

RESEARCH ARTICLE

Dimensions of corporate culture and financial performance: Evidence from Chinese publicly listed companies

Shuhui Liang¹, Xiang Gao^{2,*}

¹ International College for Interdisciplinary Studies, Payap University, Chiang Mai 50000, Thailand

² Research Center of Finance, Shanghai Business School, Shanghai 200235, China

* Corresponding author: Xiang Gao, gaoxiang@sbs.edu.cn

ABSTRACT

Corporate culture is the soul of the enterprise and plays a vital role in creating corporate cohesion and improving business performance; in many cases, the role of corporate culture on business performance is not direct, but there are a series of intermediary influencing mechanisms. Most of the current academic circles have studied the influencing mechanism between corporate culture and business performance from the perspective of dynamic matching. Still, there is a lack of research results based on the theoretical perspective of Edgar H. Schein's corporate culture dimensions. Based on Schein's theoretical perspective of corporate culture dimensions, this study explores the mechanism between corporate culture and business performance of Chinese listed companies from the dimensions of corporate governance culture in the external environment and corporate governance culture in the internal environment and analyzes the data of A-share listed companies in China's Shanghai Stock Exchange and Shenzhen Stock Exchange as samples using IBM SPSS Statistics version 27.0 for data analysis. The results are twofold. First, the adaptability of the enterprise's external environment has a significant and positive effect on the Weighted average return on net assets in the financial dimension; it has a substantial and positive impact on customer satisfaction in the non-financial dimension. Second, internal corporate governance culture has a significant and positive effect on weighted average return on net assets, Debt-to-Equity Ratio, Earnings per share in financial dimensions, Percentage of highly educated employees, customer satisfaction survey, and non-financial dimensions. Percentage of highly educated employees, Customer Satisfaction, Customer retention rate, and R&D investment as a percentage of operating income in non-financial dimensions have significant positive effects. The findings of this study provide theoretical and practical guidance for Chinese listed companies to strengthen the construction of external environment adaptive culture and internal corporate governance culture.

Keywords: corporate culture; business performance; financial performance; influencing mechanism

1. Introduction

With the relaxation of segmentation policies and the development of information technology, regional integration is further advanced, and the competition among publicly-listed enterprises becomes increasingly intense. Corporate culture, as the soul of the enterprise, is the values and behavioral norms that are formed in the long-term development process of the enterprise and are observed by all members^[1], which plays an important role in uniting the strength of the enterprise staff, reducing the operating costs, and creating a good

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external business environment. As corporate culture has the qualities of an invisible contract, it does not directly play a role in business performance^[2,3,4]. Still, it implicitly determines corporate employees' behavior^[5] and influences the performance of a company in various aspects through mechanisms, such as providing motivation, facilitating cooperation, and aligning beliefs held by the employees, managers, and other stakeholders^[6].

The mediating mechanism between corporate culture and business performance has aroused extensive interest among scholars in corporate culture research. Wu^[7] believes that there is a phenomenon of "disconnection" between corporate culture and business performance; the reason is that the current scholars on the role of the mechanism between the two research results are still relatively small, and the "black box" between the two has not yet been completely opened. Most current studies on the mechanism of corporate culture and corporate performance are based on the perspective of dynamic analysis, exploring the main mediating variables such as organizational commitment, corporate innovation, corporate social responsibility, and so on. For example, Pérez-Cornejo et al.^[8] argued that stakeholders' national culture significantly moderates firm performance and corporate reputation. Based on the perspective of social responsibility, Mushafiq et al.^[9] studied the association mechanism between corporate culture and corporate development, and they concluded that corporate focus on social responsibility can help corporations obtain more resources and win a better social image, which in turn promotes the economic efficiency of corporations. It has also been argued that CSR does not directly affect firm performance, but green innovation and green change leadership significantly moderated the link between CSR and firm performance^[10]. Li et al.^[11] stand in the perspective of environmental management, arguing the relationship between corporate environmental culture of Chinese, environmental management, and corporate financial performance; they believe that enterprises, as the main body of social and economic development, are inevitable to coordinate the relationship between corporate profitability and environmental protection, through the empirical research they found that corporate environmental culture and corporate environmental management have a significant favorable influence on the financial performance of enterprises. Shi et al.^[12] constructed the mechanism of environmental protection tax law and enterprise environmental performance, and their study shows that environmental protection tax law mainly promotes enterprise environmental performance by strengthening the rigidity of law enforcement of local governments, improving the environmental concern of local governments, promoting green innovation of enterprises, and solving the collusion between governments and enterprises.

Synthesizing the current research results, many scholars at home and abroad explore the role mechanism between corporate culture and business performance from different perspectives and using different variables^[11,7]. However, most of the current research on the role mechanism between corporate culture and business performance in Chinese academia is based on the mediating role mechanism of individual influencing factors, and there is almost no literature on the systematic role mechanism from the point of view of the adaptability of the enterprise's external environment and internal governance, which leads to the fact that the current interpretation of the role mechanism of corporate culture on business performance is too one-sided. Listed companies have unique characteristics compared to non-listed companies in terms of internal governance, financial management, financing mode, shareholder scale, etc., and the corporate culture formed is also very different^[13]. The intermediary mechanism between the unique corporate culture and the corporate performance of listed companies has its unique characteristics^[14]. Therefore, we have the following theoretical thinking: can listed companies seek survival from the external environment to strengthen governance within the enterprise as a mediating mechanism between corporate culture and enterprise performance? Can the external adaptability of corporate culture (governance of the external environment of the enterprise) effectively improve the enterprise's business performance? Can enterprises' internal resource integration characteristics

(internal governance) effectively enhance their business performance? Based on these questions and addressing the gaps in current research, this study attempts to empirically investigate the above questions from the perspective of Edgar H. Schein's corporate culture dimensions.

2. Theoretical framework and hypothesis development

2.1. Edgar H. Schein's perspective on corporate cultural dimensions

Schein and Schein^[15] define corporate culture as a shared pattern of basic assumptions that a group acquires in solving its external adaptation problems as well as internal integration problems. For the problem of corporate culture adaptation, Edgar H. Schein argues that the implicit culture and basic assumption patterns in a company are shared only when employees acquire a formal identity.

For this reason, Edgar H. Schein raises the issue of the dimensionality of a corporate culture based on a functional perspective, where he considers the main problems faced by the enterprise: firstly, responding to the external environment to ensure the survival of the enterprise, and secondly, strengthening the internal integration of the organization^[15]. Regarding the issue of external adaptation of the enterprise, Edgar H. Schein believes that the main problems are the mission strategy, the vision of the objectives, the way to achieve the goals, etc., developed by the enterprise to adapt to the external environment^[16], and the need for all employees to reach a common understanding in dealing with the external environment of the enterprise's survival, to form a synergy, to deal with the relationship with the main stakeholders and to achieve some balance; Regarding the issue of the internal governance of the enterprise, the main problems include: Creating a common language and conceptual categories, assigning power, authority, and status, forming norms of trust, intimacy, friendship, and love, defining rewards and punishments^[16]. According to Edgar H. Schein, strengthening the issues of internal corporate governance, the leadership of the founders and management of the company is critical.

Edgar H. Schein's delineation of corporate culture dimensions has attracted many scholars who have discussed it from different perspectives. According to Yin^[17], Edgar H. Schein's delineation of the dimensions of corporate culture addresses two fundamental issues for organizations: first, "survival and adaptation to the external environment" and second, "integration of internal processes to ensure continued survival". According to Fosu et al.^[18] and Ortiz-Martinez et al.^[19], firms cannot exist independently from the social environment, and corporate environmental practices impact the development of green innovation that promotes corporate social performance. Firms enhance corporate social performance through green innovation and corporate image, which provides a rare opportunity for firms to develop. In fact, as a listed company, it is not only the process of corporate culture evolution but also the main problem faced by listed companies in their operation and management by continuously adjusting corporate strategies and operation initiatives to adapt to the external development environment and shaping the values of internal corporate governance, to enhance the efficiency of corporate internal regulation and governance and realize better operation performance. In conclusion, Edgar H. Schein's differentiation of corporate culture dimensions highlights the functional significance of corporate culture. It provides a new way for listed companies to solve external and internal contradictions and enhance corporate performance through the practical perspective of corporate culture.

