Employee Satisfaction and Enterprise Digital Transformation —— Empirical Evidence from the "Top 100 Employers of the Year in China"

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Abstract. In recent years, against the backdrop of the rapid development of innovative information technologies such as big data, artificial intelligence, quantum computing platforms, blockchain, and 5G communication technologies, digital technology has become the core engine driving the high-quality development of the economy. In this paper, we study the impact of employee satisfaction on the digital transformation of enterprises by using the data of listed companies from 2011 to 2023 and the "Top 100 Best Employers of the Year in China" jointly released by Zhaopin and Peking University's Center for Social Research. The study finds that employee satisfaction has a positive impact on enterprise digital transformation, and this conclusion still holds after a series of robustness tests. The facilitating effect of employee satisfaction on enterprise digital transformation is more obvious in the high-tech industry group and the labor-intensive company group. Mechanism analysis shows that the degree of enterprise digital transformation is increased because the improvement of employee satisfaction can reduce the external financing constraints of the enterprise, improve the enterprise's risk-bearing ability and labor investment efficiency, and the above results are consistent with the enterprise's choice to work for the long-term value of the enterprise by improving employee satisfaction and at the same time improving the enterprise's productivity and financial performance, realizing the risk-bearing of the employees and the enterprise, alleviating the financing constraints, and then the above results are consistent with the logic of promoting enterprise digital transformation. This conclusion provides a theoretical basis for enterprises to re-appreciate the importance of employee satisfaction and the potential value of human capital, and also has certain significance in guiding enterprises to improve the degree of digital transformation.

Keywords: employee satisfaction; corporate digital transformation; financing constraints; corporate risk-taking capacity.

1. Introduction

With the continuous iteration and upgrading of cutting-edge digital technologies represented by big data, artificial intelligence, quantum computing platforms, and blockchain, the digital economy is rapidly growing into a core engine driving high-quality economic and social development. At present, the in-depth application and cross-fertilization of digital technology has broken through a single technical field to form a systematic innovation synergy, which not only injects strong kinetic energy into the transformation and upgrading of industrial structure, but also becomes a key strategic pivot point for reshaping the global competition pattern. In the context of the deep development of the digital economy, digital transformation is accelerating the evolution of the middle-income trap, reconfiguring the economic growth paradigm of the strategic hand, through the aggregation of innovation factors and total factor productivity, and continue to release the systematic kinetic energy of the industrial structure to leap [1]. From a meso perspective, it can effectively drive the optimization of industrial pattern and value chain upgrading; from a micro perspective, it provides an innovation engine for enterprises to break through the bottleneck of production capacity and realize the iteration of business ecology[1]. General Secretary Xi Jinping pointed out at the conference celebrating the 40th anniversary of reform and opening up that "we should adhere to the concept that innovation is the first driving force and talent is the first resource, implement the innovation-driven development strategy, improve the national innovation system, accelerate the independent innovation of key core technologies, and create a new engine for economic and social development." Talent is a

fundamental element of innovation and development, whether it is scientific and technological competition, enterprise competition, or comprehensive national power competition, which is ultimately a competition for talent. It can be seen that to promote the digital transformation of enterprises, the cultivation of talent is particularly critical. How to rationally utilize talent as the first resource is a problem that enterprises should consider at this stage, so this paper will start from employee satisfaction, discuss whether enterprises can promote their digital transformation by improving employee satisfaction.

Many scholars have explored the impact of employee satisfaction on corporate behavior and corporate innovation capacity from multiple perspectives [2]and Cheng Junjun et al. [3] found that job satisfaction not only significantly affects employees "behavioral performance and job performance , but also has an important impact on personal life satisfaction. Higher employee satisfaction can help reduce employee turnover and improve business performance, and at the same time, it can enhance employees' work engagement and organizational commitment, which in turn strengthens employees" sense of organizational identity and sense of belonging [4,5,6,7]. There have also been many studies on digital transformation in recent years. Liu Shuchun et al. [8] and Mao Ning et al. [9] found that the real-life dilemmas that cause enterprises to "not know", "not be able to", and "not dare to" transform digitally are the lack of basic technological capabilities, the high level of transformation costs, and the low level of business competence. underlying technological capabilities, excessive transformation costs, and uncertain future benefits. Han et al. [10] found that the industrial policies formulated by the government are conducive to improving enterprise productivity, which in turn promotes enterprise digital transformation. Based on the previous literature, this paper will discuss the impact of employee satisfaction on enterprise digital transformation.

Theoretically employee satisfaction has a facilitating effect on the degree of enterprise digital transformation, first of all, the improvement of employee satisfaction can enable employees to obtain additional compensation and incentives, which in turn reduces the tendency of employees to leave the company and improves business performance[5,6,7,11], which helps to realize risk-taking between employees and the enterprise, establish the value of tolerating failure based on the long term, and make employees choose to work for the long-term value of the enterprise, which in turn contributes to the digital transformation of the enterprise. Secondly, employee satisfaction can largely affect the attitude of creditors to the enterprise, on the one hand, employees and creditors have similar interest propositions, on the other hand, healthy employee relations can effectively reduce employee turnover, so that the enterprise's productivity and financial performance can be improved, and at the same time, the enterprise's risk of debt default can be mitigated, and the cost of debt financing can be reduced [12], which in turn gains the favor of creditors, eases external financing constraints, and promotes enterprise digital transformation. Finally, due to high employee satisfaction, enterprises are able to establish a good reputation in the recruitment market, forming a virtuous cycle of talent management through the dual path of attracting a concentration of excellent talent and enhancing the willingness of employees to stay. This helps to improve work efficiency and thus promote digital transformation [13,14].

However, employee satisfaction may also have a dampening effect on corporate digital transformation. Due to institutional weaknesses under the principal-agent framework, management often chooses to increase compensation and benefits and acquiesce to negative employee performance as strategic means to gain employee support in order to maximize its own interests [15,16], which can result in a decrease in the company's production and operational efficiency that is detrimental to the digital transformation of the company. In addition, the measures introduced by companies to improve employee satisfaction often require large investments, which may lead to a decline in the company's performance if the benefits of these investments are less than their costs [17]. If the costs in this regard are too high, companies will find it difficult to invest money in high-cost, long-cycle and high-risk innovation projects such as digital transformation, which is also detrimental to digital transformation.

