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Does Artificial Intelligence Enhance Innovation Efficiency in Cultural Media Companies? —— Empirical Evidence from A-Share Listed Cultural Media Companies in China

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SUMMARY: *In order to analyze the impact of the development of artificial intelligence (AI) on the innovation efficiency of cultural media companies, this study takes A-share listed companies on the Shanghai and Shenzhen stock exchanges in China from 2010 to 2023 as samples, and uses a two-way fixed effects model for empirical analysis. The research results indicate that the development of artificial intelligence has significantly improved the innovation efficiency of cultural media companies, and this finding remains robust in various sensitivity checks. The development of artificial intelligence can improve the innovation efficiency of cultural media companies by alleviating financing constraints, improving information transparency, enhancing human capital, and increasing analyst coverage. Further analysis shows that ESG performance and the level of artificial intelligence transformation can positively regulate the impact of artificial intelligence on innovation efficiency. Heterogeneity analysis shows that the promoting effect of artificial intelligence is more pronounced in first tier cities, mature cultural media companies, cultural media companies with high resource allocation, and areas with weak intellectual property protection.*

KEYWORDS: *Artificial intelligence; Innovation efficiency; Cultural media companies; Bidirectional fixed effects model; Heterogeneity analysis*

1 Introduction

Cultural media innovation has become a core variable in building a modern industrial system in the context of the big picture, and the deep learning and quantitative analysis capabilities derived from artificial intelligence based on big data models have become an important force in the new round of cultural media innovation [1]. The gradual and profound introduction of artificial intelligence in human society has brought about significant changes in the management and business models of cultural media companies. Since its emergence and entry into the social production system, AI has long caused concerns about replacing human production and status. AI is having a substitution effect on the Chinese market, and the demand for professions with high AI exposure (i.e. the degree to which job content can be replaced by AI) is showing a downward trend. However, the market has not quickly adapted to the practical transformation of artificial intelligence technology, so the promotion of artificial intelligence cultural media companies from a management perspective has become a new research topic [2, 3]. Whether artificial intelligence technology can truly profoundly change the operation and innovative production of cultural media, and whether the subjective tendency of cultural media

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company managers to follow the trend will lead to an imbalance between external promotion and internal technical strength, all need to be recognized and studied.

Facing the future, cultural media professionals need to pay attention to new opportunities and use digital technology to serve cultural media; Cultural media companies need to undergo digital transformation, fully leverage the power of digital technology, and accelerate their transformation and upgrading [4]. Therefore, in the context of a special era, how should we treat artificial intelligence and clarify its mechanisms and channels for driving innovation? Does it affect the effective output of innovative achievements rather than incremental innovation? Based on this, this article explores the role of artificial intelligence in the innovative operation of cultural media companies, and provides corresponding management opinions and policy recommendations for listed cultural media companies and related departments. On a practical level, innovation in cultural media companies plays an important role in promoting productivity development and achieving high-quality national development in modern economic society [5]. High quality development must better solve the problem of high-tech "source of vitality" for cultural media companies. This is a key institutional and mechanism reform task to achieve high-quality development. Grasp AI For the operation mechanism of effective innovation output, combined with the new opportunities of technological development, exploring the role that "artificial intelligence" can play in the current era is of great practical significance for China to deepen the implementation of innovation driven development strategy, get rid of "ineffective innovation", "idle funds", and "low-end industrial chain". At the academic level, this article uses literature analysis to sort out various literature related to artificial intelligence, executive characteristics, and innovation quality of cultural media companies, defines the relevant concepts involved in this article, and explores the impact of artificial intelligence willingness on the innovation quality of cultural media companies from the theoretical basis of technological innovation theory, agency theory, human capital theory, technology accumulation and cost saving effect of artificial intelligence, inclusiveness and wave taking institutional theory, and proposes relevant suggestions. Research hypothesis [6, 7].

This article takes A-share listed companies on the Shanghai and Shenzhen stock exchanges in China from 2010 to 2023 as samples, and uses a two-way fixed effects multiple regression model and a mediation effect model to test the data. The results verify the relationship between artificial intelligence and the innovation quality of cultural media companies, and the moderating effect of some attributes in the management characteristics on the relationship between the two. In further research, the impact of artificial intelligence on the innovation quality of cultural media companies under different conditions was explored based on heterogeneity such as property rights, innovation capabilities, and industries. This article conducts an in-depth study on the impact of artificial intelligence development on the innovation quality of cultural media companies, breaking through existing research on the technical background of managers and the impact of technological innovation. It attempts to start from human psychology, introduce management thinking to explore the mechanism of action, and provide a good solution for listed companies and related deepening innovation driven development strategies to allocate resources more effectively.

2 Literature Review

After in-depth exploration and systematic organization of various domestic and foreign literature, the core characteristics of "artificial intelligence cultural media innovation" are as follows: there are extremely few specialized research works on the theme of "artificial intelligence cultural media innovation". In recent years, with the rapid increase in the number of relevant literature in the field of art and design, this phenomenon is closely related to the

active promotion and support of national policies [8]. The most extensively discussed core topic in various literature is undoubtedly 'Artificial Intelligence (AI)'. The application of artificial intelligence technology in cultural media and the immersive aesthetic experience it brings have always been the focus of frequent discussions among researchers.