2.2. Influencing mechanism of corporate culture on corporate performance

The above analysis shows that Edgar H. Schein's division of corporate culture dimensions reveals how corporate culture affects business performance. In the current increasingly competitive environment, listed companies often take survival and development as the priority. They are committed to dealing with the relationship between the enterprise and different external environments, and corporate culture is accompanied by the development of the enterprise and the way of doing things. In the survival and development of

enterprises, a series of assumptions are often developed around the issues of “how to do” and “what to do”^[16], and the mission strategy, goal vision, and the way to achieve the goal, etc., which are extended from this series of assumptions, is the performance of enterprises actively adapting to the external environment. Manifestation of the firm’s active adaptation to the external environment. This external environment adaptive culture of enterprises has a distinctive epochal nature, and factors such as science and technology, culture, politics, economy, and religion in different eras will impact enterprise culture^[20]. With the increasingly severe environmental situation, the Chinese government has introduced major strategic shifts such as the “dual-carbon” goal and the green transformation of listed companies^[21].

Under this distinctive background, environmental protection and green development have become essential opportunities and challenges for listed companies to build their external environment. If listed companies adjust their own adaptive culture promptly according to these changes in the external survival environment, the more adaptable they are to the external survival environment, the more they can win more reputation, be recognized by society, and obtain more development opportunities, thus realizing higher value creation and better business performance. In terms of internal resource integration, listed companies will redeploy or combine various internal resources, such as the size of the board of directors, personnel arrangements, incentives and rewards, the formulation of organizational goals, employee behavioral norms, etc., according to the changes in the external environment of the enterprise and the needs of the strategic development of the enterprise to achieve the purpose of optimizing the management process, reducing the cost of management, improving the efficiency of management, and realizing the management objectives. The optimization of internal corporate governance and internal business processes has a direct effect on corporate business performance. It can be said that the higher the level of internal corporate governance, the more it can promote the sustainable development of the enterprise^[22]. **Figure 1** illustrates the mechanism in a graphical view.

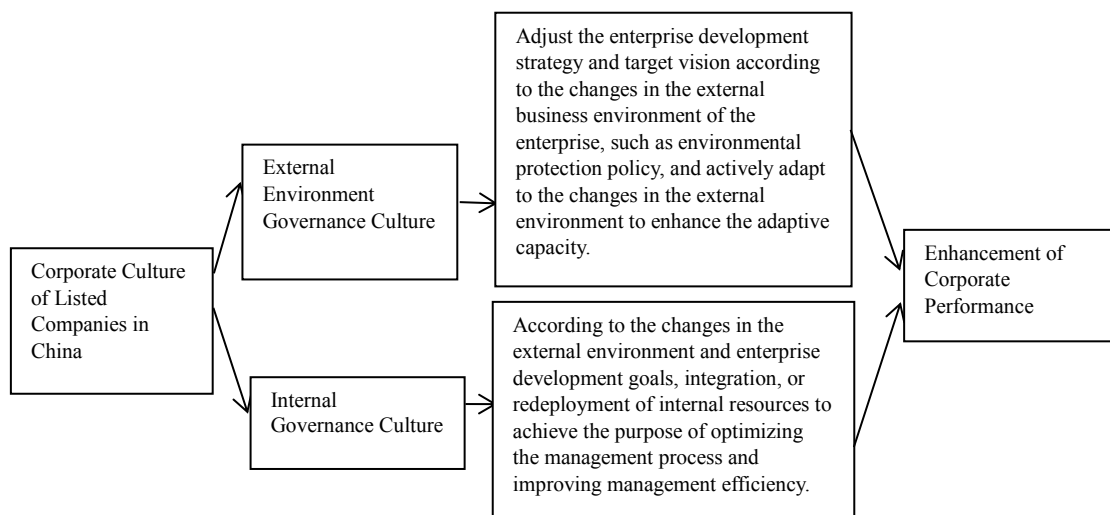


Figure 1. An illustration of the influencing mechanism of corporate culture on the performance of listed companies.

In summary, combined with Edgar H. Schein’s elaboration on the dimensions of corporate culture, the adaptability of the external environment of enterprises in this study refers to the ability of listed companies to actively adapt to the external ecological environment construction and environmental protection work and to strengthen the enterprise’s environmental risk management in the context of the current increasingly severe environmental pollution and the active promotion of the concept of green and sustainable development. The internal resource integration of the enterprise refers to the enterprise’s ability to enhance its governance level in terms of shareholders’ rights and interests, governance structure, quality of information disclosure,

governance risks, and business ethics by improving the efficiency of resource utilization and creating a balanced relationship with significant stakeholders. The external adaptability and internal integration of corporate culture are both part of corporate culture, and they are not distinctly separate but closely linked as one. To survive, an enterprise must first can adapt to the external environment, and to ensure that it continues to have this ability, it must strengthen its internal governance. Both mutually reinforce and aim to realize the enterprise's vision and strategic objectives.

This study explores the influencing mechanism of corporate culture and business performance of listed companies through the perspective of Edgar H. Schein's corporate culture dimension, mainly based on the following three considerations: First, Edgar H. Schein's delineation and elaboration of the corporate culture dimension summarizes the main external environment adaptation problems and internal governance problems faced by Chinese listed companies in their survival and development, and the delineation of the culture dimension has a solid theoretical and generalization. The division of cultural dimensions is highly academic and generalized. Second, domestic scholars such as Yin^[17], Fosu et al.^[18], and others have explored the role and significance of Edgar H. Schein's delineation of corporate culture dimensions as well as leadership, which makes the model constructed in this study highly reliable; third, the mechanism of action explored in this study is unique in the sense that most of the scholars based on the perspective of dynamic matching analysis, which takes organizational commitment, corporate social responsibility, corporate innovation, human resource management practices, etc. as mediating variables^[23], such a research perspective is not comprehensive and systematic enough, and no scholars have conducted empirical research based on the systematic and comprehensive perspective of Edgar H. Schein's corporate culture dimension as a mediating variable.

2.3. Using balanced scorecard to measure corporate performance

To solve the problem of ineffective implementation of corporate strategy, Kaplan and Norton^[24] proposed the establishment of a performance management system through the Balanced Scorecard (BSC) to "realize strategic leadership." They argued that the traditional financial accounting model can only measure past events (the lagging outcome factor) but cannot assess the forward-looking investments of a company (the leading driver). With increasing competition, the quality-centered development strategy of enterprises must necessarily consider indicators such as customers and the future growth of the enterprise, so the Balanced Scorecard provides a comprehensive evaluation of enterprise performance through four dimensions: financial, customer, internal operations, and learning and growth, which encompass both financial and non-financial indicators.

With the introduction of the Balanced Scorecard to China in the late 1990s, the Balanced Scorecard has become a corporate performance evaluation method alongside the Volvo Evaluation Method, the EVA evaluation system, the DuPont analysis, and the Chinese state-owned capital fund performance evaluation system in the current comprehensive performance evaluation methods for Chinese listed companies^[25]. The advantages of the balanced scorecard in the performance evaluation of listed companies, such as considering the current development of the enterprise and focusing on corporate strategy, considering the financial and non-financial indicators of the enterprise, and being conducive to optimizing the internal management process of listed companies^[24], this performance evaluation method has rapidly gained acceptance among Chinese enterprises.

In the process of adapting to the external environment and strengthening internal corporate governance, listed companies directly or indirectly have an impact on corporate performance. To comprehensively measure the mechanism of listed companies' corporate culture on business performance, this study constructs a performance evaluation system for listed companies based on the balanced scorecard theory in four dimensions: finance, customers, internal business processes, and learning and growth. Based on the current financial and

accounting management situation of Chinese listed companies, the indicators of financial dimension are set as earnings per share, debt-to-equity ratio, and weighted average return on net assets; non-financial dimensions include customer dimension, internal business process, and learning and growth dimension, of which customer dimension is customer satisfaction and customer retention; internal business process is accounts receivable turnover ratio and inventory turnover ratio; learning and growth dimension is the percentage of highly educated employees; and learning and growth dimension is the percentage of highly educated employees. The internal business process is the accounts receivable and inventory turnover rates, and the learning and growth dimension is the proportion of highly educated employees and the proportion of R&D investment to operating income. **Table 1** lists all indicators in hierarchy.

