

Enterprise Competitive Culture and Intelligent Investment

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Abstract. Against the backdrop of intensified competition in the digital economy and manufacturing sector, intelligent investment has become a key driver for enterprises' transformation and upgrading. However, in reality, there exists a paradox of "hot policies but cold enterprises", and the direction of the role of competitive culture remains unclear. Based on the resource-based view and dynamic capability theory, this paper takes A-share listed companies in China from 2009 to 2024 as the research sample, and uses text analysis to construct indicators of competitive culture. It empirically examines the impact of competitive culture on intelligent investment and its transmission mechanism. The benchmark regression results show that competitive culture has a significant positive impact on intelligent investment. This conclusion remains valid after a series of robustness tests, including changing the measurement of independent variables, adjusting standard errors, adding control variables, and controlling for fixed effects at different levels. The mediation mechanism test reveals that competitive culture significantly promotes intelligent investment through two paths: by increasing the total asset turnover rate to reduce agency costs and by raising the Herfindahl index to enhance market concentration. This paper uncovers the internal logic and boundary conditions of competitive culture in driving intelligent transformation, providing theoretical basis and empirical reference for enterprises to optimize internal cultural orientation, formulate intelligent investment strategies, and for government departments to improve industrial competition and talent policies.

Keywords: Competitive culture of enterprises, Intelligent investment, Agency cost, Market concentration, Text analysis

1. Introduction

Against the backdrop of intensified global manufacturing competition and the digital economy wave, intelligent investment by enterprises is regarded as a key path to enhance production efficiency and reshape core competitiveness. Governments around the world have also successively introduced policies to encourage enterprises to accelerate intelligent transformation. However, a perplexing paradox is gradually emerging: despite the continuous increase in external policy support and the continuous decline in the cost of intelligent technology, a large number of enterprises show significant hesitation and conservatism in intelligent investment decisions, even leading to a mismatched pattern of "hot policies, cold enterprises". Meanwhile, the competitive culture that is generally promoted within enterprises, which should stimulate efficiency orientation and innovation

drive, seems to fail to effectively translate into active investment in intelligent projects in reality. Instead, it coexists with the sluggish pace of enterprises' intelligent transformation. This phenomenon raises a profound practical contradiction: why the widely recognized competitive culture, which can enhance organizational vitality, fails to drive enterprises to embrace the intelligent wave as expected, but may instead become an implicit resistance in intelligent investment decisions? This contradiction not only troubles enterprise managers and policymakers but also poses a severe challenge to traditional competitive culture theory.

Although existing research has paid attention to the impact of enterprise competitive culture on economic consequences such as labor cost stickiness, stock price crash risk, and employment structure, and has accumulated relatively rich empirical evidence, most studies still remain at the level of the impact of competitive culture on traditional operational elements and financial performance, and few have extended it to the cutting-edge strategic field of enterprise intelligent investment. More importantly, the existing research on the influencing factors of enterprise intelligent investment mainly focuses on external driving factors, such as the impact of the gig economy on the labor supply structure, the policy effects of government technological transformation subsidies, and the institutional support of the regional business environment, while rarely exploring from the perspective of internal value orientation how corporate culture, as a deep-seated factor, shapes enterprises' willingness to adopt intelligent technology and investment intensity. This division of research perspectives has led to the long-term separation of competitive culture theory and intelligent investment theory into two relatively independent academic streams, lacking effective theoretical integration and empirical dialogue. Facing the practical contradiction of "prevalent competitive culture but sluggish intelligent investment", existing theories cannot clearly explain the mechanism through which competitive culture affects intelligent investment, nor can they clarify the boundary conditions of this effect under different environmental conditions.

To fill the above research gap, this study focuses on the core issue of "how and when does enterprise competitive culture affect enterprise intelligent investment", and constructs and empirically tests an integrated theoretical model. The study adopts a two-stage questionnaire survey and text analysis of listed company annual reports, taking manufacturing enterprises as the research object, to systematically examine the impact of enterprise competitive culture on the scale and efficiency of intelligent investment.

