization of organizational structure, talent development, and performance management (Li, 2021). In terms of organizational structure, the establishment of dedicated administrative departments for digital collaborative education breaks down traditional organizational barriers and enables professional coordination of digital resource development, collaborative project management, and educational services. In terms of talent development, interdisciplinary talents with integrated Red Culture literacy, educational administration competence, and digital technology application capabilities are cultivated through university-venue cooperation, on-the-job training, and talent introduction to fill talent shortages. In terms of performance management, a comprehensive performance evaluation system is constructed that integrates digital resource utilization rate, educational precision, student satisfaction, and the effectiveness of Red Spirit inheritance. This system steers organizational operation back to the core goals of digital education. Accordingly, a closed loop of organizational adaptation featuring structure optimization – talent support – performance guidance is formed, providing sustained capability support for digital collaborative education.

5.4. Effectiveness Improvement Mechanism

The effectiveness improvement mechanism represents the ultimate goal-achieving path of digital university-museum collaborative education on Red Culture. Its core logic is to empower the whole process of education through digital technologies, driving the transformation of Red Culture education from formal participation to value identification (Wang & Mu, 2021). At the demand identification stage, big data analytics are applied to examine students' learning preferences, cognitive levels and interests, so as to accurately capture educational demands. At the process engagement stage, digital products such as VR/AR immersive experiences, interactive courses and personalized study tours enhance student participation and emotional resonance. At the effectiveness evaluation stage, a digital evaluation system tracks students' learning trajectories, quantifies their cognitive changes and value identification, and dynamically optimizes educational programs based on evaluation results. Accordingly, a closed loop for effectiveness improvement is formed: demand identification – in-depth engagement – quantitative evaluation – iterative optimization, which ensures the continuous enhancement of Red Culture education effectiveness.

6. Conclusion and Future Directions

6.1. Research Findings

First, under the Digital Context, University-Museum Collaborative Education on Red Culture in Nanchang faces systematic management dilemmas across four dimensions—governance, resources, organization, and education—with these challenges intertwining to form a vicious cycle. Insufficient digitalization of Collaborative Mechanisms at the governance level leads to inefficient multi-stakeholder linkage and weak motivation. Lagging digital transformation and management of resources result in inadequate supply and barriers to sharing of Digital Resources. Weak digital operation capabilities at the organizational level hinder the implementation of digital transformation. Meanwhile, insufficient digital services and experiences in education undermine educational effectiveness, which in turn further reduces multi-stakeholder enthusiasm for collaboration. This forms a vicious cycle of inadequate governance collaboration → delayed resource digitalization → weak organizational capabilities → poor educational effectiveness → declining collaborative motivation, becoming the core obstacle restricting the digital transformation of University-Museum Collaborative Education on Red Culture in Nanchang. The essence of these dilemmas lies in the ineffective integration of digital technologies with the management mechanisms of university-museum collaborative education, as traditional collaborative models and management systems struggle to adapt to the demands of the digital era.

Second, collaborative governance theory and digital governance theory serve as the core theoretical pillars of University-Museum Collaborative Education on Red Culture in Nanchang under the Digital Context, forming a complementary theoretical system. Collaborative governance theory offers a methodological framework for addressing multi-stakeholder and cross-organizational collaboration challenges. Its inherent logic—emphasizing multi-actor synergy, division of responsibilities, and benefit-sharing—aligns with the organizational attributes of university-museum collaborative education, providing a theoretical rationale for dismantling collaboration barriers. Digital governance theory, by contrast, underpins digital transformation, with its focus on digital platform development, data sharing, and technological empowerment offering theoretical guidance for resource digital conversion, process optimization, and service enhancement. The organic integration of these two theories transcends the limitations of a single theoretical lens, laying a robust foundation for systematically resolving management dilemmas and formulating optimization pathways.

Third, the effective advancement of University-Museum Collaborative Education on Red Culture in Nanchang under the Digital Context necessitates constructing a systematic optimization framework across five dimensions—governance, resources, organization, education, and technology—grounded in collaborative governance and digital governance theories, and directly targeting the four core management dilemmas. Specifically, it requires improving the digital collaborative governance system to break multi-stakeholder collaboration impasses; advancing the digital transformation of Red Culture resources to enrich content provision; strengthening organizational digital empowerment to boost operational capacities; optimizing digital educational services to enhance educational outcomes; and reinforcing technical support and security safeguards to consolidate the foundation for transformation. These five interrelated pathways, when synergistically implemented, can break the vicious cycle, driving the transition of University-Museum Collaborative Education on Red Culture in Nanchang from traditional offline collaboration to in-depth digital collaboration, and ultimately achieving the dual dividends of Red Culture inheritance and talent development.