Table 1. Constructing balanced scorecard for Chinese listed companies.

		Dimensions	Strategic goal	Key indicators
			Profitability	Earnings per share
Corporate Performance Evaluation System of Chinese Listed Companies Based on Balanced Scorecard	Financial dimension		Ability to raise debt and operate	Debt-to-Equity Ratio
			operating ability	Weighted average return on net assets
	Customer Dimension	Customer	Customer relationship management capability	Customer Satisfaction
				Customer retention rate
	Non-financial dimensions	Internal business processes	Management efficiency	Accounts Receivable Turnover Ratio
			Level of supply chain operations	Inventory Turnover Ratio
	Learning and Growth Dimensions		Employee education level	Percentage of Highly Educated Employees
			Enterprise R&D capability	R&D Investment in Operating Revenue

2.4. Hypothesis development

2.4.1. Impact of Adaptive Culture on the Business Performance of Listed Companies in the External Environment

The United Nations Environment Program^[26] took “Strengthening Nature Conservation Actions to Achieve the Sustainable Development Goals” as the theme of the UNES5.2 conference, and the discussion at the conference highlighted the crucial role of nature in social, economic, and environmentally sustainable development. With the gradual implementation of China’s environmental protection policies and related laws, Chinese listed companies face increasingly severe ecological governance issues. This external corporate development environment provokes us to ponder: can listed companies, especially market-oriented ones, ensure continued good business performance against the backdrop of increasingly stringent societal requirements for corporate environmental management?

According to Li et al.^[11], corporate environmental culture can only realize its influence on corporate performance through ecological management practices and environmental culture, as the values, ethical norms, and codes of conduct guiding companies to deal with environmental issues correctly, can directly or indirectly influence managers’ perceptions and judgments of environmental decisions. Guo et al.^[27], by examining the impact of government-imposed environmental regulations on firms’ green innovation, concluded that in the long run, environmental regulatory policies can improve firms’ performance by promoting corporate innovation. According to Soana^[28], managers with forward-looking environmental perceptions will consider environmental issues when formulating development strategies for their firms, and firms should actively

explore adaptive environmental strategies to enhance environmental performance. According to Chapman and Karau^[29], the uncertain external environment can be regarded as either a threat or an opportunity, and to survive in an ambiguous and turbulent environment, as a company, it must make strategic adjustments in response to changes in the environment, and change its strategy in terms of the processes, products and target customers of the company's operations. As a listed company, a strong culture of adaptability to the external environment can draw on and integrate advantageous resources, rally the consensus of employees, to effectively deal with the impact of external uncertainty risks, reduce corporate costs and promote the improvement of corporate performance. Based on the above-related research and analysis of enterprises' external environmental adaptability, this study proposes the following research hypotheses (see **Figure 2**):

H1: The culture of external environmental adaptability of listed companies significantly affects their business performance

H1a: The external environment adaptive culture of listed companies significantly affects their financial performance.

H1b: The adaptive culture of listed companies' external environment significantly affects their non-financial performance.

2.4.2. The impact of internal governance culture on operating performance of listed companies

The internal governance of listed companies has a close relationship with business performance, which domestic and foreign scholars have empirically studied from various perspectives. Jarne-Jarne et al.^[30] concluded through an empirical study that there is a close relationship between corporate governance, corporate culture, and business performance management and that corporate culture significantly impacts corporate governance and business performance. Cheng^[31] argued that the governance efficiency of Chinese-listed companies is insufficient. The level of corporate governance needs urgent improvement. The effectiveness of the governance of listed companies should be comprehensively diagnosed through the elements of shareholders' governance, board of directors' governance, management governance, supervisory board governance, and information disclosure. Taking energy enterprises as an example, Lv et al.^[32] argued that traditional energy enterprises should pay close attention to the changes in the external environment and actively establish a reasonable and effective internal governance mechanism. They select data on equity structure, board governance, and incentive systems to conduct empirical research and argue that improving the internal governance level of energy enterprises is conducive to improving their investment efficiency.

Iqbal and Piwovar-Sulej^[4] believe that sustainable leadership can affect organizational citizens' behaviors toward the environment either directly or through the green organizational climate, and the relationship between the green organizational climate and employees' organizational citizenship behaviors toward the environment depends on the fit degree between people and organizations. It can be seen that the internal governance of the enterprise through the strengthening of institutional construction, the construction of internal governance mechanisms, to regulate and deal with the relationship between shareholders, the board of directors, management employees and other stakeholders, to ensure the efficient operation of the enterprise, and effectively improve the business performance of the enterprise. Based on the above analysis of the research on the relationship between internal governance culture and corporate performance, this study proposes the following research hypotheses (see **Figure 2**):

H2: The internal governance culture of listed companies significantly affects their business performance

H2a: The internal governance culture of listed companies significantly affects their financial performance

H2b: The culture of external environment adaptation of listed companies significantly affects their non-financial performance

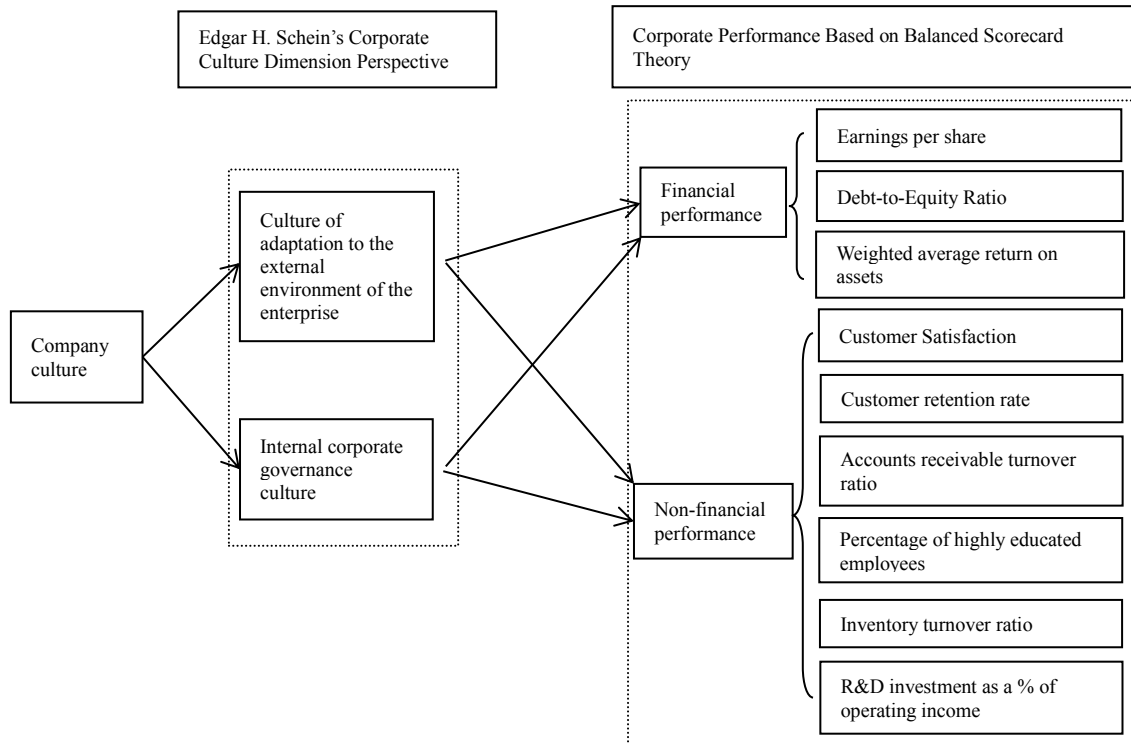


Figure 2. A theoretical framework of how corporate culture influence performance of listed companies in China.