In terms of theoretical significance, this study, by revealing the inhibitory effect of competitive culture on intelligent investment and its multiple transmission paths, expands the research on competitive culture from the traditional fields of labor adjustment and capital market risk to the fields of technology investment and digital transformation, providing a new theoretical entry point for the integration of resource-based view and dynamic capability theory in competitive culture research. At the same time, this study responds to the theoretical concern in the field of cultural research of "how value orientation is transformed into specific decision-making behavior", enriching the theoretical accumulation of cross-research between organizational behavior and strategic management. In terms of practical significance, the findings of this study can help enterprise management to re-examine the possible effects of competitive culture during the intelligent transformation process, especially during the current period when China's economy is transitioning from high-speed growth to high-quality development. A large number of manufacturing enterprises are now facing a critical window for intelligent upgrading. The research conclusions of this article can provide practical management insights for enterprises on how to maintain a moderate competitive vitality while effectively avoiding the inhibitory effect of culture on technological

investment, and how to adjust cultural strategies in a timely manner in an uncertain environment to support intelligent transformation.

2. Literature review

Previous studies have explored the economic consequences of corporate competitive culture from multiple dimensions. Some scholars have found that corporate competitive culture, as an informal institution, significantly influences a company's labor cost decisions. Ma Fuqi's research indicates that the more a company emphasizes competition in its annual reports, the lower the level of labor cost stickiness, meaning that the company is more inclined to reduce labor costs during periods of business decline. This effect is more pronounced in non-state-owned enterprises and those in industries with weaker competition, and the underlying mechanism lies in the short-sighted behavior induced by the competitive culture, which makes the management place greater emphasis on short-term gains [1]. At the same time, the research by Xie Chenxin, Ye Dezhu, and Ye Xian extended the perspective to the capital market and found that corporate competitive culture is also closely related to the risk of stock price collapse. The more a company emphasizes competition in its annual reports, the greater the risk of stock price collapse. The underlying mechanism lies in the joint effect of cultural construction within the enterprise and opportunistic behavior [2]. Additionally, the research by Yin Liuzhi and Wei Huimin further revealed the possible nonlinear impact of competitive culture. Based on the analysis of manufacturing enterprise data, they indicated that there is a significant inverted U-shaped relationship between internal competition and labor employment. That is, moderate competition promotes employment expansion in the short term, while excessive competition inhibits employment growth [3]. These studies present the diverse impacts of corporate competitive culture from perspectives such as labor adjustment, capital market risks, and employment changes in a relatively systematic manner.

When discussing the influencing factors of the dependent variable of enterprise intelligent investment, the existing literature mainly conducts analysis from aspects such as the labor market structure, government policies and institutional environment. The research by Liu Kuo-ming, Yuan Wang-ping and Zhou Hao found that the rapid rise of the gig economy significantly promoted the intelligent process of manufacturing enterprises by changing the supply structure of the labor market. The mechanism lies in that the gig economy platform, by leveraging the wage premium advantage, generates a suction effect. Manufacturing enterprises, in response to the shortage of labor, increase the use of industrial robots and hire more relevant technical personnel [4]. The research by Wu Lang and Shi Jun-wei focused on the government policy level and systematically examined the impact of technological transformation subsidies on the industrial intelligent development of enterprises. The study showed that technological transformation subsidies enabled enterprise intelligent development through three transmission mechanisms: easing financing constraints, strengthening entrepreneur attention and stimulating technological innovation. At the same time, the policy effect presented structural differences. Growth-stage enterprises, small-scale enterprises, large enterprises and state-owned enterprises showed heterogeneity in different mechanism dimensions, and regional business environment constituted an important contextual variable [5]. These studies provided important external perspectives for understanding the driving factors of enterprise intelligent investment, covering key dimensions such as labor market changes and industrial policy intervention.

The existing research has accumulated rich evidence in the economic consequences of enterprise competitive culture and the influencing factors of enterprise intelligent investment. However, there are still three shortcomings: First, competition culture and intelligent investment belong to different

research frameworks and lack theoretical integration; second, the mediating mechanism by which competition culture affects intelligent investment has not been revealed; third, the moderating role of external environment and internal characteristics has been ignored.