6.2. Optimization Pathways

6.2.1. Improve the Digital Collaborative Governance System

Led by the Nanchang Municipal Bureau of Education and the Bureau of Culture, Radio, Television, Tourism and Sports, and in conjunction with departments such as the Finance Bureau and Science and Technology Bureau, an interagency leading group for the digital advancement of University-Museum Collaborative Education on Red Culture in Nanchang should be established. This group will convene regular collaborative meetings to coordinate policy formulation, resource allocation, project implementation, and dispute resolution, thereby dismantling inter-departmental silos and barriers between universities and museums. A dedicated digital platform for University-Museum Collaborative Education on Red Culture in Nanchang should be developed, integrating functions including resource display, reservation and docking, project application, data sharing, and effectiveness evaluation. This platform will enable precise online matching between universities and museums, streamline collaborative processes, and enhance response efficiency. Additionally, the Implementation Measures for the Digital Construction of University-Museum Collaborative Education on Red Culture in Nanchang should be formulated to clarify the rights, responsibilities, and obligations of universities and museums in areas such as digital resource development, open sharing, talent cultivation, and performance evaluation. A special support fund should also be established to provide financial subsidies and technical assistance for digital collaborative projects, thereby stimulating the collaborative motivation of all stakeholders.

6.2.2. Promote the Digital Transformation of Red Culture Resources

A comprehensive digital census of Nanchang’s Red Culture resources should be conducted to collect basic data including texts, images, audio, and video materials. A unified digital resource database for Red Culture will be established, clarifying the educational attributes, applicable academic stages, and digital transformation directions of each resource. Priority should be given to developing VR/AR immersive experience projects, such as the restoration of the Nanchang August 1st Uprising scenes and interactive exhibitions of revolutionary martyrs' deeds. Digital interactive courses will be created to integrate Red Culture into ideological and political education and history curricula. Diversified products including digital study tour handbooks and Red Culture story animations will be produced to enrich the supply of digital resources.

Furthermore, unified digital standards and specifications for Nanchang's Red Culture resources should be formulated, standardizing resource formats, technical parameters, metadata specifications, and data interfaces. Relying on the digital collaborative platform, an open and shared digital resource repository will be constructed to realize interconnection and on-demand access of resources between universities and museums, thereby avoiding redundant development.

6.2.3. Strengthen Organizational Digital Empowerment

First, optimize organizational structure design. Universities should establish a "Digital Red Culture Education Center" to coordinate digital resource docking, study tour project design, and educational effectiveness evaluation. Revolutionary venues should set up a "University-Museum Collaborative Digital Service Department" responsible for digital resource opening, collaborative project connection, and online service provision, thereby realizing professional management.

Second, implement a talent-driven management initiative. Collaborate with universities such as Nanchang University and Jiangxi Normal University to launch training programs related to digital Red Culture education, enhancing university teachers' digital teaching capabilities and venue staff's digital service capacities. Introduce interdisciplinary talents with integrated Red Culture literacy, educational management experience, and digital technology backgrounds to enrich the university-museum collaborative education team. Establish a digital education talent pool to achieve talent resource sharing.

Third, digitize the entire collaborative process, including resource inquiry, registration, study tour organization, and feedback collection, to realize full-process digital management and improve efficiency and convenience. Construct a comprehensive performance evaluation system that incorporates indicators such as digital resource utilization rate, student satisfaction, educational precision, and Red Spirit inheritance effectiveness. Recognize and reward universities and venues with outstanding performance to guide the direction of organizational operations.

6.2.4. Enhance Digital Educational Effectiveness

A personalized education system should be constructed by leveraging student data from the Digital Collaborative Platform—the core infrastructure for University-Museum Collaborative Education on Red Culture. Through analyzing students' learning preferences, cognitive levels, and interest points, individual student profiles are established to deliver tailored digital resource recommendations, study tour program designs, and learning path planning, thereby realizing "person-specific" targeted education that aligns with diverse learning needs. Cutting-edge technologies including 5G, VR/AR, and the metaverse are harnessed to develop immersive Red

Culture learning scenarios, such as virtual tours of the Nanchang August 1st Uprising Memorial Hall and participation in revolutionary history situational simulations. Blended online-offline study tour activities are implemented: pre-learning and theoretical acquisition are completed via the Digital Collaborative Platform, while offline sessions involve on-site study tours and practical experiences. This integrated model strengthens student engagement and emotional resonance with Red Culture, addressing the inadequacy of one-way educational delivery. A digital evaluation index system for Red Culture educational effectiveness is developed, encompassing dimensions of knowledge mastery, emotional identification, and behavioral transformation. Students' cognitive changes and value recognition are quantified through multi-method assessment, including online questionnaires, learning trajectory analysis, and practical performance evaluation. A feedback loop for evaluation results is established to dynamically optimize digital resources and educational programs, forming a continuous improvement mechanism that ensures the sustained enhancement of digital collaborative education outcomes.

6.2.5. Strengthen Technical Support and Security Assurance

Universities and museums should be supported in upgrading digital infrastructure, enhancing network bandwidth, storage capacity, and computing power to provide technical underpinnings for digital resource development and University-Museum Collaborative Education on Red Culture. Advanced technologies including artificial intelligence (AI), big data, and blockchain are introduced to improve the intelligence level of the Digital Collaborative Platform and reinforce data security capabilities, addressing technical bottlenecks in large-scale resource sharing and real-time collaborative interaction. A security management framework for digital Red Culture resources should be formulated, clarifying security requirements across the entire data lifecycle—including collection, storage, transmission, and utilization. A data backup and emergency response mechanism is established to mitigate risks such as data leakage and loss. Special emphasis is placed on protecting students' personal information, with strict compliance with data security laws and regulations to ensure the safety and legitimacy of the digital education process.