3. Research design

3.1. Sample selection and data sources

According to the characteristics of financial and accounting management of Chinese listed companies, the availability, timeliness, and accuracy of data, this study takes the relevant data of A-share listed companies in the Shanghai Stock Exchange and Shenzhen Stock Exchange from 2015 to 2021 as the initial research samples. It cleanses and processes the data as follows: (I) excluding companies in the financial industry, because the accounting system adopted by financial companies is different from other companies, the comparability of various indicators will be greatly reduced. (II) excluding companies in ST, because the financial situation of such companies is abnormal, the volatility is large, and they face the risk of delisting. (III) excluding outliers and extreme value samples. The data cleaning and processing in this study refer to the practice of Hu et al.^[33]. To ensure the accuracy of the data, the data were further compared and corrected by manually reviewing the annual reports of listed companies, official company websites, etc., and 11,345 unbalanced panel sample observations from 1,537 companies listed in China were finally obtained.

The raw score data of listed companies' external environment adaptive culture and internal governance culture are obtained from China Securities Index (CSI) Environmental, Social, and Governance (ESG) rating score data. The financial and non-financial data on firm performance are obtained from the WIND database. The raw data of enterprise asset size, enterprise age, and enterprise type come from the WIND database. These data are uniformly processed by linear interpolation substitution method vacancy value filling and data standardization.

3.2. Definition and measurement of variables

3.2.1. Dependent variable

Enterprise external environment adaptive culture refers to enterprises' unique concepts, behaviors, and practices in actively adapting to the construction of the external ecological environment and strengthening the enterprise's environmental risk management capability against increasingly severe environmental protection work. To measure the variable of corporate external environmental adaptability culture, this study draws on the practices of Ma and Meng^[34], Zhao^[35], etc., which mainly classify corporate external environmental adaptability into the dimensions of climate change, resource utilization, environmental pollution, environmental friendliness, and human capital, and adopts the Huazheng ESG scoring system's method of measuring and scoring criteria for environmental governance indicators.

Internal corporate governance culture is the unique experience and practice of internal corporate governance formed by listed companies to strengthen internal governance. Neralla^[36], Ludwig and Sassen^[22], etc., measured from the perspectives of the board of directors' size, proportion of equity incentives, governance structure, and the quality of corporate internal control. Gao et al.^[37] argued that ESG can significantly improve firm performance at all life cycle stages, and the association between ESG and firm performance is more pronounced when the quality of corporate disclosure is high. Based on the research results of Chinese and foreign scholars, this study divides the internal corporate governance culture into the dimensions of shareholders' rights and interests, governance structure, letter approval quality, and governance risk. It adopts the CSI ESG scoring system for the metrics and scoring criteria for internal corporate governance indicators.

3.2.2. Independent variables

This study adopts the balanced scorecard theory to evaluate corporate performance comprehensively. This theoretical tool can consider the advantages of financial and non-financial indicators of listed companies and the implementation of current development and strategic goals. Among the four dimensions of the balanced scorecard, the financial dimensions are earnings per share, debt-to-equity ratio, and a weighted average return on net assets; the customer dimensions are customer satisfaction and customer retention; the internal business process dimensions are accounts receivable turnover, inventory turnover; and the learning and growth dimensions are the percentage of highly-educated employees, and the proportion of R&D investment in operating income. The data of these indicators are obtained from the WIND database.

3.2.3. Control variables

Empirical studies have shown that the corporate culture and corporate performance of listed companies are affected by factors such as corporate asset size, corporate age, and corporate type^[38,39,40], so this study takes these three items as control variables. Company size adopts the total corporate assets of listed companies, including current assets, long-term investments, fixed assets, intangible and deferred assets, other long-term assets, etc., i.e., the total assets item of the enterprise balance sheet. Company age refers to the time listed companies have experienced since birth, mainly indicating the length of the enterprise's existence. Type of the Company relates to the characteristics of the enterprise, the enterprise type of listed companies based on the attribution of the company's property to determine, mainly state-owned enterprises, private enterprises, joint ventures, etc., primarily based on the classification in the *Flush Finance*. The data of control variables are primarily based on the annual reports released by SSE and SZSE A-share companies, and the data are from the WIND database. The descriptions of the variables involved in this study are shown in **Table 2** below:

Table 2. Variable definition.

Variable type	Variable name	Notation	Definition and measurement of indicators	Data source	Reference
Independent variable	Adaptability to the external environment of the company	Aeee	It refers to the fact that in the context of increasingly severe environmental protection work, enterprises actively adapt to the ecological environment construction, strengthen the enterprise's environmental risk management ability, and enhance the competitiveness of enterprises. This study divides enterprises' external environmental adaptability into climate change, resource utilization, environmental pollution, environmental friendliness, human capital, etc. It adopts the Huazheng ESG scoring system to score and standardize the environmental governance indicators.	CSI ESG Rating Score	[34,35]
	Internal corporate governance culture	Icgu	It is the unique corporate internal governance experience, concepts, and practices formed by listed companies to strengthen internal governance. In this study, the internal corporate governance culture is categorized into the dimensions of shareholders' rights and interests, governance structure, letter-approval quality, and governance risk, and the CSI ESG scoring system is used to score and standardize the internal corporate governance indicators.	Data	[22]
Dependent variable (based on balanced scorecard theory)	Earnings per share	EPS	Earnings per share mainly reflect the profitability of listed companies. The formula is (net profit - preferred stock dividend)/average number of common shares issued and outstanding.		
	Financial performance	Debt-to-Equity Ratio	DB	The debt-to-Equity Ratio mainly reflects the listed company's ability to raise debts and operate. The formula is (total liabilities/total assets)100%.	[41]
		Weighted average return on net assets	ROE	It is the ratio of the net return of an investment fund to the amount of net assets at the end of the period over a certain period. The formula is (the total net return/total net assets at the end of the period)100%.	
		Customer Satisfaction	Csat	Customer satisfaction with a product or additional service is quantified using Hexun.com customer satisfaction survey ratings.	
		Customer retention rate	TOP5	Percentage of sales from top 5 customers = (ratio of combined sales from top 5 customers/total annual sales)100%.	[42]
		Accounts receivable turnover ratio	Rtr	The accounts receivable turnover ratio is the average number of times accounts receivable are converted into cash within a certain period, which mainly measures the liquidity of accounts receivable of listed companies. It is calculated as follows: (Revenue from principal business/average amount of accounts receivable)100%.	WIND data-base
	Non-financial performance	Inventory turnover ratio	ITO	It is mainly used to measure the level of operation of listed companies for each segment and the supply chain. The formula is: (operating cost/inventory)100%.	
		Percentage of highly educated employees	PHEE	It refers to the proportion of the total number of employees with bachelor's degrees and above to the overall number of employees in the enterprise.	
	R&D investment as a percentage of operating income	RD Spend Sum Ratio	It mainly reflects the R&D capability of the enterprise. The formula is: (R&D investment/operating income)100%.		[43]

Control variable	Company size	SIZE	Company size assets (total assets) = current assets + long-term investments + fixed assets + intangible and deferred assets + other assets	[38]
	Company age	AGE	It is the amount of time a business has experienced since its birth, mainly indicating the time it has existed.	[20]
	Type of Company	PROPER TY	The company's type is determined based on the attribution of the company's property, mainly state-owned enterprises, private enterprises, joint ventures, and so on.	[39]

3.3. Empirical model specifications

Based on the above analysis, this study constructs a multiple regression model to examine the mechanism of corporate culture affecting listed companies' business performance to verify the proposed hypotheses. To test the relationships specified by H1a and H1b, i.e., the adaptive culture of the external environment of listed companies and their business performance, model equations (1) and (2) are constructed:

$$EPS (DB, ROE) = \alpha_0 + \alpha_1Aeee + \alpha_2SIZE + \alpha_3AGE + \alpha_4PROPERTY + \mathcal{E} \tag{1}$$

where α_0 is the intercept, α_1 to α_4 are the coefficients of the firm's external environment adaptability on the firm's financial performance, and \mathcal{E} is the random error term.

$$Csat (TOP5, Rtr, ITO, PHEE, RD Spend Sum Ratio) = \mu_0 + \mu_1Aeee + \mu_2SIZE + \mu_3AGE + \mu_4PROPERTY + \varphi \tag{2}$$

where μ_0 is the intercept, μ_1 to μ_4 are the coefficients of the firm's external environment adaptability on the firm's non-financial performance, and φ is the random error term.