The concept of "artificial intelligence cultural media innovation" deeply permeates and shapes the life and development patterns of every individual and even the entire society. Artificial intelligence cultural media innovation is not only a key part of national large-scale cultural and sports activities, but also a driving force and basic characteristic of social operation and development. In his book "Changes in Media Forms," he revealed the evolution of media forms and emphasized that the birth of cultural media was not a sudden idea, but rather a natural evolution of traditional media forms [9, 10]. The emergence of new forms of cultural media has not completely replaced the old, but has prompted them to constantly evolve and coexist in response to change. Currently, the spark between new artificial intelligence technologies and art continues to burn in the field of cultural media. Many scholars have shown a strong research interest in the innovation of artificial intelligence cultural media. German Oliver Grau profoundly explained the manifestation of this relationship in the innovation of artificial intelligence cultural media [11]. Nicholas Negroponte's "Artificial Intelligence for Survival" popularized the public's understanding of artificial intelligence cultural media innovation in a simple and understandable way, elaborating on the core concepts of artificial intelligence technology, its evolution trajectory, and the broad and profound value it brings. Nowadays, artificial intelligence elements have permeated into every aspect of daily life. With the comprehensive advent of the era of artificial intelligence, the academic community in China is actively exploring the forms of media art expression in this transformation, and the research trend is constantly heating up [12]. Cultural media is a medium for information dissemination, which achieves all-round interactive dissemination of information through computer devices. Although traditional concepts tend to classify cultural media as perceptual media, in reality, its scope extends far beyond that. There are differences in the definition of cultural media, but scholars generally believe that there is a close relationship between cultural media and artificial intelligence technology, which is inseparable from computer technology and Internet technology [13].

Regarding the concept of artificial intelligence cultural media innovation, AI cultural media innovation is a new way of creative expression that is rooted in advanced artificial intelligence technology and modern communication tools, integrating human logical intelligence with the emotional charm of art. New media art relies on advanced multi-dimensional computer technology and Internet platform as its cornerstone [14]. New media art shows significant innovation energy in many fields, such as art creation, emotional comfort, information transmission, aesthetic evaluation and critical thinking. It is good at breaking the old and innovating, and belongs to a new art type that can make profound changes in artistic aesthetic perception, feeling and thinking mode. The birth of media innovation is not a random event, it is essentially the inevitable result of the intertwined interaction and common evolution of technology and art in the era of artificial intelligence and information [15]. Looking back at the history of media evolution, ideological innovation and technological leap are intertwined, jointly shaping the diverse appearance and leapfrog improvement of art. The continuous advancement of technologies such as computers, chips, artificial intelligence, and human-computer interaction has promoted the rise of early algorithmic art and information visualization. Avant garde artists deeply influenced by machine aesthetics and control theory art have devoted themselves to innovative practices in contemporary art, giving rise to many emerging art forms such as surrealism, video art, algorithmic creation art, and electronic media art. The evolution of media innovation and communication technology is closely related,

mainly due to the continuous development of cultural media technology, which covers the innovation of information presentation methods, content innovation, and transmission methods. Therefore, artificial intelligence cultural media innovation can be understood as an artistic expression based on cultural media technology, which integrates the essence of art, computer science, artificial intelligence, and media technology [16, 17].

Compared to old media, media innovation itself has a relative characteristic. Artificial intelligence cultural media innovation continues to evolve, with an overemphasis on the changes brought about by "new" technologies. The innovation of artificial intelligence cultural media is actually a product of the interweaving of artificial intelligence technology and artistic creation, with rich and varied forms of expression, including diverse characteristics such as interactive experience, network connection, and algorithm computation. The choice of academic term 'artificial intelligence cultural media innovation' is closely related to the current development status of China's disciplinary system. Currently, most universities in China adopt "Media Innovation" as the discipline name for this major, and this name is also a major standard in the national discipline catalog. For the "Multimedia Art" major, its core focus is on the diversity of media forms. The development of media innovation cannot be separated from the integration with advanced technology, and the continuous progress of technology is driving the transformation of artificial intelligence cultural media innovation.

3 Theoretical Analysis and Research Hypotheses

Artificial intelligence technology can promote the innovation efficiency of cultural media companies through various means, including reducing financing constraints, improving information transparency, enhancing human capital levels, and increasing analyst coverage, thereby providing more favorable conditions for the innovative development of cultural media companies [18]. The logical framework for AI development to enhance the innovation efficiency of cultural media companies is shown in Figure 1.

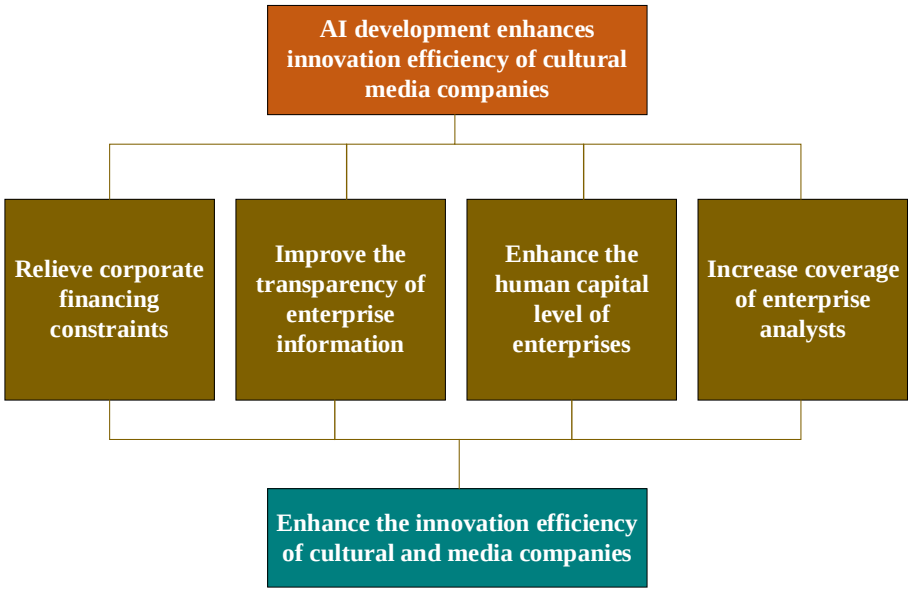

Figure 1: AI development enhances innovation efficiency of cultural media companies

From the perspective of corporate financing constraints, on one hand, AI development can more accurately assess the credit risk and repayment capacity of cultural media firms. It also accelerates interconnection among financial entities, alleviating long-standing information

asymmetry in financial markets, optimizes risk assessment, reduces the financing risk premium for cultural media companies, increases financial institutions' willingness to extend credit, and shortens loan approval cycles through automated intelligent approval replacing traditional manual processes, thereby easing financing constraints [19]. On the other hand, the unique attributes of cultural firms make information asymmetry during financing particularly distinct. Reduced financing constraints allow cultural media companies to access more funds, increasing their innovation investment and risk tolerance for innovation, enabling them to shorten innovation cycles and timely launch innovative outcomes, fostering strategic cooperation and resource integration among firms, enhancing the innovation capability and efficiency of cultural media companies, and achieving innovation upgrades.