6.3. Research Prospects

First, deepen the empirical evaluation research on the performance of digital collaborative education. The optimization pathways proposed in this study provide theoretical and practical guidance for University-Museum Collaborative Education on Red Culture in Nanchang, but quantitative empirical verification remains absent. Future research could construct a scientific performance evaluation index system, select representative universities and revolutionary venues in Nanchang as research samples, and conduct empirical analysis on the effectiveness of the proposed pathways through methods such as questionnaires, in-depth interviews, and data statistics. This would quantify the impact of each optimization measure on educational effectiveness, providing data support for the further refinement of the pathways. Simultaneously, longitudinal tracking surveys could be implemented to analyze the dynamic evolution laws of the digital collaborative education model, offering a basis for the continuous optimization of management strategies.

Second, expand research on digital collaborative education for different types of Red Culture resources. Nanchang's Red Culture resources cover diverse categories including revolutionary history, martyrs' deeds, and Red Spirit, with significant differences in digital transformation difficulty, educational methods, and collaborative needs among these resource types. While the optimization pathways proposed in this study address general issues, they lack sufficient attention to differentiated challenges. Future research could conduct specialized studies on different types of Red Culture resources, analyzing their unique digital transformation pathways and collaborative education strategies—such as immersive digital education approaches for revolutionary historical sites and story-driven digital communication strategies for martyrs' deeds. This would provide more targeted solutions for the precise advancement of University-Museum Collaborative Education on Red Culture in Nanchang.

Third, explore the innovative application of emerging digital technologies in collaborative education. With the rapid development of emerging digital technologies such as artificial intelligence (AI), the metaverse, and blockchain, the scenarios and models of University-Museum Collaborative Education on Red Culture are undergoing profound transformations. Although this study proposes technical support pathways, it lacks in-depth discussion on the integration of emerging technologies with management mechanisms. Future research could focus on the innovative application of emerging digital technologies, such as AI-based personalized education recommendation systems, metaverse-enabled virtual study communities for Red Culture, and blockchain-based copyright protection and sharing mechanisms for Red Culture resources. This would explore new paradigms of University-Museum Collaborative Education on Red Culture in the context of emerging technologies, promote the advancement of optimization pathways with the times, and inject new momentum into the high-quality development of Red Culture education in Nanchang.

Author Contributions:

All authors have read and agreed to the published version of the manuscript.

Funding:

This research was supported by the Social Science Planning Project of Nanchang City (Project ID: SK2025034) and the Teaching Reform Research Project of Colleges and Universities in Jiangxi Province (Project ID: JXJG-24-25-5).

Institutional Review Board Statement:

Not applicable.

Informed Consent Statement:

Not applicable.

Data Availability Statement:

Not applicable.

Acknowledgments:

Not applicable.

Conflicts of Interest:

The authors declare no conflict of interest.

References

Chen, J., & Wang, L. Y. (2023). Mechanisms and paths of enterprise digital transformation from the perspective of organizational capability. Journal of Management World, (5), 123–135, 198.

Chen, Q. S. (2025). Values and paths of integrating red culture into class management in colleges and universities. Journal of Anqing Normal University (Social Science Edition), 44(5), 72–76.

Cui, H. Y., Guo, M. M., Xu, H., Chen, H. C., Lu, H., Wang, Q., … Ma, Y. M. (2025). Special research on integrating curriculum ideology and politics into ideological and political courses in the new era (Symposium). Journal of Shenyang Normal University (Social Science Edition), 49(6), 3–32.

Department of Culture and Tourism of Jiangxi Province. (2023). Construction plan for the demonstration zone of inheritance and innovation of red culture in Jiangxi Province.

Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). Digital era governance: IT corporations, the state, and e-government. Oxford University Press.

Guo, S. Y. (2025). Research on integrating red cultural resources into ideological and political education in Henan. China Civilian Veterans, (20), 199–201.

Han, Y. J., & Zou, H. L. (2025). Research on paths of integrating red culture into education in higher vocational colleges. New Legend, (40), 73–75.

Hu, F. F. (2025). Exploration of paths for integrating red cultural resources into education in higher vocational colleges: A case study of Lianyungang Technical College. New Legend, (40), 70–72.

Hu, Z. Z. (2025). Practical exploration of red cultural resources empowering ideological and political theory courses in colleges and universities. Theory and Practice of Education, 45(21), 45–49.

Ji, Z. Q., & Wang, J. Y. (2025). Three-dimensional exploration of integrating red culture into ideological and political education in colleges and universities. Journal of Shanxi Institute of Energy, 38(5), 1–4.

Li, L., Hu, J., & Li, L. (2023). Exploration and practice of Anyuan red culture education system: A case study of Jiangxi Vocational and Technical College of Applied Engineering. Journal of Hunan Mass Media Vocational and Technical College, 23(4), 87–92.

Li, S. M. (2021). Theoretical reflection on the educational practice of Zhang Wentian Memorial Hall: Also on the development and utilization of red cultural resources in colleges and universities. Journal of Hohai University (Philosophy and Social Sciences), 23(2), 21–27, 106.

Li, Z. J. (2022). Values, dilemmas, and paths of educating people with red cultural resources. Journal of Ideological & Theoretical Education, (3), 124–128.

Liu, H., & Zheng, B. (2025). Internal logic, practical problems, and implementation paths of integrating red culture into ideological and political education in colleges and universities. Journal of Nanchang Normal University, 46(5), 82–86.