Therefore, it is difficult to judge the direction of the influence of employee satisfaction on enterprise digital transformation from our theory, and it needs to be tested with empirical evidence. Using a sample of A-share listed companies from 2011 to 2023, we demonstrate that employee satisfaction has a positive effect on corporate digital transformation, a result that remains robust after changing the way of measuring the explanatory variables, changing the regression model, changing the regression sample, and propensity score matching (PSM). The results of the heterogeneity analysis indicate that this effect is larger in the samples of high-tech industries and labor-intensive firms. The results of mechanism analysis suggest that employee satisfaction contributes to the digital transformation process of firms by enhancing their risk-taking ability, optimizing labor investment efficiency, and alleviating financing constraints. The above results are consistent with the logic that by improving employee satisfaction, enterprises can make employees choose to work for the long-term value of the enterprise and improve the productivity and financial performance of the enterprise, realize the risk-taking of both employees and the enterprise, and at the same time alleviate the financing constraints, thus promoting the digital transformation of the enterprise.

The contributions of this paper are: firstly, it improves the research system of the company with employees as the main body. Previous studies have mostly analyzed the impact of employee satisfaction on shareholders' rights and interests, company internal control, company operating performance and innovation. It has been found that companies with high employee satisfaction perform better in the stock market, mainly in the following ways: the company's share price is more stable, investor confidence is stronger, and more value can be created for shareholders in the long run[18], a perfect employee treatment system can also improve the financing conditions of the enterprise, alleviate the loan constraints, and reduce the cost of debt financing, which will help the enterprise to keep the moderate level of financial leverage[12]. On the other hand employee satisfaction can also show a positive image to the outside world, thus attracting more investment support and solving the problem of shortage of funds for innovative projects[19]. Based on the existing theoretical framework, this study focuses on whether employee satisfaction can influence digital transformation and whether its mechanism of action is to increase risk-taking capacity and employee labor efficiency and reduce firms' external financing constraints.

Secondly, it has broadened the research related to the impact of enterprise digital transformation, and the existing literature suggests that the internal factors affecting enterprise digital transformation have led to the fact that enterprises "won't," "can't," "don't dare," and "don't know how to". The real-life dilemmas of digital transformation are mainly the lack of basic enterprise technological capabilities, excessive transformation costs, and uncertain future benefits[8,9]. Regarding the external factors affecting enterprise digital transformation, existing studies have mostly examined them from the perspectives of industrial policy, digital infrastructure construction, external financing difficulties, and government innovation subsidies. Different from previous studies, this paper takes employees as the main body and studies their impact on enterprise innovation activities from the perspective of employee satisfaction, a subjective psychological feeling, to expand the understanding of the relationship between employee satisfaction and enterprise digital construction.

At the same time, this paper also has a certain practical significance, the results of this paper show that modern enterprises want to sustained development, can not just let employees bury their heads in the sand, but also care about their work experience and development needs. Enterprises focus on improving employees' sense of well-being and occupational satisfaction, not only to more fully mobilize employees' enthusiasm, but also to stimulate employees to more innovative ideas. The conclusions of this paper provide new ideas for enterprises: by improving labor practices and enhancing employee satisfaction, they can better promote the digital transformation of enterprises.

The paper is structured as follows: Part II is the literature review, Part III is the research hypothesis, Part IV is the empirical results and analysis, Part V is the further analysis and Part VI is the summary.

2. Literature review

Research on employee satisfaction. Job satisfaction refers to the positive psychological experience that occurs when job content matches employees' value needs. This variable not only has a positive and positive impact on employee work behavior and performance output, but also enhances individual satisfaction and subjective well-being perception[2,3]. A company's increased employee satisfaction can facilitate corporate digital transformation by reducing employee turnover, gaining favor with creditors and giving the company a good reputation in the labor market, while at the same time, it may also prompt management to seize personal benefits and inhibit corporate digital transformation by making employee labor less efficient.

Previous studies have analyzed the impact of employee satisfaction on shareholders' equity, company internal control, company business performance and innovation. First of all, from the aspect of shareholders' equity, companies with high employee satisfaction have more stable stock prices and stronger investor confidence, which can create more value for shareholders in the long run[18]; a perfect employee treatment system can also improve the financing conditions of the enterprise, alleviate the loan constraints, and reduce the cost of debt financing, which in turn can help the enterprise to maintain a moderate level of financial leverage, and reduce the likelihood of financial crisis [12]. Employee satisfaction can also make it easier for firms to obtain financial injections by sending positive messages to the outside world, which in turn eases the financial pressure in innovation activities [19].

In terms of the company's business performance, higher employee satisfaction helps to reduce employee turnover and improve business performance, and at the same time, it can enhance employees' work engagement and organizational commitment level, which in turn strengthens employees' sense of organizational identity and sense of belonging[4,5,7,11]. It also stimulates employees' sense of ownership and responsibility, and resonates with the company. At the same time, due to higher employee satisfaction, companies are able to establish a good reputation in the recruitment market, forming a virtuous circle of talent management through the dual path of attracting excellent talent agglomeration and increasing the willingness of employees to stay[13,14]. Higher employee satisfaction can also reduce the tendency of employees to leave the company [5]. And enhancing employee satisfaction can bring additional bonuses or benefits to employees and reduce the psychological expectations of employees who only focus on immediate benefits, thus establishing the relationship between employees and the company in terms of risk-sharing, and enabling employees to form the cognition of accepting failures and developing steadily [16].Considering that innovation projects are risky and have a lengthy research cycle, the abovementioned roles of employee satisfaction will not only help to push the firms to produce more innovations, but also helps to increase firm value[20]. Firms with high employee satisfaction tend to have higher levels of innovation and investment efficiency[20.21].Chen et al. [20] found that employee treatment and satisfaction are significantly and positively correlated with firms' level of innovation. In terms of corporate internal control, Luo Yanmei[22] found that high-quality employees are often able to take the initiative to identify internal control deficiencies and provide constructive suggestions and feedback for improvement in the process of internal control implementation, which Shapiro and Stiglitz [23] found can also effectively guide employees to focus more on the common good and take the initiative in fulfilling their internal control duties. Moreover, higher employee satisfaction can promote the exchange of value between employees and the organization, effectively reduce the cost of fulfilling the organizational contract, and enhance the organizational identification of employees with the internal control system. This sense of identity makes employees no longer regard the internal control system as a mere binding mechanism, but more actively comply with the relevant requirements, thus effectively reducing friction conflicts and compliance risks in the process of internal control management[24].