A higher level of industry competition prompts firms to increase AI investment and explore new business models to enhance their competitiveness. To avoid being eliminated from the market, firms more actively use AI technology to improve their adaptability and market sensitivity, gaining higher innovation performance by enhancing competitive advantage. Concurrently, fierce industry competition creates strong external pressure and a market screening mechanism, accelerating knowledge spillover and technology diffusion, enabling firms to quickly absorb cutting-edge AI application experiences from the industry, encouraging technical exchange and cooperation among firms, and incentivizing firms to enhance talent quality to better utilize AI for driving corporate innovation development.

4 Empirical Analysis

4.1 Model Specification

4.1.1 Baseline Regression Model

To examine the impact of AI development on the innovation efficiency of cultural media companies, the following regression model is constructed:

$$\mathrm{PAT}_{it}=\alpha_0+\alpha_1\mathrm{AI}_{it}+\alpha_2 Control_{it}+\delta_i+\rho_t+\varepsilon_{it} \tag{1}$$

Here, i denotes the firm, t denotes the year. The dependent variable is the innovation efficiency (PAT) of the cultural media company. The explanatory variable is AI development (AI). $Control_{it}$represents relevant control variables.$\delta_i$denotes firm fixed effects, $\rho_t$denotes time fixed effects, and $\varepsilon_{it}$is the random error term.

4.1.2 Mediation Effect Model

To explore the mechanism through which AI development affects the innovation efficiency of cultural media companies, a mediation effect analysis is employed. The mediation effect models are specified as follows:

$$\mathrm{PAT}_{it}=\alpha_0+\alpha_1\mathrm{AI}_{it}+\alpha_2 Control_{it}+\delta_i+\rho_t+\varepsilon_{it} \tag{2}$$

$$\mathrm{M}=\partial_0+\partial_1\mathrm{AI}_{it}+\partial_2 Control_{it}+\delta_i+\rho_t+\varepsilon_{it} \tag{3}$$

M represents the mediator variable, specifically including Financing Constraints (WW), Information Transparency (INFO), Human Capital (EDU), and Analyst Coverage (ATTENTION). Other variables are consistent with Equation (1).

4.1.3 Moderation Effect Model

To test the influence of various moderating variables on the results, the following model is constructed for in-depth investigation:

$$PAT_{it}=\theta_0+\theta_1 AI_{it}+\theta_2 Z+\theta_3 AI_{it}\times Z+\theta_4 Control_{it}+\delta_i+\rho_t+\varepsilon_{it} \quad (4)$$

Z represents the moderating variable, specifically including ESG, Digital Transformation Level (DCG), and HHI. Other variables are consistent with Equation (1).

4.2 Variable Selection

4.2.1 Dependent Variable

Innovation Efficiency of Cultural Media Companies (PAT): This paper uses the natural logarithm of R&D expenses as the innovation input variable and the natural logarithm of the number of patents as the innovation output variable, employing the DEA method to calculate innovation efficiency.

4.2.2 Explanatory Variable

Artificial Intelligence Development (AI): For measuring AI development, this study refers to the method, constructing a quantitative indicator of AI technology application level based on the textual content of listed companies' annual reports. Specifically, the research team first screened 73 core vocabulary terms directly related to AI technology (e.g., "machine learning," "deep learning," "natural language processing," "intelligent algorithm") and expanded the associated vocabulary (e.g., "automated decision-making," "data mining," "intelligent customer service") to form a comprehensive AI keyword library [20, 21]. Using text analysis, the frequency of these keywords in each listed company's annual report is counted, and a weighted calculation method is used to construct a comprehensive "listed company-AI level" indicator. Finally, through standardization, comparable data measuring the level of AI technology application is generated.

4.2.3 Moderator Variables

ESG: Existing research typically assigns values from 1 to 9 to Huazheng ESG ratings from low to high. However, this approach suffers from issues such as discontinuous scores and weakened comparability due to the downplaying of differences and dynamics in ESG performance. In fact, according to the "Huazheng ESG Rating Methodology (V2.0)" published by Huazheng Index Company, ESG ratings are generated based on ESG scores, with the nine grades "AAA~C" corresponding to "score ≥95" to "score <60" respectively. A higher corporate ESG score implies better ESG performance and a correspondingly higher rating. In light of this, this paper directly uses the Huazheng corporate ESG score (on a percentile scale) to measure the level of a firm's implementation of ESG concepts, thereby fully reflecting the differences in cross-sectional comparison and the dynamics in longitudinal comparison, enhancing the robustness of the research conclusions.

Digital Transformation Level (DCG): Referring to the research results, this paper measures the corporate digitalization level by counting the frequency of 76 digital-related terms disclosed in the firm's annual reports across five dimensions [23]: AI technology, big data technology, cloud computing technology, blockchain technology, and digital technology, and taking its natural logarithm. A larger value indicates a higher degree of corporate digital transformation.

HHI: The HHI index is widely used in practice and has become a mainstream tool for

assessing concentration in academic research and market regulation. The HHI index is essentially a weighted sum of corporate market shares. Its economic meaning is the sum of squares of the percentages of each competitor's industry revenue or total assets. The measurement method is the Herfindahl-Hirschman Index.

4.3 Data Sources and Processing

This paper uses A-share listed cultural media companies in Shanghai and Shenzhen from 2010 to 2023 as the research sample. Data processing and regression analysis were performed using Stata 16.0. Descriptive statistics for the variables are detailed in Table 1.