3. Mechanism analysis and hypothesis formulation

First, the competitive culture promotes intelligent investment by reducing agency costs. In an intense market competition environment, management faces greater performance pressure and external supervision, and the space for opportunistic behavior is significantly reduced, leading to a decrease in agency costs. The reduction in agency costs releases the internally occupied funds that were previously inefficiently utilized, reduces resource misallocation and waste in the enterprise, and thereby provides a more abundant and stable financial foundation for intelligent investment projects. At the same time, the increase in total asset turnover itself reflects the improvement in the enterprise's operational efficiency, enabling the enterprise to convert assets into cash flow more quickly, further enhancing the enterprise's ability to invest in technological upgrading. Therefore, the competitive culture, through the transmission chain of "reducing agency, improving efficiency, and releasing funds", effectively promotes intelligent investment.

Second, the competitive culture drives intelligent investment by enhancing market concentration. Under competitive culture, in the environment of survival of the fittest, enterprises with technological, management, and cost advantages can continuously expand their market share, while inferior enterprises gradually become marginalized or exit, resulting in an increase in industry market concentration. With the increase in market concentration, leading enterprises gain stronger pricing power, more abundant profit accumulation, and more stable market expectations, which makes them more willing and capable of undertaking large-scale, long-term intelligent equipment investment compared to the dispersed competitive environment. Moreover, high market concentration often accompanies the gradual unification of industry technical standards and the enhancement of synergy effects. The leading enterprises that pioneer the intelligent transformation not only can consolidate their technological barriers but also can drive the digitalization upgrade of upstream and downstream enterprises through the industrial chain transmission, thereby accelerating the overall intelligent transformation process of the industry.

Third, the competitive culture promotes intelligent investment by expanding the scale of human capital. Under competitive pressure, enterprises must actively attract high-quality talents with new technology literacy, innovation ability, and management experience to maintain or obtain competitive advantages, thereby promoting the growth of the overall employment scale. The expansion of human capital scale brings two positive effects: On the one hand, the addition of more high-quality employees enhances the organizational ability and technical support capacity of the enterprise to implement, maintain, and continuously optimize complex intelligent systems, reducing the implementation obstacles of technology implementation; on the other hand, the larger scale of human capital helps to achieve learning effects through professional division of labor and knowledge sharing, while spreading the unit cost of intelligent transformation (such as training costs, system adaptation costs, etc.), forming a "talent aggregation - technology absorption - cost reduction - benefit improvement" virtuous cycle. Therefore, the competitive culture, by expanding the scale of human capital, provides necessary talent guarantee and scale economic advantages for intelligent investment.

Based on the above analysis, this paper formulates Hypothesis 1: The competitive culture has a significant positive impact on intelligent investment.

4. Variable setting and model selection

4.1. Data source

This paper selects the data of A-share listed companies in China from 2006 to 2024. The data processing carried out in this paper includes the following steps: (1) Removing companies in the ST and *ST categories; (2) Eliminating samples with obviously abnormal financial data; (3) Deleting samples with incomplete data in the statistical year; (4) Reducing the influence of extreme values on the test results by performing upper and lower 1% trimming on continuous variables. The variable data are all from the Wind and CSMAR databases, and the processed data is analyzed using Stata 18.0 econometric analysis software.

4.2. Variable setting

First, enterprise competitive culture. Using the text analysis method, a competition culture word bank is constructed based on the annual reports of listed companies, and the frequency of key words is counted to measure the degree of emphasis on competitive culture. The word bank is refined based on the "Modern Chinese Dictionary", "Chinese Idiom Dictionary", "Synonym Dictionary", and the competitive value framework, including words such as "competition", "promotion", "reform", "development", etc. In the analysis, negative words are excluded to avoid interference, and stop words are added to ensure the comparability of word frequency and the accuracy of the text.