Increased employee satisfaction can also have a negative impact on firms. Bertrand and Mullainathan [15], Pagano et al.[16]found that due to institutional weaknesses under the principal-agent framework, management often chooses to increase compensation and benefits and acquiesce to

negative employee performance as a strategic means of obtaining employee support, in order to maximize its own interests. Moreover, in addition, the measures introduced by companies to enhance employee satisfaction often require substantial investments, which may instead lead to a decline in the company's performance if the benefits derived from these investments are less than their costs [17]. Improving employee treatment may also be due to management's excessive use of funds for relational investments to satisfy their own benefits, and such relational investments can crowd out funds needed for firms' R&D and innovation activities, leading to underinvestment in innovation. Xu Hongmei et al.[21]found that overly comfortable working conditions may also make the employees feel high and lose the motivation to struggle, which in turn leads to slackness and unwillingness to take the initiative to innovate.

Research related to digital transformation. In recent years, some scholars have also done relevant research on enterprise digital transformation. Digital transformation is a necessary way for enterprises to comply with the economic development trend. To put it simply, under the premise of keeping the core business unchanged, by increasing the R&D investment and innovative application of digital technology, all kinds of resources of enterprises are closely integrated with digital technology. This deep integration can optimize the enterprise's production management mode, which not only breaks through the limitations of traditional resource conditions, but also practically improves the operational efficiency[25]. At present, the digital transformation process is showing the development characteristics of emerging technology-driven innovation as the core, through the deep integration of artificial intelligence, big data and other cutting-edge technologies, enterprises are focusing on building a new type of service model with scenario adaptation and demand customization, which effectively strengthens the core competitive advantage of enterprises in the era of the digital economy[26]. The digital transformation of enterprises is influenced by both external and internal factors.

First of all, regarding the internal factors affecting enterprise digital transformation, Liu Shuchun et al. [26]and Mao Ning et al. [27]found that the real dilemmas that cause enterprises to "won't," "can't," "don't dare," and "don't have" digital transformation are mainly the lack of basic technological capabilities of enterprises, excessive costs, and uncertain future benefits. The real dilemmas of digital transformation are the lack of basic technological capabilities of enterprises, the high cost of transformation, and the uncertainty of future benefits. For the external factors affecting enterprise digital transformation. Han Yonghui et al. [10] found that the industrial policy implemented by the government has a precise support mechanism, which can make the supported industries or enterprises obtain higher bank credit support and government subsidies, significantly improve enterprise performance indicators and total factor productivity, and thus promote the process of enterprise digital transformation. Guo Kaiming et al. [9] found that the implementation of digital infrastructure policies will also promote the development of regional software and information technology service industry. Chen et al. [27] found that under the macro environment of intensified financing constraints, the high cost of digital technology application is often a developmental obstacle on the process of enterprise digital transformation. Liu Shulin et al. [18] found that in the downward period of economic cyclical adjustment, local governments prioritize the enhancement of those short-term economic indicators that can achieve total economic growth. Yan Xiandong and Zhu DiXing[29]found that under the pressure of enterprise performance appraisal, local governments tend to prioritize the allocation of public financial funds to general economic projects, with a view to achieving short-term results in economic growth targets. In contrast, many financial S&T expenditures with long-term and innovative support receive less attention[30]. Because of its orientation and signaling effect, government innovation subsidies not only provide innovation resources for enterprises directly, but also can indirectly solve the problem of insufficient external financing funds for enterprises[31]. Government innovation subsidies are an important policy tool that can stimulate the innovation vitality of enterprises (Chen Lin and Zhu Weiping, 2008) [32]and can also directly compensate for the lack of enterprise innovation resources. Shang Hongtao and Fang Dan [33]found that the government reduces the trial-and-error cost of enterprises' digital technological innovation by

selecting high-quality innovative enterprises and implementing precise support, which disperses the uncertainty risk of enterprises' technological innovation. Zhou et al. [34]found that a large investment in R&D resources is a necessary condition for the digital transformation of enterprises, and enterprises should focus on solving the problem of external financing constraints if they want their innovation resources to meet their own innovation needs.

In summary, it can be seen that existing scholars' research on the impact of employee satisfaction mainly focuses on financing costs, innovation level, business performance and internal control, etc., and the research on the impact factors of enterprise digital transformation mainly focuses on basic technology, input costs, policy subsidies, external financing constraints, etc., while the research on employee satisfaction on digital transformation has not yet paid attention to. Therefore, this paper will specifically study the impact of employee satisfaction on digital transformation to enrich the literature in the field of employee satisfaction and digital transformation.

3. Research hypotheses and empirical design

Research hypotheses. Firstly Stakeholder theory suggests that increased employee satisfaction not only provides employees with more incentives, but also significantly enhances their well-being, while increasing the level of employee commitment in the company, reducing the tendency of employees to leave, and improving business performance[6,7,11]. This allows employees and companies to share the risk, reduces the idea that employees only pursue short-term benefits, and fosters a work attitude that accepts failure and looks beyond the horizon[23]. While digital transformation is a long-cycle, high-investment and high-risk enterprise innovation activities, employees choose to work for the long-term value of the enterprise, and actively participate in the digital transformation of the enterprise can be promoted to a certain extent.