Table 1: Descriptive Statistics

VarName	Obs	Mean	SD	Min	Median	Max
PAT	582	0.1232	0.1590	0.0000	0.0000	0.5521
AI	582	0.7823	0.9229	0.0000	0.6931	3.5835
WW	582	-0.8439	0.3830	-1.1360	-1.0004	0.0000
INFO	582	0.2748	0.1974	0.0000	0.2687	0.8433
EDU	577	0.3417	0.2074	0.0000	0.3349	0.7551
ATTENTION	582	1.4811	1.2397	0.0000	1.3863	3.9318
ESG	582	4.3109	0.0955	3.8781	4.3276	4.4763
DCG	582	1.7028	1.1844	0.0000	1.9459	4.0943
HHI	582	0.3788	0.3451	0.0000	0.1512	1.0000
SIZE	582	22.1752	1.2232	15.7294	22.1335	24.0960
TOP	582	0.4311	0.2007	0.0719	0.4489	0.8035
LEV	582	0.3493	0.1840	0.0554	0.3283	0.9746
ROA	582	0.0361	0.0928	-0.4479	0.0544	0.2204
AGE	582	2.1039	0.9293	0.0000	2.3026	3.3322
CASH	582	0.2200	0.4398	-1.7160	0.2046	1.9542
GDP	582	10.4781	0.6729	8.2253	10.5277	11.7615
IND	582	2.5153	0.1768	2.2219	2.4617	2.8461
DUAL	582	0.1976	0.3985	0.0000	0.0000	1.0000

5 Empirical Results

5.1 Baseline Regression Results

Table 2 presents the baseline regression results of the impact of AI development on the innovation efficiency of cultural media companies.

Table 2: Baseline Regression Results

	(1)	(2)
	PAT	PAT
AI	0.0408***	0.0337***
	(5.181)	(4.052)
SIZE		0.0237***
		(2.880)
TOP		-0.2330***
		(-2.823)
LEV		-0.0436
		(-0.994)
ROA		0.0853
		(1.277)
AGE		0.0332**
		(1.976)
CASH		-0.0169
		(-1.235)
GDP		-0.2005*
		(-1.736)
IND		0.8405**
		(2.403)
DUAL		0.0229
		(1.251)
_cons	0.0348	-0.4495
	(1.492)	(-0.326)
FE	Yes	Yes
Year	Yes	Yes
N	582	582
R^2	0.5308	0.5517

*Note: t-statistics in parentheses. The same applies below. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

5.2 Endogeneity Test

The experimental results in Table 3 show that the regression coefficients of the impact of artificial intelligence on innovation efficiency relative to cultural media companies are 0.0676 and 0.0737, respectively. Both experimental data are significant at the 1% level, which is consistent with the baseline regression results and indicates that there is no endogeneity issue between the two.

Table 3: Endogeneity Test

	(1)	(2)
	PAT	PAT
AI	0.0676***	0.0737***
	(6.503)	(5.502)
SIZE	0.0343***	0.0423***
	(5.028)	(5.312)
TOP	-0.0090	0.0108
	(-0.240)	(0.269)
LEV	-0.0297	-0.0830**
	(-0.780)	(-1.984)
ROA	0.0832	0.0195
	(1.079)	(0.241)
AGE	0.0110	0.0014
	(1.224)	(0.130)
CASH	-0.0216	-0.0364**
	(-1.372)	(-2.071)
GDP	0.0131	0.0150
	(1.306)	(1.389)
IND	-0.0575	-0.0907**
	(-1.465)	(-2.091)
DUAL	0.0374**	0.0472**
	(2.125)	(2.438)
_cons	-0.6993***	-0.7854***
	(-3.741)	(-3.664)
FE	Yes	Yes
Year	Yes	Yes
N	523	464
R^2	0.2105	0.2286

5.3 Robustness Checks

According to the regression results in the first column of Table 4, the regression coefficient of the core variable is 0.0507, which is significant at the 1% level, indicating that the results of changing the regression method are consistent with the baseline regression, demonstrating the robustness of the regression results.

Table 4: Robustness Checks

	(1)	(2)	(3)
	PAT	PAT	PAT
AI	0.0507***	0.0322***	0.0336***
	(6.737)	(3.687)	(4.017)
SIZE	0.0351***	0.0220***	0.0237***
	(6.118)	(2.620)	(2.867)
TOP	-0.0329	-0.2187**	-0.2402***
	(-0.942)	(-2.532)	(-2.877)
LEV	-0.0200	-0.0406	-0.0480
	(-0.583)	(-0.885)	(-1.079)
ROA	0.1422*	0.0680	0.0848
	(1.902)	(0.964)	(1.267)
AGE	0.0133*	0.0307*	0.0344**
	(1.853)	(1.772)	(2.024)
CASH	-0.0151	-0.0114	-0.0173
	(-1.073)	(-0.803)	(-1.256)
GDP	0.0163	-0.1827	-0.2029*
	(1.644)	(-1.535)	(-1.753)
IND	-0.0446	0.7835**	0.8416**
	(-1.184)	(2.158)	(2.395)
DUAL	0.0308*	0.0127	0.0226
	(1.911)	(0.647)	(1.221)
MBOARD			-0.0296
			(-0.582)
GROWTH			-0.0002
			(-0.219)
_cons	-0.7481***	-0.4528	-0.3619
	(-4.271)	(-0.318)	(-0.260)
FE	No	Yes	Yes
Year	Yes	Yes	Yes
N	582	532	582
R^2	0.2576	0.5387	0.5521

6 Mechanism Analysis

6.1 Mediation Effect Analysis

6.1.1 Financing Constraints (WW)

The second column of the experimental results in Table 5 shows that the impact coefficient (WW) of artificial intelligence on financing constraints in the innovation and development process of cultural media companies is -0.0365, which is significant at the 10% level. This indicates that the development of artificial intelligence can help alleviate the financing constraints in the innovative development of cultural and media companies.