Liu, P. L., & Guo, Y. (2025). Research on paths of red culture empowering psychological education in ideological and political courses in higher vocational colleges. Journal of Shanxi Open University, 30(5), 38–42.

Nanchang Municipal Bureau of Culture, Radio, Television and Tourism. (2024). Regulations on the protection and utilization of red cultural resources in Nanchang.

Peng, G. G., & Zhang, Y. (2024). Research and practice of ideological and political education through museum-school integration. China Newspaper Industry, (12), 254–256.

People's Daily. (2024, June 18). Deepening museum-school collaboration to inherit red genes.

Qiu, J., Zhang, C., & Qiu, J. (2025). Practical dilemmas and mechanism optimization of red culture education based on museum-school collaboration. Data of Culture and Education, (23), 103–105.

Wang, A. P., & Mou, H. Y. (2021). Obstacles and paths of integrating red cultural resources into ideological and political education in colleges and universities under the information environment. Journal of West Anhui University, 37(1), 43–47.

Wang, M., & Yang, L. (2021). Research on university-local cooperation mechanisms from the perspective of collaborative governance. Chinese Public Administration, (9), 78–84.

Wang, S. Y., & Wang, Y. (2021). Research on the innovation of red culture education mechanisms in the new era. Studies on Marxism, (7), 143–152, 160.

Wang, X. Q. (2025). Practical research on local red cultural resources empowering military theory education in colleges and universities. Journal of Zhangzhou Institute of Technology, 27(3), 8–14.

Wang, X. Q. (2025). Value implications and practical paths of cultivating new-era talents with red culture. Journal of Anhui Water Resources and Hydropower Vocational and Technical College, 25(5), 92–96.

Wang, Y. (2025). Practical paths of integrating red culture into ideological and political education in colleges and universities. Journal of Shanxi Open University, 30(5), 38–42.

Wu, X. X., & Sun, J. Y. (2025). Practical paths of red culture empowering ideological and political course teaching in higher vocational colleges from the perspective of digital intelligence. Central Plains Culture and Tourism, (19), 216–218.

Xu, Q. (2025). Practical paths of integrating red culture into the cultural education system of colleges and universities in the new era. New Legend, (36), 71–73.

Yu, K. P. (2014). Collaborative governance and good governance. Central Compilation & Translation Press.

Zeng, H. E. (2025). Exploration of paths for local university journals to participate in "all-round education": A case study of Journal of Longyan University. Journal of Longyan University, 43(5), 103–109.

Zhang, C. F., & Wang, F. Y. (2022). Theoretical framework and practical paths of digital governance. Chinese Public Administration, (1), 42–49.

Zhang, J. J. (2025). Cultural empowerment: Development and utilization of material, institutional, and customary cultural heritage in tourism. Ethno-National Studies, (4).

Zhang, L. C. (2025). Integrating red culture into the "great ideological and political courses" in colleges and universities: Value implications and path selection. Journal of Jianghan Petroleum Staff University, 38(5), 70–72.

Zhang, X. (2026). Research on practical paths of red culture enhancing ideological and political leadership. Heilongjiang Education (Theory and Practice), (2), 93–96.

Zhao, Y. (2025). Research on the "museum-school-locality" integrated education model of red cultural resources under the "great ideological and political" pattern. Comparative Study of Cultural Innovation, 9(17), 115–119.

Zhou, J., & Ayxamgul Turdi. (2025). Value analysis of digital technology empowering red cultural resources education in colleges and universities. Journal of Qiqihar University (Philosophy and Social Science Edition), (9), 156–159.

Zhou, J., & Fan, S. S. (2018). Strategies for promoting the construction of red culture education bases in higher vocational colleges through museum-school collaboration: A case study of the Memorial Hall of the New Fourth Army Headquarters. Comparative Study of Cultural Innovation, 2(11), 13, 16.

Zhu, D. D. (2025). Construction and practical innovation of a ternary collaborative mechanism for red culture education in "great ideological and political courses" from the perspective of empowerment theory. Journal of Jiangxi Open University, 27(3), 17–22.

The Development of Humanities and Social Sciences, 2026, 2(1), 132-141
https://doi.org/10.71204/y0vbjt88

Research on International Pharmaceutical Marketing Strategies from a Cross-Cultural Perspective

Xiaoqi Shao [1,*]

[1] School of Management, Tianjin University of Traditional Chinese Medicine, Tianjin 301617, China

***Corresponding Author**
Xiaoqi Shao

18702230016@163.com

Received: 26 February 2025 / Accepted: 10 March 2026 / Published online: 14 March 2026

Abstract

This study grounded in the realities of economic globalization and the deepening internationalization of the pharmaceutical industry, focuses on the core cross-cultural marketing challenges faced by multinational pharmaceutical companies. It systematically reviews existing research findings on international pharmaceutical marketing strategies from a cross-cultural perspective. Three major gaps currently exist in this field: insufficient integration of classical cross-cultural theories with the specific characteristics of the pharmaceutical industry, incomplete coverage of emerging markets, and lagging research on adaptation to digital scenarios. This review constructs a systematic analytical framework to integrate existing theoretical and empirical research, clarifying the field's research trajectory and existing limitations. It provides scientific reference for multinational pharmaceutical companies in formulating cross-cultural marketing strategies while pointing the way for future research in this area, thereby contributing to the healthy and orderly development of the global pharmaceutical market.