Secondly companies with high employee satisfaction also gain the trust of banks or investors and are therefore more likely to get the financial support they need for research and development as a way of solving the problem of insufficient funds. Since the application of digital technology in business incurs high costs, the company needs a lot of external funding. Firm satisfaction can largely influence the attitude of creditors towards the firm. On the one hand, from the stakeholder perspective, employees and creditors have similar interest appeal characteristics: their earnings are less sensitive to the rise in company performance, i.e., when the company's profitability grows, both of them will have limited earnings enhancement; however, when the company's performance declines or even faces bankruptcy and liquidation, they will bear a significant risk of loss [19]. On the other hand, good employee relations can reduce employee turnover rates, leading to improved productivity and financial performance, which in turn reduces the cost of corporate debt financing [12]. Therefore, firms with high employee satisfaction can alleviate the external financing constraints faced by digital transformation by attracting creditors' investment, which in turn promotes digital transformation. Summarizing the above analysis, this paper proposes hypothesis H1 as follows:

Hypothesis **H1**: Increased employee satisfaction promotes enterprise digital transformation

Too much employee satisfaction may also be detrimental to company innovation. Managers may gain employee support by promising higher salaries and increased employee benefits in exchange for employee support. Due to agency problems, management may obtain employee support by acquiescing to negative employee performance or by offering excessive pay in order to maximize their own interests [15]. This can lead to a decrease in the efficiency of the company's production and operation, which is not conducive to the digital transformation of the enterprise.

In addition, the measures introduced by companies to enhance employee satisfaction often require substantial investment, which may lead to a decline in the company's performance if the benefits from these investments are smaller than their costs [17]. Under the macro environment of intensifying economic downward pressure, initiatives aimed at enhancing employee satisfaction, such as measures to improve employee compensation packages and welfare protection systems, are usually accompanied by significant cost escalation, and this cost pressure may adversely affect the business

performance of the firms[35]. If the cost in this regard is too high, it will be difficult for enterprises to make sufficient investment in high-cost, long-cycle and high-risk innovation projects such as digital transformation, which is also detrimental to the digital transformation of enterprises. Summarizing the above analysis, this paper proposes hypothesis H2 as follows:
Hypothesis **H2**: Employee Satisfaction Inhibits Enterprise Digital Transformation

Empirical design. In order to test the impact of employee satisfaction on enterprise digital transformation, the following regression model is set up with reference to Xu Hongmei et al. [21]and Guan Kaolai et al. [36]:

$$lnDT_{i,t} = \alpha + \beta Top100_{i,t} + \gamma' Control_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t}$$

lnDT is the degree of digital transformation of enterprises, and the measurement of digital transformation of enterprises in existing studies mainly focuses on qualitative analysis, lacking a systematic quantitative assessment framework[37]. If an empirical study of the economic performance of digital transformation is to be conducted, it is necessary to refine the concept of the core variable "digital transformation" in a highly abstract manner. Objectively speaking, it is difficult to directly quantify the degree of digital transformation of enterprises through public financial data. The main reasons are: first, the current accounting standards do not include digital transformation as a mandatory disclosure, resulting in a lack of standardized presentation of the relevant implementation details; second, digital transformation has a multi-dimensional manifestation, which includes both traditional enterprises digitally reconfiguring their business systems, and also covers the endogenous digital operation modes of start-ups, whose heterogeneous nature leads to the lack of a unified assessment system. It is worth paying attention to the fact that the management's strategic statement on digital transformation in the annual report essentially reflects the top-level design of the development path by the core decision-making layer of the enterprise, which has a programmatic guiding effect on the direction of the enterprise's operation. Therefore, this paper refers to the study of Wang H. [38]and others to extract “artificial intelligence technology”, “big data technology”, “blockchain technology” in the CSMAR database of corporate annual reports. “cloud computing technology” and “digital application technology” in the CSMAR database, and use the logarithmic value of their aggregation plus one to measure the degree of digital transformation (*lnDT*) of enterprises.

This paper measures employee satisfaction using a dummy variable (*Top100*) for whether a listed firm is on the "Top 100" list. Specifically, *Top100* takes the value of 1 if firm i enters the list in year t, otherwise it takes the value of 0. Considering that the list is dynamically adjusted every year, i.e., firms may enter or leave the list in different years, this study adopts a more stringent assignment rule, i.e., *Top100* takes the value of 1 only if the firm enters the list in year t, and takes the value of 0 if the firm fails to enter the list in year t + 1. The main focus of this paper is on the estimation of regression coefficient β. This paper focuses on the estimation of the regression coefficient β. If the estimation is significantly positive, it indicates that employee satisfaction promotes the digital transformation of enterprises, and if it is significantly negative, it indicates that employee satisfaction inhibits the digital transformation of enterprises.

Control is a series of control variables, including firm *size*, gearing ratio (*Lev*), profitability (*ROA*), equity concentration (*Top1*), dual, *age*, *cash* flow, *balance*, *growth*, and research and development (Rd). (*Rd*).*Year* and Industry indicate that the paper controls for year and industry fixed effects, respectively.

Table 1 Variable Definitions

Variable type	variable symbol	variable name	Description of variable construction
explanatory variable	*Top100*	Employee Satisfaction	If the company is selected as one of the "Top 100 List" in the current year, the value will be 1, otherwise it will be 0.
explanatory variable	*lnDT*	Enterprise Digital Transformation	On the basis of calculating the frequency of the five keywords "artificial intelligence technology", "big data technology", "blockchain technology", "cloud computing technology" and "digital technology application" in the annual reports of enterprises, the logarithmic value of their aggregation plus 1 is used to measure the degree of digital transformation of enterprises. "On the basis of the frequency of the five keywords "digital technology application" in the annual reports, the logarithmic value of 1 is added to the summary to measure the degree of digital transformation of enterprises.
control variable	*Size*	Enterprise size	Natural logarithm of total assets
	Lev	gearing	Total liabilities/total assets
	ROA	profitability	Net profit/total assets
	Top1	shareholding concentration	Shareholding ratio of the largest shareholder
	Dual	two jobs in one	If the chairman and general manager are one person, the value is 0, otherwise it is 1.
	Age	Age of business	Logarithmic value of the number of years the enterprise has been in existence plus 1
	CashFlow	net cash flow	Ratio of net cash flows from operating activities to total assets of the enterprise for year t
	Balance	Shareholding Counterbalance	Ratio of shareholding of the first largest shareholder to the second largest shareholder
	Growth	growth capacity	Revenue growth rate
	Rd	R&D investment	R&D investment, ratio of R&D expenses to sales revenue of the enterprise in year t