Table 5: Mediation Effect of Financing Constraints

	(1)	(2)
	PAT	WW
AI	0.0337***	-0.0365*
	(4.052)	(-1.777)
SIZE	0.0237***	-0.0948***
	(2.880)	(-4.675)
TOP	-0.2330***	0.1263
	(-2.823)	(0.620)
LEV	-0.0436	-0.0520
	(-0.994)	(-0.480)
ROA	0.0853	0.1485
	(1.277)	(0.901)
AGE	0.0332**	-0.0154
	(1.976)	(-0.372)
CASH	-0.0169	-0.0446
	(-1.235)	(-1.321)
GDP	-0.2005*	0.2025
	(-1.736)	(0.710)
IND	0.8405**	-0.0274
	(2.403)	(-0.032)
DUAL	0.0229	-0.0670
	(1.251)	(-1.481)
_cons	-0.4495	-0.7909
	(-0.326)	(-0.232)
FE	Yes	Yes
Year	Yes	Yes
N	582	582
R^2	0.5517	0.5294

6.1.2 Information Transparency (INFO)

Column (2) of Table 6 shows that the coefficient of AI development's impact on corporate information transparency (INFO) is 0.0434, significant at the 1% level. This indicates that AI development improves corporate information transparency. Simultaneously, improved corporate information transparency enhances internal communication and collaboration within cultural media firms, allowing cultural enterprises to frequently contact and absorb heterogeneous information, avoiding knowledge lock-in, thereby promoting innovation efficiency. Therefore, corporate information transparency plays an important transmission role between AI development and the innovation efficiency of cultural media companies, verifying the existence of a mediation effect.

Table 6: Mediation Effect of Information Transparency

	(1)	(2)
	PAT	INFO
AI	0.0337***	0.0434***
	(4.052)	(4.581)
SIZE	0.0237***	0.0559***
	(2.880)	(5.979)
TOP	-0.2330***	0.1815*
	(-2.823)	(1.933)
LEV	-0.0436	-0.1856***
	(-0.994)	(-3.718)
ROA	0.0853	0.1063
	(1.277)	(1.399)
AGE	0.0332**	0.2151***
	(1.976)	(11.239)
CASH	-0.0169	0.0143
	(-1.235)	(0.916)
GDP	-0.2005*	0.1129
	(-1.736)	(0.859)
IND	0.8405**	0.7166*
	(2.403)	(1.801)
DUAL	0.0229	0.0110
	(1.251)	(0.525)
_cons	-0.4495	-4.0402**
	(-0.326)	(-2.574)
FE	Yes	Yes
Year	Yes	Yes
N	582	582
R^2	0.5517	0.6236

6.1.3 Human Capital (EDU)

From Column (2) of Table 7, it can be seen that the regression coefficient of the core explanatory variable on human capital (EDU) is 0.0143, passing the significance test at the 10% level, indicating that AI development helps enhance the firm's human capital level. Furthermore, the improvement in human capital levels in cultural media firms enhances their creative output capacity, increases the depth, breadth, and activity of members' participation in innovation activities within the cultural media firm's innovation system, and boosts the willingness to innovate. Therefore, human capital level plays a partial mediating role in the process of AI development affecting the innovation efficiency of cultural media companies, indicating that the mediation effect holds.

Table 7: Mediation Effect of Human Capital

	(1)	(2)
	PAT	EDU
AI	0.0337***	0.0143*
	(4.052)	(1.916)
SIZE	0.0237***	0.0447***
	(2.880)	(5.553)
TOP	-0.2330***	0.3142***
	(-2.823)	(4.127)
LEV	-0.0436	0.1473***
	(-0.994)	(3.759)
ROA	0.0853	0.0301
	(1.277)	(0.505)
AGE	0.0332**	-0.0572***
	(1.976)	(-3.744)
CASH	-0.0169	-0.0173
	(-1.235)	(-1.394)
GDP	-0.2005*	0.0384
	(-1.736)	(0.370)
IND	0.8405**	0.2511
	(2.403)	(0.799)
DUAL	0.0229	-0.0378**
	(1.251)	(-2.311)
_cons	-0.4495	-2.0381*
	(-0.326)	(-1.651)
FE	Yes	Yes
Year	Yes	Yes
N	582	577
R^2	0.5517	0.7917

6.1.4 Analyst Coverage (ATTENTION)

From Column (2) of Table 8, it can be seen that the regression coefficient of the core explanatory variable on analyst coverage (ATTENTION) is 0.2321, passing the significance test at the 1% level, indicating that AI development helps enhance the firm's analyst coverage level. The level of AI development enhances the analysis accuracy and coverage scope of corporate analysts, increases corporate analyst coverage, and thus improves the innovation efficiency of cultural media companies.

Table 8: Mediation Effect of Analyst Coverage

	(1)	(2)
	PAT	ATTENTION
AI	0.0337***	0.2321***
	(4.052)	(4.861)
SIZE	0.0237***	0.3294***
	(2.880)	(6.989)
TOP	-0.2330***	1.8793***
	(-2.823)	(3.970)
LEV	-0.0436	-0.3359
	(-0.994)	(-1.335)
ROA	0.0853	1.8683***
	(1.277)	(4.877)
AGE	0.0332**	-0.0122
	(1.976)	(-0.126)
CASH	-0.0169	-0.0213
	(-1.235)	(-0.271)
GDP	-0.2005*	-1.1116*
	(-1.736)	(-1.678)
IND	0.8405**	-5.1829**
	(2.403)	(-2.583)
DUAL	0.0229	-0.2278**
	(1.251)	(-2.166)
_cons	-0.4495	17.7701**
	(-0.326)	(2.245)
FE	Yes	Yes
Year	Yes	Yes
N	582	582
R^2	0.5517	0.7574

6.2 Moderation Effect Analysis

A high ESG rating indicates better financial performance for cultural media companies. A good ESG rating helps enhance the reputation and brand image of cultural media companies, providing a favorable external environment for their innovative activities. Digital transformation can help cultural media companies collect and store more business data, which can improve the quality of innovation for cultural media companies. Through the 'exposure effect', it enhances the transparency of cultural media companies' innovative development, thereby strengthening the positive impact of artificial intelligence on the innovation efficiency of cultural media companies. Both indicators show significance at the 5% level, indicating that HHI (inverse measure of competition) also plays a moderating role between artificial intelligence technology and the innovation efficiency of cultural media companies. Higher levels of industry competition (lower HHI) encourage cultural media companies to actively use artificial intelligence technology to enhance their competitive advantage and achieve higher innovation performance.

