

The Impact of Enterprise Digital Transformation on the Cost of Debt Financing

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Abstract: In the environment of today's era, the rapid improvement of digital technology and the strength of intelligent technology has promoted the development of digital transformation. Changes in the economic environment in recent years have made the financing cost more and more important in enterprises, and how to reduce the financing cost has become an important issue. This paper selects all A-share listed Chinese enterprises to study the impact of enterprise digital transformation on the cost of debt financing. The empirical process concludes that promoting enterprise digital transformation reduces the cost of debt financing and proves the robustness of the conclusion. Meanwhile, the heterogeneity test shows that the differences in corporate nature and governance structure affect the effect of corporate digital transformation on debt financing cost reduction.

Keywords: Cost of debt financing, Digital Transformation Index, Digitized outcome scores

1. Introduction

Digital transformation is the process by which companies integrate new-generation information and communication technologies into all areas of their business. This process mainly uses artificial intelligence, big data, cloud computing, block-chain, 5G and other digital technologies to realize advanced digital business models to assist and enhance traditional business models. When data becomes the key to the development of each industry, society will set off a wave of digital social change. In the Outline of the Fourteenth Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Vision 2035, the word “digitization” appears 25 times, emphasizing the importance of digitization in the country's new journey. In addition, The White Paper on China's Digital Economy (2022) elaborates on the latest report of the 20th National Congress, which pointed out the need to build a digital China and accelerate the development of the digital economy. Enterprises as the core body of the digital economy technology innovation plays a bridge role, the concept of digitization and enterprise integration and through the practice can be more efficient to study the development factors related to enterprises and achieve efficient development. Therefore, to grasp the development opportunity of digital transformation of enterprises in China, and to fully release the huge multiplier effect of digital technology and data resources in enhancing total factor productivity has become a necessary way for the high-quality development of enterprises in China under the new normal [1].

The expanding financing requirements resulting from high price inflation have led to an increase in the capital intensity of firms, and thus to enhanced sensitivity of their income streams to economic fluctuations [2]. This balancing of the relationship between the cost of corporate finance and risk is

at the heart of determining the most appropriate capital structure for a company. Among the main types of corporate financing cost methods, compared to the cost of equity financing, debt financing cost is less risky despite lower returns. Although digitization is increasingly becoming a corporate trend, the fit between corporate digitization and the cost of debt financing and whether there are any potential problems need to be examined. The study [3] shows the characteristics of financing behavior of listed companies in China that few choices are made between internal financing and debt financing. Considering that there are fewer opportunities to research the cost of debt financing compared with the cost of equity financing, this paper systematically studies and explores the impact of today's corporate digital transformation on the cost of debt financing.

2. Literature review

Capital is the lubricant for the successful operation of an enterprise, and its role is reflected in every link of an enterprise [4]. According to the financial theory of western companies, the operation goal of capital structure of listed companies is to maximize shareholders' wealth [5]. Therefore, the financing cost of enterprises has become a research topic with high frequency. In the choice of financing cost, listed companies need to make a trade-off. Debt financing is a double-edged sword, bringing in both revenue and rise to funding risks [6]. In order to avoid the cost of debt financing, which is a central factor that brings irreparable risks to enterprises, scholars have explored the factors that can affect the cost of debt financing in many aspects. From the classic historical domestic and international literature, the main macro-influences on the cost of debt financing are industrial policy, legal environment, and monetary policy, and the micro-influences are the nature of property rights, accounting soundness, quality of accounting information, and social responsibility[7].Take the environment for example, corporate risks arising from climate change and air pollution will add the uncertainty of firms' future cash flows and ability to repay debt ,increasing their credit risk[8].For financing costs from an innovation perspective, in a dynamic and fast-changing world, digital innovation and transformation can help improve organizational efficiency and competitive advantage.[9].Most of the literature articulates the benefits of digital transformation, but ignores many of the vulnerabilities. Although the need for digital transformation is clear, a key challenge for many organizations is the lack of helpful knowledge of the required digital capabilities[10].Referring to the previous literature, it is concluded that the digital transformation of enterprises can significantly reduce the cost of corporate debt financing, and the higher the degree of digital transformation of enterprises is[11].The hypotheses were made on the research objectives of this paper were made, and two independent variables were successively used to test the conclusion.

3. Empirical process

3.1. Data sources

In this paper, all A-share listed Chinese companies are taken as samples, and all the original data of independent variables, dependent variables and control variables are obtained from CSMAR, in order to reduce the influence of special industries on the research results, companies in ST and financial industries are excluded, and missing data of each variable of the sample are eliminated, and finally 4,588 observations are obtained for 2019-2022. Based on this tailing process was carried out at 1% to 99% level to eliminate anomalous values to the exact results.