Second, intelligent transformation. This paper uses text mining methods and constructs an intelligent transformation index based on the frequency of specific keywords. The specific steps are as follows: ① Manually collect and summarize the annual reports of sample companies, extract the "Management Discussion and Analysis (MD&A)" section in the annual reports, and use the Python open-source "Jie-ba" Chinese word segmentation module's built-in dictionary to segment the MD&A text and determine the language expression characteristics of intelligent transformation. ② Based on the "Intelligent Manufacturing Development Plan (2016-2020)" to screen listed companies, assign a value of 0 to companies that have not undergone intelligent transformation. ③ Conduct a keyword association graph analysis of intelligent transformation, and extract 27 keyword combinations related to enterprise intelligent transformation. ④ If the sample company's annual report contains keywords related to intelligent transformation, the proportion of the number of times these keywords appear in the annual report of the sample company to the number of similar keywords appearing in the annual reports of the same industry sample companies is used to measure the intelligent transformation degree of the sample company in that year.

Third, the control variables of this paper, enterprise size Size, asset-liability ratio Lev, enterprise market value Tobinq, equity concentration Top1, and enterprise performance (profitability) Roa

4.3. Model performance

To examine the impact of enterprise competitive culture on intelligent investment, a fixed effect model was used for regression testing, and the regression model (1) was constructed:

$$AI_{it} = \beta_0 + \beta_1 * com_{it} + \sum \alpha_k + controls_{it} + \lambda_t + \mu_i + \varepsilon_{it} \quad (1)$$

Where ε_{it} represents the random disturbance term; i and t represent the company and year, respectively. At the same time, the annual fixed effect λ_t and the individual fixed effect μ_i were

controlled, k represents the number of control variables, and β_0 represents the constant term. β_1 represents the coefficient of the independent variable.

5. Empirical analysis

5.1. Descriptive statistics

Table 1 shows that the mean value of the independent variable "enterprise competitive culture" (competition1) is 0.006, indicating that the overall competitive culture of the sample enterprises is at a relatively low level; its standard deviation is 0.002, with the maximum value being 0.027 and the minimum value being 0. This reflects that although there are certain differences in the degree of competitive culture among different enterprises, the overall fluctuation is relatively small, and the competitive culture is relatively concentrated in the sample enterprises.

The mean value of the dependent variable "intelligent investment" (ai) is 0.022, with a standard deviation of 0.059, and the maximum value is 0.857. This indicates that the proportion of intelligent investment in most sample enterprises is relatively low, but there are significant differences among individual enterprises. The level of intelligent investment of some enterprises is far higher than the average value. This difference may be related to the different values of the independent variable "enterprise competitive culture", or it may be influenced by the combined effects of control variables such as enterprise profitability, scale, leverage level, growth rate, and equity structure.

In addition, the statistical characteristics of each control variable are basically consistent with the existing research. The distribution of these variables is reasonable, and no obvious outliers are present, providing a good data foundation for the subsequent empirical analysis.

Table 1. Descriptive statistical analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
ai	45182	0.022	0.059	0.000	0.857
competition1	45182	0.006	0.002	0.000	0.027
ROA	45182	0.034	0.066	-0.556	0.222
Size	45182	22.098	1.278	19.415	26.452
Lev	45182	0.415	0.203	0.028	0.91
TobinQ	45182	1.999	1.302	0.795	17.676
Top1	45182	0.339	0.148	0.075	0.758

5.2. Baseline regression

Table 2 reports the baseline regression results of the impact of enterprise competitive culture (competition1) on intelligent investment (ai). As shown in the (1) column of Table 2, when no control variables are added, the coefficient of competition1 is 1.1118, and it is significant at the 1% level. In the (2) column, after adding enterprise-level control variables, the coefficient is 1.0902, still significant at the 1% level; in the (3) column, the fixed effect of the year is further controlled, and the coefficient rises to 1.8816, with the significance remaining unchanged. In the (4) column, a two-way fixed effect model (individual and year) is adopted to control the heterogeneity of enterprises that does not change over time and the common time trend. The results show that the coefficient of competition1 is 1.5974, still highly significant at the 1% statistical level.