To test the relationship between H2a and H2b, i.e., internal governance culture and business performance of listed companies, model (3) equation and model (4) equation are constructed, namely:

$$EPS (DB, ROE) = \gamma_0 + \gamma_1Icgu + \gamma_2SIZE + \gamma_3AGE + \gamma_4PROPERTY + \omega \tag{3}$$

where γ_0 is the intercept, γ_1 - γ_4 are the coefficients of the influence of the internal governance culture of the firm on the firm's financial performance, and ω is the random error term.

$$Csat (TOP5, Rtr, ITO, PHEE, RD Spend Sum Ratio) = \delta_0 + \delta_1Icgu + \delta_2SIZE + \delta_3AGE + \delta_4PROPERTY + \sigma \tag{4}$$

where δ_0 is the intercept, δ_1 - δ_4 are the coefficients of the impact of internal corporate governance culture on firms' non-financial performance, and σ is the random perturbation term.

4. Data analysis and hypothesis testing

4.1. Descriptive statistics

Descriptive statistics of the variables involved in this study were carried out using mathematical statistical software. Among them, the descriptive statistics of the control variables are summarized in **Table 3** as follows:

Table 3. Summary statistics of controls.

	Sample size	Number of Obs.	Percentage	
Type of Company	state-owned company	11,344	3,769	33.2
	private company	11,344	6,909	60.9
	joint venture	11,344	368	3.2
	other	11,344	207	1.8

Age of company	1-16	11,344	940	8.2
	17-33	11,344	9,865	86.9
	34-50	11,344	434	3.9
	51-66	11,344	14	.2
Size of corporate assets	100-100 million yuan (RMB)	11,344	15	.1
	100 million to 100 billion (RMB)	11,344	10,950	96.7
	100 billion to 500 billion (RMB)	11,344	304	2.7
	Enterprises with more than 500 billion (RMB)	11,344	59	.5
Total		11,344 (91 missing values)	11,344 (91 missing values)	100% (0.8% has missing values)

From the above table, we can see that in the descriptive statistics of the control variables, the percentage of state-owned enterprises is 33.2%, and private enterprises account for 60.9%, which indicates that private enterprises account for the most significant proportion of A-shares in Chinese listed companies. The age of enterprises is 17-33 years old, accounting for 86.9%, which indicates that the age of enterprises of Chinese listed companies is generally younger compared with foreign listed companies. In terms of enterprise asset size, the asset size of A-share enterprises of Chinese listed companies is generally not significant; 96.7% of the enterprises' asset size is below 100 billion, which indicates that there is still a lot of room for the development of A-share enterprise size as far as the sample data is concerned. The following **Table 4** shows the descriptive statistics of independent variables and dependent variables.

Table 4. Summary statistics of main variables.

	N	Minimum	Maximum	Mean	Standard Deviation
Adaptability to the external environment of the company (%)	11,322	29.460	92.210	60.538	8.354
Internal corporate governance culture (%)	11,322	19.600	97.330	77.260	8.556
Earnings per share	11,328	-16.460	8.170	.304	.717
Debt-to-Equity Ratio	11,328	.978	146.077	41.576	20.022
Weighted average return on net assets	11,328	-149.445	460.738	5.829	17.157
Customer Satisfaction Survey Score	9,696	.000	4.000	.140	.659
Customer retention rate	10,990	.000	157.890	30.252	21.045
Accounts receivable turnover ratio (times)	11,328	-.265	9,997.694	41.490	339.474
Inventory turnover ratio (times)	11,328	.000	46,733.973	61.179	1,016.336
R&D investment as a percentage of operating income	11,328	.000	76.350	4.692	5.521
Percentage of highly educated employees	11,328	.000	100.000	29.887	21.673
Number of observations in the baseline model	9,369				

Note: we exclude abnormal values for companies with debt-to-equity ratio above 150%, weighted average return on net assets below -150%, accounts receivable turnover ratio above 10,000%, and inventory turnover ratio above 50,000 times. This is because these observations significantly deviate from the average, and may lead to a large discrepancy in the results.

According to the above table, the enterprise external environment adaptability score is 60.54, indicating that most A-share enterprises have better external environment risk control ability as a whole, but the standard deviation of 8.35 shows that the differences in environmental risk control ability among sample enterprises are relatively significant; in internal governance culture, the mean value of 77.26 shows that the inner governance ability of A-share enterprises is generally strong, but the standard deviation of 8.56 shows that the differences in governance ability among sample The difference in the enterprises is relatively significant, and the governance ability among A-share companies is uneven; the earnings per share is 0.30 yuan (RMB), with a standard deviation of 0.72, which illustrates that the earnings per share rate of A-share enterprises is generally low, and there is not much difference among A-share enterprises in the sample; the higher the debt-to-equity ratio is, the higher the financial risk of the company is, resulting in the more volatile share price, and the above table of the sample enterprises, the debt-to-equity ratio of 41.58% illustrates that the Sample enterprise debt situation is not very serious, but the standard deviation is 20.02, indicating that the sample enterprises in the debt situation of individual differences; weighted average return on net assets mean value of 5.83, relative to the highest value of 460.74, the difference is still significant, the standard deviation of the exact difference is also very large; customer satisfaction survey scores mean value of 0.14, compared with the highest value of 4 points, the score is lower; TOP5 sales share of the lower; the average value of 0.14, compared with the highest value of 4 points, the score is lower; TOP5 sales share of the lower. The average value of the TOP5 sales ratio is 30.25, the score is too low, and the standard deviation between the sample enterprises is too large; accounts receivable turnover, inventory turnover, and TOP5 sales ratio have the same problem; the average value of R&D investment in operating income is 4.69, the standard deviation is basically in a reasonable range, indicating that listed companies' R&D investment in income is generally low and the difference is not significant; the average value of the percentage of highly educated employees is 29.89, indicating that highly educated employees have a higher income. 29.89, indicating that the proportion of highly educated employees is too low, and the standard deviation of 21.67 shows the significant differences in highly educated employees among enterprises.

4.2. Correlation analysis

The correlation coefficient is a natural number between [-1, +1] in correlation analysis. When the correlation coefficient is between -1 and 0, it indicates that there is a negative correlation between the variables; when the correlation coefficient is between 0 and 1, it suggests that there is a positive correlation between the variables; when the correlation coefficient is 0, there is no correlation between the two.

In this study, the Pearson correlation coefficient is used to test the correlation of each variable. When the absolute value of the correlation coefficient is between 0.1 and 0.3, it is generally considered that there is a weak correlation between the variables; when the total value of the correlation coefficient is between 0.3 and 0.5, it is usually assumed that there is a moderate correlation between the variables; when the absolute value of the correlation coefficient is more significant than 0.5, it is generally believed that there is a strong correlation between the variables. The results of the correlation test of the variables in this study are shown in **Table 5** below.

Table 5. Correlation matrix.