Table 9: Moderation Effect Results

	(1)	(2)	(3)	(4)
	PAT	PAT	PAT	PAT
AI	0.0337***	0.0298***	0.0218*	0.0325***
	(4.052)	(3.557)	(1.745)	(3.885)
SIZE	0.0237***	0.0253***	0.0221***	0.0241***
	(2.880)	(3.098)	(2.672)	(2.932)
TOP	-0.2330***	-0.2366***	-0.2216***	-0.2111**
	(-2.823)	(-2.860)	(-2.658)	(-2.555)
LEV	-0.0436	-0.0154	-0.0446	-0.0337
	(-0.994)	(-0.347)	(-1.015)	(-0.768)
ROA	0.0853	0.0591	0.0872	0.0750
	(1.277)	(0.884)	(1.306)	(1.127)
AGE	0.0332**	0.0261	0.0382**	0.0319*
	(1.976)	(1.546)	(2.196)	(1.900)
CASH	-0.0169	-0.0171	-0.0172	-0.0134
	(-1.235)	(-1.256)	(-1.259)	(-0.977)
GDP	-0.2005*	-0.2366**	-0.1923*	-0.1786
	(-1.736)	(-2.057)	(-1.661)	(-1.549)
IND	0.8405**	0.6919**	0.8053**	0.6182*
	(2.403)	(1.980)	(2.289)	(1.701)
DUAL	0.0229	0.0168	0.0205	0.0236
	(1.251)	(0.918)	(1.117)	(1.267)
ESG		0.1456**		
		(2.019)		
ESG_RGZN		0.1636***		
		(2.685)		
DCG			0.0039	
			(0.432)	
DCG_RGZN			0.0114*	
			(1.696)	
HHI				0.0305
				(1.296)
HHI_RGZN				-0.0418**
				(-2.311)
_cons	-0.4495	-0.4000	-0.4341	-0.1641
	(-0.326)	(-0.289)	(-0.315)	(-0.118)
FE	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
N	582	582	582	582
R^2	0.5517	0.5617	0.5543	0.5578

7 Heterogeneity Analysis

7.1 City Tier

The results in Table 10 find that the regression coefficients for AI development in first-tier,

second-tier, and third-tier cities are 0.0376, -0.0153, and 0.0647, respectively. The heterogeneity test focuses on how AI development reconstructs user connections through models like immersive experiences and personalized recommendations, verifying the marginal improvement space for innovation efficiency in high-end markets driven by technology.

Table 10: Heterogeneity by City Tier

	(1)	(2)	(3)
	First-tier	Second-tier	Third-tier
AI	0.0376***	-0.0153	0.0647
	(3.821)	(-0.666)	(1.650)
SIZE	0.0258***	0.0806**	0.0450
	(2.696)	(2.456)	(0.959)
TOP	-0.0830	-0.9274***	-0.5567
	(-0.857)	(-3.268)	(-1.020)
LEV	0.0180	-0.2658**	-0.1703
	(0.347)	(-2.318)	(-0.355)
ROA	0.0765	-0.0578	-0.2516
	(1.099)	(-0.254)	(-0.519)
AGE	0.0474**	0.0107	-0.1009
	(2.547)	(0.221)	(-0.769)
CASH	-0.0202	-0.0315	0.0249
	(-1.329)	(-0.846)	(0.177)
GDP	-0.2396	0.7496	0.0606
	(-1.568)	(1.278)	(0.245)
IND	1.0106**	0.1289	3.6688
	(2.285)	(0.130)	(1.496)
DUAL	-0.0028	0.1042**	-0.0508
	(-0.130)	(2.138)	(-0.584)
_cons	-0.6387	-8.8479*	-9.1126
	(-0.344)	(-1.709)	(-1.486)
FE	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	411	120	51
R^2	0.6210	0.5053	0.8065

7.2 Firm Lifecycle

The results from Columns (1) to (3) in Table 11 show that the impact coefficients of AI development on firms in different lifecycle stages are 0.0299, 0.0343, and 0.0173, respectively. It is not significant in the decline stage but significant at the 10% and 5% levels in the growth and maturity stages, respectively. Comparing the coefficients and significance, the effect is slightly larger in mature firms, indicating that AI development has the most pronounced promoting effect on innovation efficiency in mature-stage cultural media companies. Mature firms face organizational rigidity; AI development can optimize processes and assist decision-making but needs to overcome path dependence. The heterogeneity test is significant because it canverify AI's ability to crack the innovation inertia of mature firms and the synergistic effect between technology investment and organizational change.

Table 11: Heterogeneity by Firm Lifecycle

	(1)	(2)	(3)
	Growth	Maturity	Decline
AI	0.0299*	0.0343**	0.0173
	(1.671)	(2.230)	(0.977)
SIZE	0.0154	0.0378***	0.0366*
	(0.708)	(2.741)	(1.674)
TOP	-0.2345	-0.3176**	-0.0525
	(-1.216)	(-2.344)	(-0.181)
LEV	0.0301	0.0204	-0.1870
	(0.291)	(0.274)	(-1.490)
ROA	0.1268	0.0661	-0.0094
	(0.786)	(0.592)	(-0.061)
AGE	-0.0127	0.0499*	-0.0089
	(-0.311)	(1.711)	(-0.103)
CASH	-0.0166	0.0265	-0.0433
	(-0.486)	(1.020)	(-1.508)
GDP	-0.2137	-0.0974	-0.8198***
	(-0.519)	(-0.447)	(-3.513)
IND	2.4244**	1.3022**	-1.3265*
	(2.584)	(2.013)	(-1.682)
DUAL	0.0633	0.0342	-0.0023
	(1.469)	(0.973)	(-0.071)
_cons	-4.0436	-2.8373	10.5380***
	(-0.986)	(-1.027)	(3.609)
FE	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	186	227	169
R^2	0.7166	0.6406	0.7127

7.3 Resource Allocation Heterogeneity

The results from Columns (1) to (2) in Table 12 show that the impact coefficients of AI development on firms with different resource allocation levels are 0.0533 and 0.0163, respectively. It is significant at the 1% level in high-resource-allocation firms but not significant in low-resource-allocation firms. The heterogeneity test focuses on the technology-resource synergy effect, verifying the non-linear enhancement effect of AI development on innovation efficiency under high investment.