This result has important economic significance: for every 1 unit increase in competition1, the intelligent investment (ai) of enterprises will increase by approximately 1.5974 units on average. Considering that the sample mean of competition1 is 0.006 and the mean of ai is 0.022, this coefficient indicates that the marginal impact of competitive culture is economically significant, that is, the enhancement of enterprise competitive culture can significantly promote the level of intelligent investment.

Table 2. Baseline regression

	(1)	(2)	(3)	(4)
	ai	ai	ai	ai
competition1	1.1118*** (0.12)	1.0902*** (0.12)	1.8816*** (0.13)	1.5974*** (0.14)
ROA		-0.0091* (0.00)	-0.0097** (0.00)	-0.0048 (0.00)
Size		-0.0002 (0.00)	0.0000 (0.00)	-0.0000 (0.00)
Lev		0.0079*** (0.00)	0.0060*** (0.00)	0.0033* (0.00)
TobinQ		0.0003 (0.00)	0.0004* (0.00)	0.0002 (0.00)
Top1		-0.0002 (0.00)	0.0002 (0.00)	0.0046* (0.00)
_cons	0.0156*** (0.00)	0.0165*** (0.01)	0.0247*** (0.01)	0.0292*** (0.01)
N	45182	45182	45182	45182
R ²	0.002	0.003	0.025	0.028
year	No	No	Yes	Yes

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.3. Robustness test

Based on the results of the above robustness tests, this paper verifies the reliability of the positive impact of enterprise competitive culture on intelligent investment from multiple dimensions. Table 3 Model 1 uses the lagged one-period competitive culture indicator as the independent variable to alleviate potential reverse causality issues. The results show that the lagged coefficient is still significantly positive, indicating that the previous competitive culture can effectively predict the current level of intelligent investment. Model 2 re-estimates Model 1 using heteroskedasticity robust standard errors to control for possible heteroskedasticity issues. The estimated results are consistent with the baseline regression, indicating that the setting of standard errors does not affect the core conclusion. Model 3 replaces the measurement of the independent variable with another competitive culture indicator to eliminate the influence of index construction bias on the results. The regression coefficient is still significantly positive, proving that the promotion effect of competitive culture on

intelligent investment is not dependent on a specific measurement method. Model 4 further controls for industry fixed effects to absorb unobservable factors that do not change over time at the industry level and avoid the interference of industry characteristics on the estimation results. The signs and significance of the core independent variable have not undergone substantial changes. Model 5 adds enterprise growth (revenue growth rate), board size, and enterprise age (listing years) to the control variables of the baseline model to alleviate potential biases caused by omitted variables. The results also show that competitive culture has a significant positive impact on intelligent investment. In summary, regardless of changing the measurement of the independent variable, adjusting the standard errors, adding control variables, or changing the level of fixed effects, the positive impact of enterprise competitive culture on intelligent investment remains robust, proving that the baseline regression conclusion has high reliability.

Table 3. Robustness test

	(1)	(2)	(3)	(4)	(5)
	ai	ai	ai	ai	ai
competition1	0.9857*** (0.14)	1.5974*** (0.26)	0.0154*** (0.00)	1.6010*** (0.14)	1.6169*** (0.15)
controls	Yes	Yes	Yes	Yes	Yes
_cons	0.0282*** (0.01)	0.0292** (0.01)	-0.0139* (0.01)	0.0368*** (0.01)	0.0270*** (0.01)
N	40004	45182	45182	45182	41756
R ²	0.024	0.028	0.043	0.029	0.029
year	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.4. Mechanism verification

To further reveal the internal transmission mechanism by which enterprise competitive culture influences enterprise intelligent investment, this paper, based on theoretical analysis, proposes three action paths. It uses proxy costs (total asset turnover rate, ATO), enterprise human capital scale (number of employees, Employee), and market concentration (Herfindahl Index, HHI) as mediating variables to construct a mediating effect model for testing. The regression results are shown in Table 4.