		Aeee	Icgu	Debt-to- Equity Ratio	EPS	ROE	Csat	TOP5	Rtr	ITO	RD Spend Sum Ratio	PHEE
Aeee	Relevance	1.000	.071	.010	.046	-.003	.080	-.078	-.013	.000	-.014	-.027
	Significance (two-tailed)		.000	.323	.000	.740	.000	.000	.201	.995	.172	.008
	Degrees of freedom	0	9,288	9,288	9,288	9,288	9,288	9,288	9,288	9,288	9,288	9,288
Icgu	Relevance	.071	1.000	-.087	.229	.061	.098	-.065	.002	.001	.059	.045
	Significance (two-tailed)	.000		.000	.000	.000	.000	.000	.876	.906	.000	.000
	Degrees of freedom	9,288	0	9,288	9,288	9,288	9,288	9,288	9,288	9,288	9,288	9,288
Debt- to- Equity Ratio	Relevance	.010	-.087	1.000	-.049	-.002	-.002	.041	-.002	-.001	-.017	.020
	Significance (two-tailed)	.323	.000		.000	.847	.859	.000	.880	.925	.100	.054
	Degrees of freedom	9,288	9,288	0	9,288	9,288	9,288	9,288	9,288	9,288	9,288	9,288
EPS	Relevance	.046	.229	-.049	1.000	.106	.049	-.089	-.004	.007	-.072	-.001
	Significance (two-tailed)	.000	.000	.000		.000	.000	.000	.706	.523	.000	.908
	Degrees of freedom	9,288	9,288	9,288	0	9,288	9,288	9,288	9,288	9,288	9,288	9,288
ROE	Relevance	-.003	.061	-.002	.106	1.000	.007	-.001	.000	.001	.003	.013
	Significance (two-tailed)	.740	.000	.847	.000		.509	.958	.981	.944	.761	.207
	Degrees of freedom	9,288	9,288	9,288	9,288	0	9,288	9,288	9,288	9,288	9,288	9,288
AGE & SIZE & PROPE RTY	Relevance	.080	.098	-.002	.049	.007	1.000	-.026	-.003	-.003	-.026	.003
	Significance (two-tailed)	.000	.000	.859	.000	.509		.011	.776	.778	.011	.785
	Degrees of freedom	9,288	9,288	9,288	9,288	9,288	0	9,288	9,288	9,288	9,288	9,288
TOP5	Relevance	-.078	-.065	.041	-.089	-.001	-.026	1.000	-.012	.007	.029	.007
	Significance (two-tailed)	.000	.000	.000	.000	.958	.011		.251	.523	.006	.527
	Degrees of freedom	9,288	9,288	9,288	9,288	9,288	9,288	0	9,288	9,288	9,288	9,288
Rtr	Relevance	-.013	.002	-.002	-.004	.000	-.003	-.012	1.000	.000	-.006	-.008
	Significance (two-tailed)	.201	.876	.880	.706	.981	.776	.251		.991	.541	.418
	Degrees of freedom	9,288	9,288	9,288	9,288	9,288	9,288	9,288	0	9,288	9,288	9,288
ITO	Relevance	.000	.001	-.001	.007	.001	-.003	.007	.000	1.000	-.005	.030
	Significance (two-tailed)	.995	.906	.925	.523	.944	.778	.523	.991	.	.621	.004
	Degrees of freedom	9,288	9,288	9,288	9,288	9,288	9,288	9,288	9,288	0	9,288	9,288
RD Spend Sum Ratio	Relevance	-.014	.059	-.017	-.072	.003	-.026	.029	-.006	-.005	1.000	.418
	Significance (two-tailed)	.172	.000	.100	.000	.761	.011	.006	.541	.621	.	.000
	Degrees of freedom	9,288	9,288	9,288	9,288	9,288	9,288	9,288	9,288	9,288	0	9,288
PHEE	Relevance	-.027	.045	.020	-.001	.013	.003	.007	-.008	.030	.418	1.000
	Significance (two-tailed)	.008	.000	.054	.908	.207	.785	.527	.418	.004	.000	.
	Degrees of freedom	9,288	9,288	9,288	9,288	9,288	9,288	9,288	9,288	9,288	9,288	0

From the correlation tests with results reported in the above table, we find that there is a weak positive correlation between Aeee and EPS, Csat; there is a weak negative correlation with TOP5, PHEE; there is an

insignificant correlation with Debt-to-Equity Ratio, ROE, Rtr, ITO, RD Spend Sum Ratio. Iegu has a weak positive correlation with EPS, ROE, Csat, RD Spend Sum Ratio, PHEE; weak positive correlation with Debt-to-Equity Ratio, TOP5; insignificant correlation with Rtr, ITO.

4.3. Multiple regression analysis

This study uses IBM SPSS Statistics version 27.0 statistical software to conduct multiple linear regression analysis. We first run regressions of corporate external environment adaptability on corporate performance dimensions.

This study takes the adaptability of the enterprise’s external environment as the independent variable. It regresses earnings per share, debt-to-equity ratio, weighted average return on net assets, customer satisfaction, customer retention rate, accounts receivable turnover, inventory turnover, percentage of highly educated employees, and the ratio of research and development investment to operating income as the dependent variables. The main results of the regression are presented in **Table 6**.

Table 6. Regression results with firm’s external environment adaptability as the dependent variable.

Hypothesis	Unstandardized coefficient		Standardized coefficient		t	Significance	Covariance statistics	
	Estimate	Standard error	Estimate				Tolerances	VIF
(Constant)	61.340	.200			306.438	.000		
RD Spend Sum Ratio	-.007	.017	-.005		-.407	.684	.824	1.214
ITO	4.335E-7	.000	.001		.103	.918	.999	1.001
Rtr	-4.464E-7	.000	-.014		-1.329	.184	1.000	1.000
H1a & ROE	.000	.001	-.008		-.749	.454	.989	1.012
H1b Debt-to-Equity Ratio	.001	.000	.017		1.689	.091	.995	1.005
EPS	.512	.125	.043		4.106	.000	.967	1.034
PHEE	-.009	.004	-.024		-2.100	.036	.830	1.204
Csat	1.034	.131	.081		7.884	.000	.995	1.005
TOP5	-.032	.004	-.081		-7.817	.000	.986	1.014

The parameters of the above regression coefficients show that the firm’s external environment adaptability all have an impact on EPS ($b=0.512, \beta=0.043, P=0.000$), PHEE ($b=-0.009, \beta=-0.024, P=0.036$), Csat ($b=1.034, \beta=0.081, P=0.000$), TOP5 ($b=-0.032, \beta=-0.081, P=0.000$) have an impact. Among them, the firm’s external environment adaptability positively affects EPS and Csat and negatively affects PHEE and TOP5. In addition, firms’ external environment adaptability has a positive effect on RD Spend Sum Ratio ($b=-0.007, \beta=-0.005, P=0.684$), ITO ($b=4.335E-7, \beta=0.001, P=0.918$), Rtr ($b=-4.464E-7, \beta=-0.014, P=0.184$), ROE ($b=0.000, \beta=-0.008, P=0.454$), Debt-to-Equity Ratio ($b=0.001, \beta=0.017, P=0.091$) do not have an effect. At last, the *VIF* of all variables is around 1. There is no multicollinearity between the variables in this study.

We then run regressions of internal corporate governance culture on dimensions of corporate performance. This study takes internal corporate governance culture as the independent variable. Earnings per share, debt-to-equity ratio, weighted average return on net assets, customer satisfaction, customer retention rate, accounts receivable turnover, inventory turnover, percentage of highly-educated employees, and the ratio of research and development investment in operating revenue are taken as the dependent variables for regression. The main results of the regression presented in **Table 7** as follows:

Table 7. Regression results with firm’s internal corporate governance culture as the dependent variable.

Hypothesis	Unstandardized coefficient		Standardized coefficient	t	Significance	95.0% confidence interval for B		Covariance statistics	
	Estimate	Standard error	Estimate			Lower limit	Limit	Tolerances	VIF
(Constant)	76.426	.196		390.007	.000	76.042	76.810		
RD Spend Sum Ratio	.077	.017	.050	4.546	.000	.044	.110	.824	1.214
ITO	-5.072E-7	.000	-.001	-.123	.902	.000	.000	.999	1.001
Rtr	1.124E-7	.000	.003	.342	.732	.000	.000	1.000	1.000
H2a & ROE	.002	.001	.037	3.682	.000	.001	.003	.989	1.012
H2b Debt-to-Equity Ratio	-.003	.000	-.071	-7.144	.000	-.004	-.002	.995	1.005
EPS	2.707	.122	.224	22.173	.000	2.468	2.947	.967	1.034
PHEE	.012	.004	.031	2.882	.004	.004	.021	.830	1.204
Csat	1.121	.128	.087	8.732	.000	.869	1.372	.995	1.005
TOP5	-.019	.004	-.048	-4.773	.000	-.027	-.011	.986	1.014

The parameters of the above regression coefficients show that the internal governance culture of a company will have a significant impact on RD Spend Sum Ratio ($b=0.077, \beta=0.050, P=0.000$), ROE ($b=0.002, \beta=0.037, P=0.000$), Debt-to-Equity Ratio ($b=-0.003, \beta=-0.071, P=0.000$), EPS ($b=2.707, \beta=0.224, P=0.000$), PHEE ($b=0.012, \beta=0.031, P=0.004$), Csat ($b=1.121, \beta=0.087, P=0.000$), and TOP5 ($b=-0.019, \beta=-0.048, P=0.000$) than to have an impact. Among them, internal corporate governance culture positively affects RD Spend Sum Ratio, ROE, EPS, PHEE, and Csat and negatively affects Debt-to-Equity Ratio, TOP5. Again, in this regression specification, the *VIF* of all variables is around 1. There is no multicollinearity between the variables in this study.