Table 12: Heterogeneity by Resource Allocation

	(1)	(2)
	High Allocation	Low Allocation
AI	0.0533***	0.0163
	(4.514)	(1.418)
SIZE	0.0356**	0.0078
	(2.458)	(0.794)
TOP	0.0843	-0.1063
	(0.660)	(-0.884)
LEV	0.0756	-0.0101
	(1.100)	(-0.177)
ROA	0.2935**	0.0642
	(2.201)	(0.835)
AGE	0.0298	0.1556***
	(1.365)	(2.863)
CASH	-0.0112	-0.0429**
	(-0.547)	(-2.502)
GDP	-0.0440	-0.1809
	(-0.242)	(-1.012)
IND	1.4065**	0.5025
	(2.539)	(1.014)
DUAL	0.0501	-0.0130
	(1.600)	(-0.578)
_cons	-3.8265*	0.1977
	(-1.844)	(0.089)
FE	Yes	Yes
Year	Yes	Yes
N	291	291
R2	0.7183	0.6668

7.4 Intellectual Property Protection Heterogeneity

The results in Table 13 find that the impact coefficients of AI development on firms in high and low IP protection environments are -0.0023 and 0.0425, respectively. It is significant at the 1% level in low IP protection firms but not significant in high IP protection firms. In low IP protection environments, innovation outcomes are easily imitated; AI development can reduce infringement risks through rapid iteration and technological encryption. The heterogeneity test is significant because it can verify the compensatory mechanism of technological empowerment for insufficient innovation protection and the substitution relationship between the protection environment and technology investment.

Table 13: Heterogeneity by Intellectual Property Protection

	(1)	(2)
	High IP Protection	Low IP Protection
AI	-0.0023	0.0425***
	(-0.200)	(3.170)
SIZE	0.0258	0.0287**
	(1.063)	(2.486)
TOP	-0.3920**	-0.1969
	(-2.564)	(-1.546)
LEV	-0.0583	-0.1071
	(-0.938)	(-1.412)
ROA	0.0099	0.0580
	(0.117)	(0.506)
AGE	0.0409	0.0480*
	(1.647)	(1.677)
CASH	-0.0460**	0.0261
	(-2.578)	(1.105)
GDP	0.3976	-0.2054
	(1.183)	(-1.416)
IND	0.9722	0.6746
	(1.651)	(1.191)
DUAL	0.0013	0.1016***
	(0.052)	(3.047)
_cons	-6.7234*	-0.1005
	(-1.855)	(-0.054)
FE	Yes	Yes
Year	Yes	Yes
N	291	291
R^2	0.7127	0.5287

8 Research Conclusions and Policy Implications

8.1 Research Conclusions

Using a sample of A-share listed cultural media companies from 2010 to 2023 and employing a fixed effects model for empirical testing, this study finds: First, AI development significantly promotes the innovation efficiency of cultural media companies. Second, from the perspective of mechanisms, AI development promotes the innovation efficiency of cultural media companies by alleviating financing constraints, improving information transparency, enhancing human capital, and increasing analyst coverage. Third, ESG performance, digital transformation level, and industry concentration (HHI) have significant moderating effects on the relationship between AI development and the innovation efficiency of cultural media companies. Finally, the effect of AI development exhibits obvious heterogeneity, being more significant in cultural media firms located in first-tier cities, those in the maturity stage, those with high resource allocation, and those in regions with weak intellectual property protection.

8.2 Policy Recommendations

As the most popular advanced technology in the digital economy era, artificial intelligence has taken off from past digital transformation technologies and has surpassed the characteristics of a single technological tool, becoming a core force driving social progress. This article attempts to decompose the original concept of artificial intelligence, understand the subjective and objective conditions of how artificial intelligence is applied to humans, and the mentality of humans in using artificial intelligence. By clarifying its logical relationship, it helps cultural media companies better get along with artificial intelligence, apply artificial intelligence technology, and at the same time, help the country better implement the development strategy of artificial intelligence. Therefore, based on the review of domestic and foreign literature and relevant theories, this article proposes hypothesis research on the relationship between artificial intelligence in cultural media companies and the quality of innovation and development in cultural media companies, constructs a two-way fixed effects multiple regression model and a mediation effect model, and verifies the impact of artificial intelligence on the innovation quality of cultural media companies. To ensure the reliability of the research conclusions in this article, robustness tests were conducted using methods such as controlling for fixed effects between years and cultural media companies, changing sample intervals, changing core variables, and using instrumental variable methods. The test results all validated the hypotheses of the baseline regression. Based on the above research, this article draws the following conclusions: (1) Through heterogeneity research, it can be found that the positive effect of artificial intelligence on the innovation quality of cultural media companies in Chinese listed cultural media companies is significantly reflected at the level of non-state-owned cultural media companies. This indicates that compared to state-owned cultural media companies with soft budget constraints and smaller operating performance pressure, non-state-owned cultural media companies have greater survival pressure due to their characteristics and need to improve the innovation and transformation efficiency of advanced technologies such as artificial intelligence. Therefore, cultural media companies have a stronger motivation to achieve the strategy of integrating knowledge and action. (2) The internal moral self-examination of listed cultural media companies may lead to the inhibitory effect of artificial intelligence on the innovation quality of cultural media companies, and highly educated executives are more inclined to engage in opportunistic behavior to cater to self-interest tendencies. This also stems from the fact that the artificial intelligence indicators in the annual report do not directly reflect the actual output of the production side. Therefore, executives at the decision-making end can more directly and accurately use the language in the propaganda to create a good market image, which will further harm the strategic focus and effective output of cultural media companies in actual innovation behavior. (3) The negative impact of artificial intelligence at the market level comes from the opportunistic tendencies and information disclosure quality of cultural media companies, which leads to the lower innovation quality level of cultural media companies as the macro level of artificial intelligence development and application level increases. The development of artificial intelligence can attract institutional investors to hold shares, improve investment efficiency, and enhance the breadth value of patents through knowledge sharing. The combination of the above mechanisms has achieved continuous improvement in the innovation quality of cultural media companies.