From the regression results in column (1) of Table 4, the regression coefficient of enterprise competitive culture (competition1) on proxy costs is 2.3631, and it is significantly positive at the 1% statistical level. This indicates that enterprise competitive culture significantly enhances the total asset turnover rate of enterprises and effectively reduces their proxy costs. In column (2), the regression coefficient of enterprise competitive culture on enterprise human capital scale is 2.4665, but it fails to pass the conventional significance level test, suggesting that the direct impact of enterprise competitive culture on the overall employment scale of enterprises is not statistically significant. The results in column (3) show that the regression coefficient of enterprise competitive culture on market concentration is 0.4631, and it is significantly positive at the 5% statistical level.

This indicates that enterprise competitive culture significantly increases the market concentration of the enterprise's industry and enhances the market power of the enterprise.

Combining the significant positive impact of enterprise competitive culture on intelligent investment in the baseline regression, according to the logic of mediating effect testing, the above results indicate that proxy costs and market concentration play a significant mediating role in the process by which enterprise competitive culture influences intelligent investment. Specifically, enterprise competitive culture reduces proxy costs and enhances market concentration, thereby promoting the enterprise's intelligent investment; while the mediating path of enterprise human capital scale has not been supported by data, that is, enterprise competitive culture does not promote intelligent investment by expanding the overall employment number of the enterprise, which may be due to the substitution effect of intelligent investment on low-skilled labor, weakening the positive impact of competitive culture on employment scale.

Table 4. Test of mediating mechanism

	(1)	(2)	(3)
	ATO	Employee	HHI
competition1	2.3631*** (0.86)	2.4665 (1.81)	0.4631** (0.22)
controls	Yes	Yes	Yes
_cons	0.7760*** (0.04)	-8.3170*** (0.08)	0.2400*** (0.01)
<i>N</i>	45182	45147	45182
<i>R</i> ²	0.102	0.576	0.011
year	Yes	Yes	Yes

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

6. Conclusions and recommendations

Based on theoretical analysis and empirical testing, this paper reaches the following main conclusions. The baseline regression results show that the enterprise competitive culture has a significant positive impact on intelligent investment. This conclusion remains valid after a series of robustness tests such as changing the measurement of independent variables, adjusting standard errors, adding control variables, and controlling for different levels of fixed effects. This proves that the competitive culture can effectively promote the process of enterprise intelligent transformation. Further mediation mechanism analysis reveals the internal transmission path of the competitive culture on intelligent investment. Specifically, the competitive culture significantly improves the total asset turnover rate of enterprises, effectively reduces agency costs, thereby releasing more internal funds for intelligent projects and improving operational efficiency; at the same time, the competitive culture significantly increases market concentration, enabling dominant enterprises to expand their market share in the survival-of-the-fittest environment, and with stronger financial strength and more stable market expectations, carry out large-scale intelligent investment. However, the positive impact of the competitive culture on the scale of enterprise human capital has not passed the significance test, indicating that the competitive culture has not promoted intelligent investment

by expanding the overall employment of the enterprise. This may be due to the substitution effect of intelligent transformation on low-skilled labor, which to some extent offsets the expansion effect of the competitive culture on the employment scale.

Based on the above conclusions, this paper proposes the following research suggestions. The management of enterprises should fully recognize the positive value of competitive culture in the process of intelligent transformation, actively build a moderate and benign internal competitive atmosphere, thereby stimulating the efficiency awareness and cost control motivation of management, and thereby reducing agency costs and optimizing asset turnover efficiency. Especially when formulating salary incentives and performance evaluation schemes, asset utilization efficiency and the progress of intelligent investment should be included in the key indicator system, so that short-term performance competition and long-term technological investment form an incentive-compatible mechanism design. At the same time, enterprises should pay attention to the changing trends of the market competition pattern, and in the process of gradually increasing industry concentration, leading enterprises should more actively assume the leading role in intelligent transformation, using the profit accumulation and pricing power brought by market share expansion to increase investment in intelligent manufacturing equipment, industrial software, and digital management platforms, thereby converting market power into technological leading advantages. Finally, policy makers, while encouraging enterprises to increase intelligent investment, should also pay attention to the industry competition order and the efficiency of labor market matching, and through improving anti-monopoly regulations, vocational training subsidies, and talent mobility mechanisms, create a favorable external institutional environment for the positive role of enterprise competitive culture.

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