Data sources. The research object is listed companies in A-share market, based on the corporate financial data and other related data of A-share listed companies from 2011 to 2023. The data of the "Top 100" list used in this article comes from the "Top 100 Annual Best Employers in China" list jointly published by "Wisdom Link Recruitment" and the Social Survey Research Center of Peking University since 2011. "The data is collected and organized manually by the author. All financial data in this article are from the Cathay Pacific database. In this study, the first year of the release of the "China's Top 100 Employers of the Year List" is taken as the starting point for data collection, and the sample period is defined as 2011-2023. Based on the existing studies, this paper handles the sample data of as follows: first, ST, * ST stocks and financial industry data are excluded; second, enterprises with missing values of major variables are excluded, and a total of 35,099 observations are obtained; and third, in order to avoid the occurrence of extreme values in the data, the sample variables are reduced by 1% up and down.

4. Descriptive statistics.

Table 2 Descriptive statistics for key variables

variant	sample size	average value	(statistics) standard deviation	minimum value	maximum values
lnDT	35099	1.444	1.376	0.000	4.997
Top100	35099	0.009	0.096	0.000	1.000
Size	35099	22.310	1.314	19.970	26.380
Lev	35099	0.428	0.205	0.056	0.901
ROA	35099	0.032	0.064	-0.260	0.193
Top1	35099	0.337	0.148	0.082	0.740
Age	35099	2.957	0.325	1.946	3.555
CashFlow	35099	0.047	0.067	-0.151	0.241
Balance	35099	0.735	0.604	0.029	2.770
Growth	35099	0.142	0.359	-0.559	2.042
RD	35099	0.020	0.020	0.000	0.105
Dual	35099	0.274	0.446	0.000	1.000

The descriptive statistics of the variables are shown in Table 2. It can be seen that the mean value of enterprise digital transformation (*lnDT*) is 1.444, the maximum value is 4.997, the minimum value is 0, and the standard deviation is 1.376, which is a big difference between different companies. the mean value of Top100 is 0.009, which means that companies that are shortlisted in the "Employee Satisfaction Top100" account for 0.9% of the total number of the sample. The mean value of Top100 is 0.009, which means that the companies shortlisted in the "Top100 of Employee Satisfaction" account for 0.9% of the total number of sample. On average, the financial leverage level of the companies under study is 42.8%, profitability is 3.24%, equity concentration is 33.7%, equity resistance is 0.735, growth level is 14.2%, and 87% of the companies have two chairmen and general managers.

5. Empirical results and analysis

5.1. Analysis of baseline results

Table 3 Regression Analysis of Employee Satisfaction and Digital Transformation

	(1)	(2)	(3)	(4)
variant	*lnDT*	*lnDT*	*lnDT*	*lnDT*
Top100	1.118***	0.843***	0.696***	0.450***
	(7.632)	(8.721)	(5.737)	(4.801)
Size			0.176***	0.175***
			(12.120)	(14.757)
Lev			-0.643***	-0.165**
			(-6.583)	(-2.192)
ROA			-1.738***	-0.303*
			(-8.180)	(-1.875)
Top1			-0.532***	-0.273**
			(-3.412)	(-2.400)
Age			0.324***	-0.047
			(6.360)	(-0.946)
CashFlow			-0.743***	-0.521***
			(-4.538)	(-4.208)
Balance			0.073*	0.002
			(1.929)	(0.086)
Growth			0.073***	0.047**
			(3.244)	(2.505)
RD			23.032***	8.194***
			(25.711)	(10.121)

Dual			0.220***	0.113***
			(6.521)	(4.430)
Constant	1.434***	0.172	-3.481***	-3.296***
	(73.105)	(1.479)	(-11.321)	(-11.262)
Observations	35099	35099	35099	35099
R^2	0.006	0.458	0.159	0.483
Industry FE	NO	YES	NO	YES
Year FE	NO	YES	NO	YES

Note: ① *, **, *** denote significant at 10%, 5%, and 1% significance levels, respectively; ② Values in parentheses are two-tailed test t-values.

In the first column we neither control for fixed effects nor include control variables and can see that the regression coefficient for *Top100* is 1.118 with a t-value of 7.6320, significant at the 1% level. In the second column we control for year and industry fixed effects and can see that the regression coefficient for Top100 is 0.843 with a t-value of 8.721, significant at the 1% level. In the third column we include a series of control variables but do not control for fixed effects and can see that the regression coefficient for *Top100* is 0.696 with a t-value of 5.737, significant at the 1% level. In the fourth column we have included a range of control variables as well as controlling for year and industry fixed effects, as can be seen the regression coefficient for *Top100* is 0.450 and the t-value is 4.801, significant at the 1% level. The above results indicate that employee satisfaction significantly increases the degree of digital transformation in an organization, supporting hypothesis H1.

Among the control variables, the regression coefficients of *Lev*, *ROA*, *Top1*, and *CashFlow* are significantly negative, indicating that the higher the company's gearing ratio, the higher the company's profitability, the higher the company's equity concentration, and the higher the company's net cash flow, the more unfavorable it is to the enterprise's digital transformation. The regression coefficients of *Size*, *Growth*, *RD*, and *Dual* are significantly positive, indicating that the higher the company's size, the company's growth ability, the higher the company's R&D investment, and the company's two jobs, the more helpful to enterprise digital transformation.