Author's Profile

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References

[1] Bagheri N, Ahmadzadeh M, Mariotte P, et al. Behavior and interactions of the plant growth-promoting bacteria Azospirillum oryzae NBT506 and Bacillus velezensis UTB96 in a co-culture system[J]. World Journal of Microbiology and Biotechnology, 2022, 38(6): 101.

[2] Poon C. Measuring the density and viscosity of culture media for optimized computational fluid dynamics analysis of in vitro devices[J]. Journal of the mechanical behavior of biomedical materials, 2022, 126: 105024.

[3] O'Neill E N, Cosenza Z A, Baar K, et al. Considerations for the development of cost-effective cell culture media for cultivated meat production[J]. Comprehensive Reviews in Food Science and Food Safety, 2021, 20(1): 686-709.

[4] Duffy B E, Meisner C. Platform governance at the margins: Social media creators' experiences with algorithmic (in) visibility[J]. Media, Culture & Society, 2023, 45(2): 285-304.

[5] Sharma S, Jha P K, Panwar A. Production of bioethanol from wheat straw via optimization of co-culture conditions of Bacillus licheniformis and Saccharomyces cerevisiae[J]. Discover Energy, 2021, 1(1): 5.

[6] Baker S A. Alt. Health Influencers: how wellness culture and web culture have been weaponised to promote conspiracy theories and far-right extremism during the COVID-19 pandemic[J]. European Journal of Cultural Studies, 2022, 25(1): 3-24.

[7] Fuchs Q, Batut A, Gleyzes M, et al. Co-culture of glutamatergic neurons and pediatric high-grade glioma cells into microfluidic devices to assess electrical interactions[J]. J Vis Exp, 2021, 177: e62748.

[8] Razzak S A, Bahar K, Islam K M O, et al. Microalgae cultivation in photobioreactors: Sustainable solutions for a greener future[J]. Green Chemical Engineering, 2024, 5(4): 418-439.

[9] Polanco-Levicán K, Salvo-Garrido S. Understanding social media literacy: A systematic review of the concept and its competences[J]. International journal of environmental research and public health, 2022, 19(14): 8807.

[10] Dudman J, Ferreira A M, Gentile P, et al. Microvalve bioprinting of MSC-chondrocyte co-cultures[J]. Cells, 2021, 10(12): 3329.

[11] Chato-Astrain J, Sánchez-Porras D, García-García Ó D, et al. Improvement of cell culture methods for the successful generation of human keratinocyte primary cell cultures using EGF-loaded nanostructured lipid carriers[J]. Biomedicines, 2021, 9(11): 1634.

[12] Edmond M. Careful consumption and aspirational ethics in the media and cultural industries: Cancelling, quitting, screening, optimising[J]. Media, Culture & Society, 2023,

45(1): 92-107.

[13] Cuomo M T, Tortora D, Foroudi P, et al. Digital transformation and tourist experience co-design: Big social data for planning cultural tourism[J]. Technological Forecasting and Social Change, 2021, 162: 120345.

[14] Reisach U. The responsibility of social media in times of societal and political manipulation[J]. European journal of operational research, 2021, 291(3): 906-917.

[15] Conti M, Gathani J, Tricomi P P. Virtual influencers in online social media[J]. IEEE Communications Magazine, 2022, 60(8): 86-91.

[16] Zaid B, Fedtke J, Shin D D, et al. Digital Islam and Muslim millennials: How social media influencers reimagine religious authority and Islamic practices[J]. Religions, 2022, 13(4): 335.

[17] Merino M, Tornero-Aguilera J F, Rubio-Zarapuz A, et al. Body perceptions and psychological well-being: a review of the impact of social media and physical measurements on self-esteem and mental health with a focus on body image satisfaction and its relationship with cultural and gender factors[C]//Healthcare. MDPI, 2024, 12(14): 1396.

[18] Rozak H A, Adhiatma A, Fachrunnisa O, et al. Social media engagement, organizational agility and digitalization strategic plan to improve SMEs' performance[J]. IEEE Transactions on Engineering Management, 2021, 70(11): 3766-3775.

[19] Mishra V, Heath R J. Structural and biochemical features of human serum albumin essential for eukaryotic cell culture[J]. International journal of molecular sciences, 2021, 22(16): 8411.

[20] Policastro G, Panico A, Fabbricino M. Improving biological production of poly (3-hydroxybutyrate-co-3-hydroxyvalerate)(PHBV) co-polymer: a critical review[J]. Reviews in Environmental Science and Bio/Technology, 2021, 20(2): 479-513.

[21] Co J Y, Margalef-Català M, Monack D M, et al. Controlling the polarity of human gastrointestinal organoids to investigate epithelial biology and infectious diseases[J]. Nature protocols, 2021, 16(11): 5171-5192.

[22] Betzler D, Loots E, Prokůpek M, et al. COVID-19 and the arts and cultural sectors: Investigating countries' contextual factors and early policy measures[J]. International journal of cultural policy, 2021, 27(6): 796-814.

[23] Gisondi M A, Barber R, Faust J S, et al. A deadly infodemic: social media and the power of COVID-19 misinformation[J]. Journal of medical Internet research, 2022, 24(2): e35552.