Finally, we investigate the associations between control variables enterprise asset size, enterprise age, and enterprise type and enterprise culture in subsamples. This study conducts analysis to explore the influence of the enterprise asset size, enterprise age, and enterprise type on the adaptability of the enterprise’s external environment and the enterprise’s internal governance culture. The results are summarized in **Table 8**.

Table 8. Company size and corporate culture.

Company size (RMB)	Pearson Correlation		VIF
	Significance (one-tailed)		
	Adaptability to the external environment of the enterprise	Internal corporate governance culture	
RMB 0-100 million	.085	.000	1.007
RMB 100-100 billion	.220	.168	1.007
RMB 100-500 billion	-.566	.072	1.007
More than RMB 500 billion	-.151	.361	1.007

The results show significant differences between enterprise asset sizes on enterprise external environment adaptability and enterprise internal governance culture. In specific, small-sized firms with assets of 0-100 million dollars have a significant weak correlation on firms’ external environment adaptability and internal corporate governance culture, while firms with other asset sizes do not have a statistically significant correlation on firms’ external environment adaptability and corporate governance. This phenomenon may be because small-sized listed firms have a substantial advantage in their external environment adaptability and internal governance culture due to their single governance structure. **Table 9** includes the corresponding results.

Table 9. Company age and corporate culture.

Company age (years)	Pearson Correlation	Significance (one-tailed)	
	Adaptability to the external environment of the enterprise	Internal corporate governance culture	VIF
1-16	.007	.413	1.019
17-33	.089	.000	1.002
34-50	.231	.000	1.014
51-66	-.272	.173	1.034

The analysis of corporate age with corporate external environment adaptability and corporate internal governance culture in the above table shows that there is no statistically significant relationship between corporate age and corporate external environment adaptability and corporate internal governance culture for listed companies aged 1-16 and 51-66. Listed firms in the age groups of 17-33 and 34-50 have a significant positive correlation with firms' external environmental adaptability and internal governance culture, respectively. This suggests that firms of different ages have different impacts on the adaptability to the external environment and the internal governance culture of the firm, which may be related to the length of time the firm has been established. The strength of its corporate culture and the specific relationship between these need to be further investigated.

Table 10. Company type and corporate culture.

Type of Company	Pearson Correlation	Significance (one-tailed)	
	Adaptability to the external environment of the enterprise	Internal corporate governance culture	
State-owned business	.135	.000	
Private business	.049	.000	
Foreign enterprise	.116	.013	
Other	.182	.004	

Through the above **Table 10** of enterprise type and enterprise external environment adaptability, enterprise internal governance culture regression analysis results can be seen, different types of the enterprise for enterprise external environment adaptability, and enterprise internal governance culture correlate, and this correlation is not a significant difference in the degree of significance.

Our findings can be summarized into two points. First, we demonstrate the effect of external environment adaptive culture on the performance of listed companies. In the regression coefficients of external environment adaptability culture on business performance, external environment adaptability has a significant and positive effect on the weighted average return on net assets at the 0.05 level in the financial dimensions and a substantial and positive impact on customer satisfaction at the 0.05 level in the non-financial dimensions. External environment adaptability has significant and adverse effects at the 0.05 level on the percentage of highly educated employees and customer retention in the non-financial dimensions. External environment adaptability is not statistically significant on R&D investment as a percentage of operating income, inventory turnover, accounts receivable turnover, weighted average return on net assets, and debt-to-equity ratio. The *VIF* of all variables is around 1, indicating no multicollinearity problem in the model and that the model is well constructed. In summary, this hypothesis is partially tested.

Second, we confirm the effect of internal governance culture on the performance of listed companies. In the regression coefficients of listed companies' internal governance culture on business performance, listed

companies' internal governance culture has a significant effect on the weighted average return on net assets, debt-to-equity ratio, and earnings per share in the financial dimensions at the 0.05 level, with a negative impact on the debt-to-equity ratio. This indicates that the strengthening of the internal governance culture costs some resources and leads to an increase in the corporate debt ratio. Enterprises must spend specific resources to strengthen the internal governance culture, thus increasing the corporate debt ratio. The effect of the internal governance culture of listed companies on the non-financial dimensions of Percentage of highly educated employees, Customer Satisfaction, Customer retention rate, and R&D investment as a percentage of operating income is significant at 0.05 level, where it is harmful to Customer retention rate and insignificant on Inventory turnover, Accounts receivable turnover ratio. The *VIF* of all variables is around 1, indicating that the model has no multicollinearity problem and the model is well constructed. In summary, the part of this hypothesis is verified. **Figure 3** summarizes the results of all our empirical analyses.

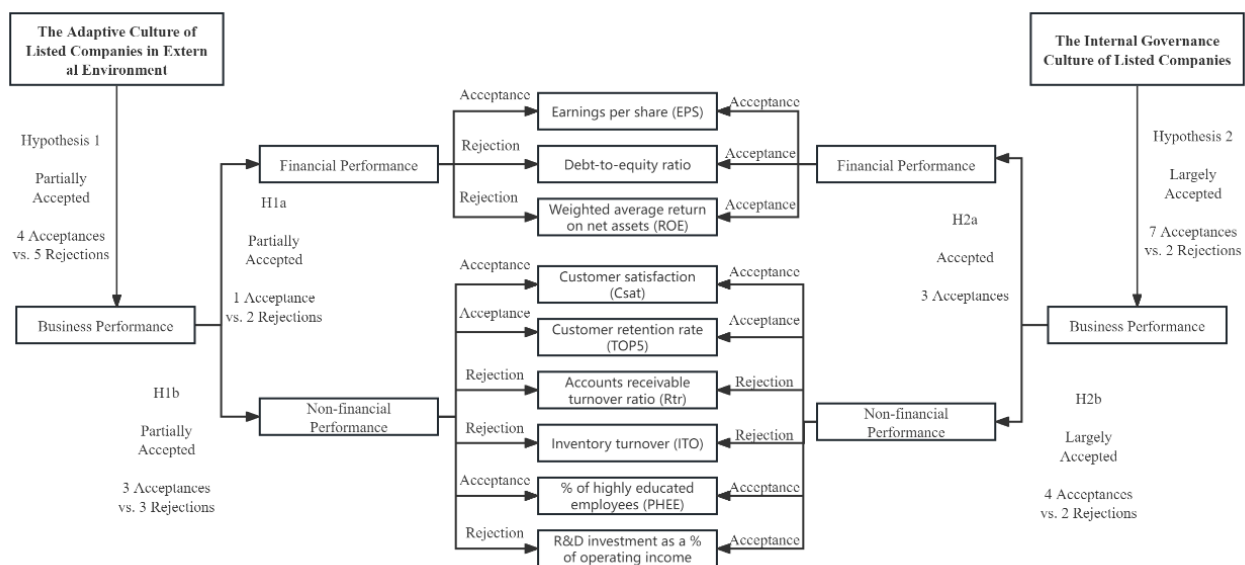


Figure 3. Summary of hypotheses accepted or rejected.