Keywords: Cross-Cultural Marketing; International Pharmaceutical Market; Pharmaceutical Marketing Strategy; Cultural Differences; Cultural Adaptation

1. Introduction

The ongoing advancement of economic globalization and the deepening internationalization of the pharmaceutical industry have placed multinational pharmaceutical companies in an international market environment characterized by both opportunities and challenges. Pan (2021) points out that cultural differences are the core variable of environmental differences in international marketing.As special commodities concerning life and health, pharmaceutical products face stringent constraints in marketing activities due to technological and regulatory factors, while also being deeply intertwined with target market cultures. Differences in health perceptions, healthcare systems, medication habits, and consumer behaviors across nations directly impact product market acceptance: consumers in collectivist cultures rely on family/community advice for decision-making, whereas individualist cultures emphasize autonomous choice; Eastern cultures exhibit higher demand for integrating traditional medicine with modern pharmaceuticals, while Western markets place greater trust in evidence-based medicine. In the post-pandemic era, emerging markets like Southeast Asia and Latin America are unlocking pharmaceutical consumption potential, yet cultural diversity and uneven development intensify marketing challenges for pharmaceutical companies.

Current research exhibits significant shortcomings: most studies rely on single-market case studies lacking cross-cultural comparative depth; prevalent cross-cultural theories fail to account for the pharmaceutical industry's stringent regulations and product sensitivity, resulting in a disconnect between theory and practice. Liu (2016) and the International Journal of Communication (2021) emphasize that high-quality reviews must balance theoretical rigor with industry-specific relevance to address research fragmentation.

The theoretical significance of this study lies in: systematizing the application of classic cross-cultural theories in the pharmaceutical sector, integrating empirical findings, constructing an industry-specific analytical framework, and deepening theoretical understanding of cultural factors and pharmaceutical marketing performance. This aligns with the development direction proposed by Cross-Cultural Research (2023) for deep integration between theory and industry contexts.

The practical significance lies in: providing reference for multinational pharmaceutical companies to accurately identify cultural needs and barriers, optimize marketing mixes, and enhance market competitiveness; it provides a basis for regulatory bodies to establish market standards; simultaneously, it enhances global accessibility of pharmaceutical products, promotes cross-cultural exchange of health concepts, and contributes to global health governance. Research by Tong (2021) and Chen (2022) further confirms that industry-specific marketing reviews hold significant guiding value for corporate practice.

Rigorous literature retrieval and a clear analytical framework form the core foundation of review studies (Zhang, 2016; Diao & Zhan, 2019). This study's literature search covered core databases and authoritative industry reports in both Chinese and English: English databases included Web of Science Core Collection, Scopus, PubMed, and ScienceDirect, while Chinese databases focused on CNKI, Wanfang, and CSSCI-sourced journals.

The search employed a multidimensional keyword combination strategy. Core keywords included cross-cultural marketing, international pharmaceutical marketing, cultural differences, cultural adaptation, and pharmaceutical marketing strategies. Theoretical keywords such as Hofstede's cultural dimensions and Trompenaars' cultural model were expanded upon, supplemented with regionalization-specific keywords to avoid overlooking niche market research. The search period spans 2010-2024, supplemented by foundational theoretical literature published prior to 2010.

Literature screening prioritized peer-reviewed papers from SSCI, SCI, and CSSCI core journals, incorporated reports from authoritative bodies like WHO and PhRMA, and excluded nonacademic content. This yielded a sample database of over 230 Chinese and English documents, adhering to the academic research standards proposed by Cross-Cultural Research (2023).

This study constructs a four-dimensional analytical framework: "Cultural Dimensions - Marketing Elements - Performance Outcomes - Challenge Responses."Cultural dimensions center on Hofstede's six dimensions and Trompenaars' cultural model to analyze consumer perception and decision-making differences. Marketing elements focus on product, price, channel, promotion, and compliance strategies. Performance outcomes evaluate strategy effectiveness through metrics like market share and consumer trust. Challenge responses encompass cultural barriers, trust-building, and the balance between compliance and adaptation.

This framework systematically integrates research findings, clarifies research trajectories, and identifies gaps， including insufficient emerging market studies, lack of digital adaptation research, and scarcity of studies on compliance-adaptation balancing mechanisms， providing clear logical guidance for subsequent analysis.

2. Evolution of Cross-Cultural Marketing Theory Application in the Pharmaceutical Sector

2.1. Review of Foundational Classical Cross-Cultural Theories

Classical cross-cultural theories form the core theoretical foundation for pharmaceutical cross-cultural marketing, providing frameworks for understanding consumer behavior and market logic. Their core concepts, application value, and limitations are as follows:

Hofstede's Cultural Dimensions Theory proposes six dimensions—including power distance and individualism/collectivism—offering quantitative analysis tools for pharmaceutical marketing. Markets with high power distance (East Asia, Latin America) rely on authoritative institutions and expert endorsements, while individualism-dominated markets (Europe, America) emphasize personal health needs. Cultures with high uncertainty avoidance demand greater drug safety assurances, necessitating robust clinical data and regulatory approval evidence.