6. Robustness tests

Table 4 Robustness test results

	(1)	(2)	(3)	(4)	(5)
	propensity score matching	Replacement of regression models	Changing the sample interval	Replacement of explanatory variable measures	Increased fixed effects
variant	*lnDT*	*lnDT*	*lnDT*	*ManageDiInnIndex*	*lnDT*
Top100	0.522***	0.450***	0.340***	0.296***	0.172**
	(4.330)	(4.808)	(3.402)	(3.530)	(2.467)
Size	0.141***	0.175***	0.198***	0.122***	0.268***
	(2.625)	(14.779)	(15.037)	(12.003)	(13.314)
Lev	-0.499	-0.165**	-0.193**	-0.193***	-0.112
	(-1.024)	(-2.195)	(-2.265)	(-3.006)	(-1.481)
ROA	0.298	-0.303*	-0.444**	-0.147	-0.190*
	(0.223)	(-1.878)	(-2.544)	(-1.036)	(-1.691)
Top1	0.949*	-0.273**	-0.367***	-0.220**	-0.540***
	(1.831)	(-2.404)	(-2.792)	(-2.192)	(-3.470)
Age	0.210	-0.047	-0.048	-0.052	-0.085
	(0.834)	(-0.947)	(-0.846)	(-1.205)	(-0.592)
CashFlow	-0.570	-0.521***	-0.554***	-0.577***	-0.177**
	(-0.729)	(-4.214)	(-3.800)	(-5.390)	(-2.090)
Balance	0.161	0.002	0.003	-0.001	-0.017
	(1.072)	(0.086)	(0.094)	(-0.048)	(-0.595)
Growth	0.123	0.047**	0.043**	0.030*	0.017
	(0.648)	(2.508)	(1.998)	(1.793)	(1.360)
RD	8.931***	8.194***	8.499***	7.380***	4.457***

	(2.676)	(10.136)	(9.641)	(10.017)	(5.964)
Dual	0.299**	0.113***	0.124***	0.102***	-0.005
	(2.114)	(4.436)	(4.362)	(4.539)	(-0.232)
Constant	-3.869***	-3.296***	-3.120***	-2.414***	-4.806***
	(-3.004)	(-11.279)	(-9.228)	(-9.597)	(-8.815)
Observations	622	35099	26960	35099	35099
Pseudo R^2/R^2	0.643	0.1899	0.444	0.458	0.304
Industry FE	YES	YES	YES	YES	NO
Year FE	YES	YES	YES	YES	YES
Firm FE	NO	NO	NO	NO	YES

Note: ① *, **, *** denote significant at 10%, 5%, and 1% significance levels, respectively; ② Values in parentheses are two-tailed test t-values.

Given that the "Top 100" selection is based on voluntary participation by enterprises, the results of the list are characterized by non-randomness. Since the Best Employers Selection Committee does not disclose the list of companies that participated in the selection process but were not selected, this study could not include such companies in the control group for analysis. Thus, first, in order to control for differences in the key characteristics of the listed and unlisted firms, and at the same time effectively mitigate the estimation bias caused by the time trend, we chose to use the propensity score matching (PSM) method[39]. After matching, we obtain a PSM sample of 622 annual observations of listed firms, in which the systematic differences in observable characteristics between the "Top 100" firms and the control group are effectively controlled by the matching method. We re-run the benchmark regression on the above PSM sample, and as shown in column 4(1) of Table 4, employee satisfaction is still significantly positive at the 1% level with respect to firms' digital transformation.

Second, we change the regression model and use the "Tobit" model for the regression analysis, and the results are shown in column 4(2) of Table 4, which shows that employee satisfaction is still significantly positively related to the digital transformation of enterprises. Third, we change the sample interval again. Since the number of companies applying for "China's Employer of the Year" has increased significantly since 2015, which may affect the regression results, this study further selects the sample interval of 2015-2023 for the robustness test. The regression results are shown in column (3) of Table 4. Fourth, we change the measure of the explanatory variables and adopt the management digital innovation-oriented indicators to measure the degree of digital transformation of enterprises, specifically by counting the frequency of the subindicators of artificial intelligence technology, blockchain technology, cloud computing technology, big data technology, and the application of digital technology in the "Management Discussion and Analysis" section of the annual report, and using them to summarize the results of digital technology application in the annual report. The frequency of AI technology, blockchain technology, cloud computing technology, big data technology, and digital technology application in the annual reports of enterprises is counted, and the logarithmic value of the summary plus one is used to measure the explanatory variables. The regression results are shown in column 4(4) of Table 4, which shows that employee satisfaction is still significantly and positively related to corporate digital transformation. Fifth, we add fixed effects, changing "industry fixed effects + year fixed effects" to "firm fixed effects + year fixed effects". The regression results are shown in column 4(5) of Table 4, which shows that employee satisfaction is still significantly positively related to enterprise digital transformation. In conclusion, the findings of this paper are robust.

7. Endogeneity test

Table 5 Endogeneity test -- Heckman two-step model

	(1)	(2)
variant	*Top100*	*lnDT*
Top100		0.473***
		(4.741)
IMR		-0.253
		(-0.612)
Size	0.619***	0.029
	(21.386)	(0.120)
Lev	0.085	-0.186**
	(0.340)	(-2.215)
ROA	1.900**	-0.760
	(2.383)	(-0.990)
Top1	0.606**	-0.417
	(2.081)	(-1.595)
Age	0.337***	-0.126
	(2.912)	(-0.910)
CashFlow	-0.243	-0.462***
	(-0.452)	(-2.957)
Balance	0.100	-0.021
	(1.342)	(-0.451)
Growth	-0.184*	0.091
	(-1.876)	(1.220)
RD	9.945***	5.858
	(5.749)	(1.491)
Dual	-0.001	0.114***
	(-0.019)	(4.455)
Constant	-21.369	1.899
	(-0.022)	(0.223)
Observations	35099	35099
Pseudo R^2/R^2	0.415	0.483
Industry FE	YES	YES
Year FE	YES	YES

Note: ① *, **, *** denote significant at 10%, 5%, and 1% significance levels, respectively; ② Values in parentheses are two-tailed test t-values.

Since treating all companies that disclose their digital transformation in their annual reports as digitally transformed and vice versa as not digitally transformed may result in sample selection bias, which leads to the endogeneity problem, this paper employs the Heckman two-stage approach to mitigate the effect of the endogeneity problem. The first step of the Heckman two-stage approach Employee satisfaction is used as an explanatory variable, and the Inverse Mills Ratio (IMR) of each observation is estimated through the Probit model, and the second step is to correct the potential selection bias by adding IMR to the original regression model as a control variable. The empirical results show that the coefficients of variables such as employee satisfaction in the Heckman model are basically the same as those in the Ordinary Least Squares (OLS) model, indicating that the explanatory power of the model remains basically unchanged after considering the potential sample selection bias.