5. Conclusions

5.1. Further discussions

In the context of increasing globalization, the policy environment, market environment and world macroeconomic conditions of enterprises' external development inevitably have an impact on their performance. Through the empirical results of this study, we find that the culture of adaptation to the external environment of listed companies partially affects the business performance of enterprises. Among them, the case of financial performance, significantly and positively affects earnings per share (EPS), it has no positive and significant effect on asset-liability ratio and weighted average return on equity; non-financial performance significantly and positively affects customer satisfaction, customer retention rate, and the proportion of highly educated employees, it has no impact on accounts receivable turnover, inventory turnover and the proportion of R&D investment to operating income. This is consistent with the findings of scholars such as Li et al.^[11] and Soana^[28]. The reason for this may be that listed companies, in actively adapting to the strategic adjustment of international and domestic environmental protection policies, have promoted the formation of a strong sense of environmental protection within the enterprise, and have established a good sense of social responsibility and a positive and active social image, which wins more customers and resources and improves earnings per share (EPS). In terms of non-financial performance, listed companies have formulated corporate visions and

strategic objectives in line with environmental policies based on the global economic situation as well as changes in domestic environmental policies, which have led to the acquisition of scarcer resources, improved customer satisfaction and customer retention, and attracted more highly educated talents. This is consistent with the research results of Shi et al.^[12], that is, when the external environment changes, enterprises have strong adaptability, which will promote the improvement of enterprise performance.

Turning to the relationship between the internal governance culture of listed companies and business performance, the internal governance culture of listed companies partially affects the business performance of enterprises, in which the influence of the internal governance culture of listed companies has a significant positive effect on financial performance; for non-financial performance, the internal governance culture of listed companies has a significant positive impact on customer satisfaction, customer retention rate, the proportion of highly educated employees, and the proportion of R&D investment in revenue. It does not affect the turnover rate of receivables or inventory turnover rate. It does not affect the accounts receivable and inventory turnover ratios. The standardization and effectiveness of the internal governance of listed companies directly affects the business performance of enterprises, especially facing the uncertainty of the international market and the increasing external risks of enterprises, it is a very effective way for listed companies to enhance their business performance by strengthening their internal governance. The reason for this is that under the driving force of a solid external environmental adaptability culture, enterprises will also strengthen the construction of internal governance culture and integrate the implementation of environmental protection policies into the internal governance of the enterprise, which will help to implement a perfect environmental management system, promote the enterprise to improve internal management control, optimize the production process, and increase the investment in management and R & D, to enable the enterprise to obtain strong market competitiveness and realize the value-added of the enterprise. This will help to implement a perfect environmental management system, promote the improvement of internal management and control, optimize production processes, and increase management and R&D investment so that the enterprise can obtain strong market competitiveness and realize enterprise value appreciation, this is consistent with the findings of Gao et al.^[43] and Lv et al.^[32].

As for the relationship between company size, company age, type of company, and corporate culture, we find that size, age, and type are closely related to the culture of corporate external adaptability and the culture of corporate internal governance: among different corporate asset sizes, small-sized listed companies have a significant positive impact on the external environment adaptability of the enterprise and the internal governance culture of the company due to the single governance structure; listed companies located in the age groups of 17-33 and 34-50 have a significant positive correlation with the external adaptability culture of the enterprise and the internal governance culture, respectively; different type of the company all have a significant positive impact on the external environment adaptability of listed companies to the new culture, internal governance culture have substantial differences^[12]. This result is mainly because the smaller the company's assets, the stronger its adaptability to changes in the external environment, and the ability to timely and flexibly adjust its development strategy and business philosophy, quickly adapt to the external environment, and strengthen internal governance. Chinese publicly listed companies falling into the two age groups of 17-33 and 34-50 are in the period of vigorous development of enterprises, and their innovation, ability to adapt to the external environment, and internal governance are in the stage of optimization and perfection. In contrast, companies with ages between 51-66 are in the period of prosperous development. However, the longer the age of the company, the more abundant the resources and experience it possesses. To reduce the cost and risk of development, their innovation and experience are often limited. Their innovation and expertise are limited, and their innovation and knowledge are limited. Although the older the company is, the more resources and

experience it possesses, it tends to be weaker in innovation and cultural change to reduce the development cost and risk, consistent with the research by Zheng et al.^[44], among others. As for the type of the company, there is no significant difference in the influence of the different types of the company on the external adaptive culture and internal governance culture of enterprises. In the context of globalization, these heterogeneous results of Chinese-listed companies are very meaningful. As Chinese listed companies, they can strengthen the construction of external environment adaptive culture and internal governance culture in a targeted way according to their size, age and nature, so as to provide a guarantee for listed companies to obtain good corporate performance and enhance their international influence and competitiveness.

5.2. Theoretical contributions and practical insights

Most previous studies have focused on the dynamic matching perspective and studied the influencing mechanism of corporate culture affecting business performance from the functional perspectives of organizational commitment, corporate social responsibility, corporate innovation, etc. At the same time, there are very few studies based on the perspective of Edgar H. Schein's organizational culture dimension. At the same time, the existing literature on the influence of corporate culture on business performance is also minimal. It is a systematic whole from culture to behavior to results, so the influencing mechanism between corporate culture and business performance should be studied holistically. Based on Edgar H. Schein's organizational culture dimension perspective, this study divides corporate culture into external environmental and internal corporate governance cultures. It explores the influencing mechanism of corporate culture affecting business performance from both internal and external perspectives in a holistic and comprehensive perspective.

The theoretical contributions of this study are mainly reflected in the following: First, it provides a new theoretical foundation and research perspective for academics to explore further the influencing mechanism between corporate culture and business performance. This study analyzes the influencing mechanism between corporate culture and business performance based on Edgar H. Schein's corporate culture dimension perspective, which provides a theoretical foundation for the in-depth study of the functional perspective of corporate culture. Second, this study theoretically enriches the theoretical research on the influencing mechanism between corporate culture and business performance and broadens the theoretical scope of the current academic research on this issue. Third, from the internal and external perspective, it comprehensively explores the influencing mechanism between corporate culture and business performance, making this study's conclusions more persuasive and more theoretically instructive.

The practical inspiration of this study is mainly reflected in the construction of enterprise external environment culture and the construction of enterprise internal governance culture. First, listed companies should pay attention to the changes in the external development environment of enterprise development and enhance the adaptability of the external environment culture. As a listed company, it needs to have a global vision, adjust its business strategy promptly according to the changes in global environmental protection policies and laws and regulations of major countries, take the initiative to assume social responsibilities, and actively communicate the practices and concepts of the company to adapt to environmental development to stakeholders, to obtain the recognition of the society, and to win a good external environment for the survival and development of the enterprise. Second, strengthen the construction of internal corporate governance culture. Earnings per share, gearing ratio, weighted average return on assets, etc. are all significantly positively affected by the internal governance culture of the enterprise, therefore, as a listed company to strengthen the reform of corporate financial management, financing model, etc., to enhance the cohesion of the corporate team by strengthening the internal governance of the enterprise, to enhance the cooperation and communication between the team members, and to enhance the sense of honor and sense of responsibility of the employees, to achieve the enhancement of the enterprise's operating performance. Third, pay attention to the role of

corporate culture in influencing non-financial performance. As a listed company, it is necessary to strengthen the positive role of corporate culture in non-financial performance in the construction of corporate culture. Non-financial performance is generally closely related to the enterprise's customer groups, employee groups, and other stakeholders by strengthening the influence of corporate culture in non-financial performance-related elements to win more support for the enterprise and enhance the core competitiveness of the enterprise.

5.3. Future research directions

Our study may be limited in the following aspects. First, the data of corporate culture dimension indicators and corporate performance indicators in this study are mainly obtained through A-share listed companies in the Shanghai Stock Exchange and Shenzhen Stock Exchange, as well as company annual reports, company official websites, and other platforms, so that the standardization of the quantitative processing is achieved and the data are objective, but subjective judgments inevitably exist in the process of data collation and identification. Secondly, since this study is mainly based on the theoretical perspective of Edgar H. Schein's corporate culture dimension to study the mediating role of corporate culture in business performance, then the specific process of this corporate external adaptive culture and corporate internal governance culture being accepted by corporate employees and stakeholders needs to be further studied in detail. As a result, future research can focus on the following two aspects. First, with the development of information technology, attempts will be made to use extensive data mining methods to conduct more precise quantitative research on corporate external environmental adaptive culture and internal governance culture. Second, in-depth research will be shown on the role played by factors other than external environmental governance culture in the value creation of corporate culture, and more critical variables between corporate culture and business performance will be explored to make the research theory more complete.

Conflict of interest

The authors declare no conflict of interest.

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