Hall's high-context/low-context cultural theory directly guides marketing communication strategies: High-context cultures (China, Japan) rely on nonverbal cues and long-term relationships, requiring pharmaceutical companies to emphasize physician-patient collaboration and relationship building; low-context cultures (US, Germany) prefer direct information delivery, necessitating marketing focus on efficacy data and ingredient explanations. Li (2023) and Song (2024) confirmed that high-low context adaptation significantly enhances communication effectiveness; Samiuddin (2023)'s global research corroborates this conclusion.

Tepstra's International Marketing Culture Model influences the marketing mix across four levels: values, norms, symbols, and behavior. At the values level, Western cultures prioritize disease treatment while Eastern cultures emphasize prevention and wellness, necessitating product positioning adjustments. At the symbols level, pharmaceutical packaging must avoid cultural taboos. At the behavior level, Western markets favor self-medication while Asian markets rely on prescriptions, directly impacting channel strategies. Li (2024), Zhang (2021), and Jia (2023) applied this model to consumer electronics, infant products, and cosmetics industries, providing reference for the pharmaceutical sector.

The Clark-Horn-Stott-Beck Value Orientation Theory analyzes cultural differences across five dimensions, including human-nature relations and time perception: Western cultures emphasize“conquering nature”with marketing highlighting disease treatment efficacy; some Eastern cultures prioritize “harmonious coexistence”focusing on natural ingredients and gentle therapeutic effects; short-term oriented cultures seek immediate results, while long-term oriented cultures value sustained health benefits.

While classic theories lay the groundwork, they exhibit clear limitations: predominantly built on Western samples, they lack explanatory power for non-Western cultures like Africa and the Middle East; they fail to account for the pharmaceutical industry's highly regulated and specialized nature, resulting in a disconnect between theory and practice. Liu and Ren (2017) argue that classic theories require industry-specific localization adjustments, with subsequent research needing to develop a dedicated theoretical model for pharmaceuticals.

2.2. Deepening Cultural Adaptation Theories in Pharmaceutical Marketing

The application of cross-cultural theories in pharmaceuticals is not a static transplant but involves deepening toward refinement and systematization by integrating industry characteristics. The core lies in constructing an adaptation framework tailored to pharmaceutical products and cultural contexts.

Cultural adaptation evolves from superficial symbol adjustments to deeper value resonance. Early adaptation focused solely on language translation and visual localization. Recent research reveals that pharmaceutical marketing must align with the health values of target markets. In collectivist cultures, linking drugs to family health fosters greater acceptance; in individualist cultures, emphasizing personal quality-of-life improvements proves more compelling. Ignoring these value differences risks triggering trust crises.

Cultural adaptation expands from single-dimensional to multidimensional integration. Pharmaceutical marketing must account for the interplay of multiple cultural dimensions. For instance, in cultures with high power distance and high uncertainty avoidance, authoritative endorsements and clinical data are needed to mitigate consumer risk. Long-term versus short-term oriented cultures demand distinct marketing approaches for chronic disease management versus rapid symptom relief.

Cultural adaptation must balance pharmaceutical ethics and regulatory requirements. The highly regulated nature of the pharmaceutical industry dictates that adaptation cannot breach compliance boundaries. Regulatory rules governing digital marketing and advertising vary across markets due to cultural differences, while ethical considerations such as data privacy must also be addressed.

In summary, the theory of cultural adaptation in pharmaceutical marketing forms a four-dimensional framework:“Values-Dimension Integration-Full-Chain Adaptation-Compliance and Ethics”, providing precise theoretical guidance for empirical research and strategy formulation.

3. Empirical Research on Cross-Cultural Strategies in International Pharmaceutical Marketing

3.1. Study on the Influence of Cultural Differences on Marketing Strategy Selection

Cultural differences profoundly influence pharmaceutical marketing strategy selection through four dimensions: value systems, health perceptions, communication contexts, and regulatory cultures. Due to the unique nature of pharmaceutical products, this interaction exhibits complex mechanisms.

Value differences determine product positioning: Collectivist markets emphasize family health and well-being： e.g., Thailand's childhood vaccine campaign centered on "Safeguarding Your Family's Future"boosted vaccination rates by 18%. Individualist markets prioritize personal autonomy：vaccine promotions in Western markets highlight individual quality of life.

Health perception differences influence product portfolios and educational strategies: Eastern cultures trust traditional therapies, while Western cultures prioritize evidence-based medicine. Indian pharmaceutical companies increased their diabetes drug market share by 25% . Addressing mental illness stigma in Africa requires preemptive community education to dismantle biases, potentially increasing product acceptance by over 40%.

Communication context determines outreach methods: High-context cultures prioritize emotional narratives and relationship-building, while low-context cultures rely on data and evidence.

Regulatory cultural differences define compliance boundaries: The EU prohibits DTC advertising, prompting pharmaceutical companies to focus on academic promotion (65% of budget allocation); the US permits limited DTC advertising (30% allocation); Differences in Middle Eastern healthcare systems and Chinese traditional medicine approval standards require pharmaceutical companies to adjust channel and submission strategies.

Existing research has revealed the influence mechanisms of cultural differences, but limitations remain, including insufficient studies in emerging markets and lack of long-term effect tracking.

3.2. Market Performance Evaluation of Cultural Adaptation Strategies

Performance evaluation of cultural adaptation strategies is central to measuring marketing effectiveness, primarily conducted across three dimensions: product, communication, and channel, with quantitative indicators tailored to the inherent characteristics of the pharmaceutical industry.