8. Further analysis

8.1. Heterogeneity analysis

8.1.1 Industry Characteristics

Table 6. Heterogeneity analysis (whether high-tech industry)

	lnDT	
variant	High-tech industries	Non-high-tech industries
Top100	0.672***	0.352***
	(3.499)	(3.482)
Size	0.199***	0.162***
	(8.507)	(11.955)
Lev	-0.159	-0.167*
	(-1.208)	(-1.848)
ROA	-0.268	-0.266
	(-0.997)	(-1.334)
Top1	-0.589***	-0.103
	(-2.768)	(-0.771)
Age	-0.003	-0.083
	(-0.038)	(-1.407)
CashFlow	-1.211***	-0.261*
	(-5.126)	(-1.847)
Balance	-0.088*	0.059*
	(-1.930)	(1.718)
Growth	0.061	0.036*
	(1.625)	(1.668)
RD	6.985***	10.813***
	(6.689)	(8.711)
Dual	0.035	0.160***
	(0.839)	(5.070)
Constant	-4.156***	-3.056***
	(-7.877)	(-9.089)
Observations	11548	23550
R^2	0.607	0.327
Industry FE	YES	YES
Year FE	YES	YES

Note: ① *, **, *** denote significant at 10%, 5%, and 1% significance levels, respectively; ② Values in parentheses are two-tailed test t-values.

Studies by Pan Yue et al. [40], Xiao Zhongyi and Lin Lin (2019)[43] point out that in a highly competitive market environment, sustainable technological innovation capability has become a key element for the survival and development of modern enterprises, a feature that is particularly pronounced in high-tech industries, thus reinforcing the facilitating effect of employee satisfaction on the digital transformation of enterprises. In contrast, the relatively weak strategic position of innovation activities in firms in non-high-tech industries leads to the suppression of the positive relationship between employee satisfaction and digital transformation. We thus expect that the effect of employee satisfaction on the extent of firms' digital transformation is more pronounced in high-tech industries.

In this paper, the sample firms are divided into two sub-samples of high-tech and non-high-tech industries based on the classification criteria and industry technology characteristics of Pan Yue et al.[1][40]. And use model (1) for regression analysis. The results are shown in Table 6, which shows

[1] High-tech industries include: pharmaceutical manufacturing, railroad ship aerospace and other transportation equipment manufacturing, software and information technology services, chemical fiber manufacturing, chemical raw materials and chemical products manufacturing, instrument and meter manufacturing, and computer communications and other electronic equipment manufacturing.

that the regression coefficient of employee satisfaction in the subsample of high-tech industry is greater than that in the non-high-tech industry. From this we get the conclusion that employee satisfaction is more motivating for digital transformation in high-tech industries than in non-high-tech industries.

8.1.2. Corporate identity

Table 7. Heterogeneity Analysis (Labor Intensive/Capital Intensive)

	lnDT	
variant	labor-intensive	capital-intensive
Top100	0.509***	0.421***
	(4.428)	(3.867)
Size	0.182***	0.181***
	(10.112)	(12.222)
Lev	-0.193**	-0.164
	(-2.044)	(-1.593)
ROA	-0.250	-0.326
	(-1.267)	(-1.320)
Top1	-0.344**	-0.192
	(-2.266)	(-1.283)
Age	-0.095	0.008
	(-1.550)	(0.121)
CashFlow	-0.483**	-0.547***
	(-2.561)	(-3.541)
Balance	-0.026	0.026
	(-0.735)	(0.717)
Growth	0.069**	0.041*
	(2.500)	(1.654)
RD	8.997***	7.114***
	(8.791)	(6.122)
Dual	0.114***	0.111***
	(3.557)	(3.109)
Constant	-3.211***	-3.670***
	(-7.153)	(-10.272)
Observations	17553	17545
R^2	0.519	0.456
Industry FE	YES	YES
Year FE	YES	YES

Note: ① *, **, *** denote significant at 10%, 5%, and 1% significance levels, respectively; ② Values in parentheses are two-tailed test t-values.

The strategic choices and behavioral decisions of enterprises are significantly affected by the degree of factor dependence, which is an important internal characteristic of enterprises. The degree of factor dependence varies across firms, so this paper classifies the sample firms into labor-intensive and capital-intensive according to the degree of factor dependence of different firms, which show significant differences in the input structure of labor and capital factors[36]. Labor-intensive companies have a higher proportion of labor inputs than capital-intensive companies, and the implementation of innovative strategies such as digital transformation depends largely on the level of employee commitment and responsibility[41]. In this way, higher employee satisfaction is more helpful for enterprise digital transformation.

Therefore, this paper refers to Guan Kao Lei [42] and uses the number of employees corresponding to each million yuan of operating revenue to measure the degree of factor dependence (Facdep) of a company's production and divides the sample into two groups of labor-intensive and capital-intensive according to the median value of Facdep in the same industry in the same year and performs a regression of the grouping using model (1). The results are shown in Table 7, the regression coefficients of labor-intensive firms are larger than those of capital-intensive firms. From this we

conclude that employee satisfaction motivates digital transformation in labor-intensive companies more than capital-intensive.