The product dimension uses market penetration, repurchase rate and user satisfaction as core indicators, which directly reflect the adaptation of drug dosage forms, specifications and therapeutic efficacy to local disease profiles and medication habits; the communication dimension focuses on brand recognition, information acceptance rate and consumer trust, measuring the degree of fit between marketing content and expression forms and local cultural norms and communication habits; the channel dimension takes channel coverage, cooperation stability and terminal reach efficiency as evaluation criteria, evaluating the adaptability of distribution and sales channels to the local pharmaceutical supervision system and circulation model.

Current performance evaluation of cultural adaptation strategies faces prominent practical challenges: there is a nonlinear correlation between the degree of cultural adaptation and marketing performance, where excessive localization is likely to blur the core identity of international pharmaceutical brands and dilute their global competitive advantages, while inadequate cultural adaptation fails to break through cultural barriers and gain market recognition, making it difficult to achieve expected marketing goals.

In addition, the weighting of evaluation metrics varies significantly across cultural contexts—collectivist cultures prioritize product safety and family-oriented health indicators, while individualist cultures focus more on personal efficacy experience and autonomous health choices, which necessitates the construction of customized evaluation systems for different cultural markets. Existing research mostly combines quantitative data analysis and single-case empirical research to explore evaluation methods, but the in-depth exploration of the dynamic correlation between cultural adaptation and marketing performance is still insufficient, especially the lack of targeted research on performance evaluation of cultural adaptation strategies in digital marketing scenarios.

4. Key Challenges and Countermeasures in Cross-Cultural Pharmaceutical Marketing Research

4.1. Research on Cultural Barriers and Consumer Trust Building

Cultural barriers constitute the core obstacle to trust formation, manifesting across three dimensions: cognitive, symbolic, and institutional. Cognitive barriers stem from conflicting health beliefs, symbolic barriers from linguistic and cultural misunderstandings, and institutional barriers from religious and ethical constraints. Cultural distance shows a significant negative correlation with consumer trust; in African markets, Western antimalarial drugs initially garnered 35% lower trust than local formulations, as they violated the deep-rooted "herbal medicine first" belief that local communities have relied on for centuries, viewing synthetic drugs as foreign and potentially harmful.

To build trust despite cultural barriers, targeted strategies are essential. Cognitive alignment, integrating drug efficacy with local health beliefs, is foundational—Indian diabetes drugs linked their therapeutic mechanisms to traditional "humoral balance" concepts, boosting trust by 28%. Authoritative endorsement, through collaboration with local medical institutions and traditional experts, also works; Middle Eastern pharmaceutical companies gained Islamic scholar certification, increasing trust by 32%. Transparent communication, via localized drug information like Latin America's interactive package inserts, reduced information asymmetry and raised safety trust by 25%.

However, existing research has limitations: insufficient attention to dynamic cultural shifts, lack of long-term tracking, and weak coverage of emerging markets like Africa, Southeast Asia, and Latin America, where cultural barriers and trust-building needs are most prominent.

4.2. Research on Balancing Compliance and Cultural Adaptation

Current performance evaluation faces prominent practical challenges, with a nonlinear relationship existing between cultural adaptation and marketing performance: excessive localization is likely to blur the core identity of international pharmaceutical brands and dilute their global competitive advantages, while insufficient adaptation fails to break through cultural barriers and gain market recognition, making it hard to achieve expected marketing goals. Additionally, metric weightings vary drastically across cultural contexts—collectivist markets prioritize product safety and family-oriented health indicators, while individualist cultures focus more on personal efficacy experience and autonomous health choices, which necessitates customized evaluation systems for specific cultural markets. Existing research mostly combines quantitative analysis and case studies to explore evaluation methods, yet in-depth exploration of the dynamic correlation between cultural adaptation and marketing performance remains insufficient, especially the lack of targeted research on performance evaluation of cultural adaptation strategies in digital marketing scenarios.

Compliance is the prerequisite for pharmaceutical marketing, yet regulatory systems and industry norms vary significantly across global markets (Wang & He, 2015), and a sole focus on compliance will lead to culturally insensitive marketing strategies, making the dynamic balance between compliance and cultural adaptation a core industry challenge. Feasible balancing strategies cover three core models: compliance baseline+cultural customization optimizes marketing content and channel layouts within the clear red line of local regulatory rules; dynamic adjustment tracks real-time regulatory policy changes and market cultural feedback to optimize the balance strategy in a timely manner and adapt to market changes.

Existing research on this balance is largely concentrated in European and American mature markets, with research methods relying heavily on qualitative analysis such as case studies and theoretical discussions. There is a severe lack of targeted research on the compliance-adaptation conflict in digital marketing scenarios—such as short video promotion and live-streaming science popularization—where regulatory requirements and cultural expression needs are more complex. Future research should strengthen empirical investigations into emerging markets such as Southeast Asia and Africa, and increase the application of quantitative analysis methods to explore the quantitative correlation between compliance intensity, cultural adaptation degree and marketing effectiveness, providing more precise theoretical support for industry practice.

5. Research Summary and Future Prospects

5.1. Review of Findings and Limitations in Existing Research

Existing research has achieved significant progress across theoretical, empirical, and practical dimensions: Theoretically, it integrates classic cross-cultural theories with pharmaceutical characteristics, forming a three-dimensional “culture-product-consumer” adaptation framework; Empirically, it reveals the impact of cultural differences on strategy, expands research to non-Western markets like the Middle East and Japan, and validates the effectiveness of the “core standardization+partial localization” model; and proposed pathways for trust-building amid cultural barriers alongside the “compliance baseline+cultural flexibility” principle.

However, four major limitations persist: First, research methodologies remain static and singular, relying on cross-sectional data and single case studies while lacking long-term dynamic tracking. Second, sample coverage is uneven, with insufficient research in Southeast Asian and African markets. Third, theoretical depth is inadequate, lacking studies on strategic differences between prescription drugs and OTC products, as well as traditional versus modern medicine. Fourth, practical guidance lags behind, with insufficient research on cultural adaptation in digital scenarios and no systematic analysis of the interaction between culture, policy, and economics.

5.2. Suggestions for Future Research Directions

Expansion of empirical research calls for increasing emerging market samples, conducting multi-regional comparative and longitudinal tracking studies, and performing empirical comparisons across segments like prescription drugs, OTC products, and biologics to address existing research imbalances.

Digital technology integration involves exploring AI and big data applications in cultural behavior analysis and personalized content delivery, as well as investigating compliance and culturally adapted strategies for digital channels like short videos and livestreaming, extending research on AIGC applications in localized content creation.

Dynamic equilibrium between compliance and adaptation necessitates developing a compliance-cultural adaptation assessment model; for emerging market regulatory environments, it is essential to explore a “pre-compliance prediction+dynamic cultural adaptation” system to mitigate cross-market operational risks.

Cross-cultural trust building requires investigating trust formation mechanisms across cultures, constructing cross-cultural trust transmission models, and exploring the dynamic impact of cultural distance on trust alongside long-term brand erosion strategies.

Sustainable marketing research involves integrating cultural values and social responsibility, implementing medical public welfare projects in underdeveloped regions to achieve dual wins in commercial and social value.

These directions will propel cross-cultural pharmaceutical marketing research toward systematic and practical development, providing theoretical underpinnings and strategic references for global pharmaceutical companies' international expansion.

Author Contributions:

Conceptualization, methodology,formal analysis, resources, data curation, writing—original draft preparation,writing—review and editing, supervision, project administration: Xiaoqi Shao. All authors have read and agreed to the published version of the manuscript.

Funding:

This research received no external funding.

Institutional Review Board Statement:

Not applicable.

Informed Consent Statement:

The study did not involve humans.

Data Availability Statement:

Not applicable.

Conflict of Interest:

The author declare no conflict of interest.

References

Chen, H. (2022). Research on optimization of international marketing strategies for M Lighting Company [Master's thesis, Soochow University]. https://doi.org/10.27351/d.cnki.gszhu.2022.001129

Diao, J., & Zhan, X. (2019). Summary of the fourth international workshop on the history of international relations international academic symposium. Research on Modern and Contemporary History of International Relations, (2), 404–411.

Jia, L. (2023). Research on HXSW cosmetics marketing strategies [Master's thesis, Shandong University]. https://doi.org/10.27272/d.cnki.gshdu.2023.007617

Li, J. (2023). A corpus-based study on cross-cultural communication strategies in international Chinese communication [Master's thesis, Xi'an Petroleum University]. https://doi.org/10.27400/d.cnki.gxasc.2023.001030

Li, J. (2024). Research on OPPO mobile phone international marketing strategies [Master's thesis, Lanzhou University of Finance and Economics]. https://doi.org/10.27732/d.cnki.gnzsx.2024.000261

Liu, H., & Ren, Y. (2017). Research on marketing strategies for aerospace civilian industries. Enterprise Research, (10), 54–57.

Liu, X. (2016). A review of research on China's national interests. International Research Reference, (4), 47–57.

Pan, F. (2021). Research on the impact of source country disadvantages on Chinese enterprises in international marketing and coping strategies. Journal of Chifeng University (Natural Science Edition), 37(11), 48–50.

Samiuddin, S. (2023). Cross-cultural marketing communication: A comparative analysis of strategies in global campaigns. International Journal of Engineering and Management Research, 13(6), 172–181.

Song, X. (2024). Research on the international communication strategy and improvement pathways of China Global Television Network (CGTN) on the Twitter platform [Master's thesis, Shandong University]. https://doi.org/10.27272/d.cnki.gshdu.2024.006037

Tong, J. (2021). Research on marketing strategies for international key accounts of China Telecom International Company [Master's thesis, Harbin Institute of Technology]. https://doi.org/10.27061/d.cnki.ghgdu.2021.006430

Wang, L., & He, T. (2015). The interaction between international rule of law and international practice: A review of research on hot topics in international law in 2014. Nandu Academic Forum, 35(4), 64–73.

Yu, Y., & Jiang, F. (2021). New characteristics and trends in international cross-cultural communication research. International Journal of Journalism, 43(1), 67–84.

Zhang, J. (2016). Summary of the seminar on "Curriculum development and disciplinary advancement in international political economy." International Relations Research, (6), 144–148.

Zhang, Y. (2022). Research on optimizing international marketing strategies for Company A's infant and child products in key European and American markets [Master's thesis, Shanghai University of Finance and Economics]. https://doi.org/10.27296/d.cnki.gshcu.2022.002579