9. Mechanism analysis

Table 8. Mechanism analysis

	(1)	(2)	(3)
variant	*KZIndex*	*CR4*	*labor*
Top100	-0.615***	0.004**	-0.045***
	(-5.771)	(2.168)	(-3.097)
Size	-0.221***	-0.004***	0.004**
	(-19.246)	(-10.451)	(2.515)
Lev	6.492***	-0.008***	-0.002
	(98.793)	(-3.595)	(-0.205)
ROA	-4.599***	-0.270***	-0.273***
	(-27.103)	(-35.771)	(-8.144)
Top1	-1.409***	-0.008***	0.021
	(-13.703)	(-2.870)	(1.230)
Age	0.241***	0.000	-0.007
	(6.109)	(0.386)	(-0.962)
CashFlow	-13.521***	0.062***	-0.046*
	(-103.184)	(13.354)	(-1.734)
Balance	-0.269***	0.001	0.012***
	(-11.709)	(1.550)	(3.196)
Growth	-0.160***	0.004***	0.103***
	(-7.164)	(5.694)	(16.895)
RD	4.023***	0.091***	0.048
	(5.181)	(4.190)	(0.449)
Dual	-0.109***	0.000	0.011***
	(-4.923)	(0.547)	(2.926)
Constant	6.123***	0.119***	0.239***
	(19.323)	(15.106)	(5.198)
Observations	34566	32259	32043
R^2	0.756	0.289	0.106
Industry FE	YES	YES	YES
Year FE	YES	YES	YES

Note: ① *, **, *** denote significant at 10%, 5%, and 1% significance levels, respectively; ② Values in parentheses are two-tailed test t-values.

According to stakeholder theory, the improvement of employee satisfaction can enable employees to obtain additional compensation and incentives, while increasing employee trust in the company, reducing turnover rates and enhancing productivity[6,7,11]while establishing a joint employee-enterprise risk-bearing relationship, so that employees form the cognition of accepting failure and steady development[43], realizing the risk-taking between employees and enterprises, and then enhancing the risk-taking ability of enterprises. Ultimately, it is conducive to promoting the long-cycle, high-investment and high-risk enterprise digital transformation.

Therefore, the mechanism variables of the first mechanism in this paper are chosen as labor investment efficiency and enterprise risk-taking capacity. For the measurement of labor investment efficiency we adopt the studies of Kong Dongmin et al. [44] and Zhang Yanzhao et al. [45]to measure the labor investment efficiency of enterprises by the absolute value of the inefficient labor productivity of enterprises , i.e., the smaller the absolute value of the inefficient labor productivity of enterprises means that the higher the labor investment efficiency of enterprises. According to the regression results in Table 8, this variable is significantly negatively correlated with employee satisfaction, which can be concluded that the higher the employee satisfaction, the higher the labor investment efficiency of the enterprise. For the measure of corporate risk-taking capacity, we refer to

the studies of Hong Jinming et al. [46]and Yu Minggui et al. [47]for the measure, which calculates the standard deviation of corporate profitability adjusted by the annual industry mean from year t-2 to year t of the enterprise, and the larger the value indicates that the greater the risk-taking capacity of the enterprise. According to the regression results in Table 8, the amount of change is significantly and positively correlated with employee satisfaction, which leads to the conclusion that the higher the employee satisfaction, the greater the risk-taking ability of the enterprise. In conclusion, employee satisfaction promotes enterprise digital transformation by improving enterprise labor investment efficiency and enterprise risk-taking ability.

Secondly firms with high employee satisfaction are also likely to be favored by creditors. On the one hand, from a stakeholder perspective, employees and creditors have similar interests: their earnings are less sensitive to rising firm performance, i.e., when the firm's earnings grow, the earnings enhancement of the two is limited, however, when the firm's performance declines or even faces bankruptcy and liquidation, they are subject to a significant risk of loss [19]. On the other hand, good employee relations can also reduce the likelihood of debt default by reducing the employee turnover rate, improving financial performance and operational efficiency so that firms can reduce the likelihood of debt default [12], which in turn can gain the favor of creditors, attract creditor's investment, alleviate the external financing constraints faced by the digital transformation, and provide financial support for the digital transformation.

Therefore, the mechanism variable for the second mechanism in this paper is chosen as corporate financing constraints. Drawing on Pan Yue et al. [48], this study adopts the KZ index to measure the degree of corporate financing constraints. The value of the KZ index is positively correlated with the degree of financing constraints faced by firms, i.e., the larger the index value, the higher the degree of corporate financing constraints. The regression results are shown in Table 8, where it can be seen that the index of KZ is significant in the negative direction, thus easing the external financing constraints of enterprises.

10. Summary

Digital technology (5G, artificial intelligence, big data, etc.) has become the core driving force for high-quality economic development, and digital transformation helps cross the middle-income trap at the macro level, drives industrial upgrading at the meso level, and improves enterprise efficiency and business model innovation at the micro level. Talent, as a basic element of innovation and development, is the key to enterprise digital transformation. This paper focuses on the relationship between employee satisfaction and enterprise digital transformation, and discusses how to optimize the allocation of talent resources to promote the digital process.

Employee satisfaction was found to have a significant positive effect on the digital transformation of enterprises. Heterogeneity analysis finds that employee satisfaction has a greater degree of digital transformation in high-tech industries and labor-intensive enterprises compared to non-high-tech industries and capital-intensive enterprises. Mechanism analysis shows that employee satisfaction promotes the degree of digital transformation of enterprises mainly by reducing the risk-taking capacity of enterprises and the labor investment efficiency of employees, as well as alleviating the external financing constraints of enterprises.

The findings of this study have policy implications and practical guidance value for enterprises to promote the practice of digital transformation and participate in the construction of digital China in the new era. First, the empirical results of this paper show that the improvement of employee satisfaction has a significant positive impact on the implementation of digital transformation and other innovative activities in enterprises. Traditional innovation research mainly focuses on the management perspective, often ignoring the creativity and subjective initiative of ordinary employees. In the context of contemporary economic development, the value contribution of employees has exceeded the scope of simple physical labor, and enterprises should focus on stimulating the enthusiasm and innovation ability of employees to maximize the value of human capital. Secondly,

enterprises should build a market-competitive salary and benefit system, establish a fair and scientific promotion mechanism, create a good working environment, and create efficient communication channels, in order to fully stimulate the work potential and enthusiasm of employees, promote the positive interaction between employee satisfaction and work efficiency, effectively reduce the risk of corporate violations, and ultimately realize the goal of high-quality development. Along with the development of society and the improvement of living standards, employees' pursuit of professional identity and quality of life is increasing, which makes the traditional management mode at the expense of employee welfare unsustainable. Modern enterprises not only need the labor contribution of employees, but also should pay attention to the multi-dimensional needs of employees, and release the full potential of human resources by improving job satisfaction, and then improve the efficiency of innovation and productivity.

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