3.2. Research model

Referring to the existing literature [12] on measurement, this paper adopts a double fixed effects model to study the impact of enterprise digital transformation on the cost of corporate debt financing.

$$Cost_{i,t} = \alpha + \beta \cdot Digital_{it-1} + \gamma \cdot Control + \epsilon + \mu_j + \delta_t \quad (1)$$

where the dependent variable Cost is the cost of corporate debt financing (i.e., FC in this paper), the independent variable Digital is the digital transformation index (i.e., DT in this paper), Control is the control variable, α is the intercept term, and β is the coefficient to be estimated. Firm, industry and year are denoted by i , j and t , respectively, in addition to setting controls for industry and year fixed effects, denoted by μ and δ , respectively; ϵ denotes the random term. The selection of independent variables is based on the theory that the speed of digital transformation can effectively inhibit agency risk, information risk and reputational risk, thus reducing the cost of corporate debt financing [13]. In this paper, it refers to the existing literature [14] practice this data is common and more commonly used way to measure the dependent variable, so we use the value of financial expenses over total liabilities as a measure of the cost of corporate debt financing indicators, control variables include company size, gearing ratio, whether the two jobs are one, nationalization mark and return on net assets. (See Table 1 for details)

Table 1: Main variables and definitions

variable name	variable symbol	variable type	data source	variable definition
Cost of debt financing	FC	implicit variable	CSMAR	Total finance costs/liabilities
Digital Transformation Index	DT	independent variable	CSMAR	Digital transformation process measure of an organization's maturity and progress
Digitized outcome scores	DOS	independent variable	CSMAR	assess the actual results achieved by enterprises in the process of digital transformation
Enterprise size	size	control variable	CSMAR	Total assets are expressed in natural logarithms
asset-liability ratio	lev	control variable	CSMAR	Total liabilities/total assets
Whether or not the two posts combined	dual	control variable	CSMAR	the chairman and general manager of an enterprise are the same person
Nationalization Logo	SOE	control variable	CSMAR	Signs used in enterprises or assets to mark the nature of their property rights of a state nature
Return on Net Assets	ROE	control variable	CSMAR	Net Profit/Owner's Equity at the end of the period
R&D Investment	IN	control variable	CSMAR	R&D investment/revenue
Profitability	ROA	control variable	CSMAR	Net profit/total assets
Growth	Growth	control variable	CSMAR	Operating income at the end of the period / Operating income at the beginning of the period - 1
Company Market Capitalization	InValue	control variable	CSMAR	Market capitalization of the company takes the natural logarithm
Equity Concentration Indicator	CR10	control variable	CSMAR	Shareholding ratio of top ten shareholders

Table 1: (continued).

Operating Income	OR	control variable	CSMAR	Operating Income (natural logarithm)
Operating Cost	OC	control variable	CSMAR	Operating cost as natural logarithm
Shareholding Ratio of the Largest Shareholder	TOP	control variable	CSMAR	Proportion of shares held by shareholders with the highest shareholding ratio to the total share capital of the company
Cash Flow Ratio	CashFlow	control variable	CSMAR	Net cash flow from operating activities / operating income
Over-indebtedness	Excesslev	control variable	CSMAR	Difference between actual debt ratio and target debt ratio
Earnings per share	EPS	control variable	CSMAR	Net profit earned by the firm per ordinary share
Net assets per share	BVPS	control variable	CSMAR	Ratio of net assets of the enterprise to the total share capital of the company
Net cash flow per share	NCFPS	control variable	CSMAR	Total number of common shares outstanding/net cash flow
Net cash flow from operating activities per share	OCFPS	control variable	CSMAR	Net cash flow from operating activities/total common stock equity
Net cash flows from investing activities per share	ICFPS	control variable	CSMAR	Net cash flows from investing activities / weighted average number of ordinary shares
Net cash flows from financing activities per share	FCFPS	control variable	CSMAR	Net cash flows from financing activities / weighted average number of ordinary shares
Capital surplus per share	CSPS	control variable	CSMAR	Total capital surplus / total share capital
Surplus reserves per share	SRPS	control variable	CSMAR	Total surplus/total equity
Liabilities per share	TLPS	control variable	CSMAR	Total liabilities / Total equity
Undistributed earnings per share	REPS	control variable	CSMAR	Total unappropriated profit / Total equity

Table 2: Descriptive statistics of FC and DT (implicit variable)

Variable	Mean	Standard deviation	Min	Median	Max	Sample Size
FC	0.857	2.278	-8.809	1.145	5.292	4,588.000

Table 3: Descriptive statistics of FC and DT (independent variable)

Variable	Mean	Standard deviation	Min	Median	Max	Sample Size
DT	37.722	10.038	21.943	36.123	66.261	4,588.000
DOS	29.643	6.142	22.215	29.153	53.938	4,588.000

Table 4: Descriptive statistics of FC and DT (control variable)

Variable	Mean	Standard deviation	Min	Median	Max	Sample Size
size	23.046	1.438	20.308	22.948	26.951	4,588.000
lev	0.483	0.196	0.078	0.487	0.902	4,588.000
dual	0.210	0.407	0.000	0.000	1.000	4,588.000
SOE	0.834	0.372	0.000	1.000	1.000	4,588.000
ROE	0.031	0.186	-1.121	0.061	0.318	4,588.000
IN	3.785	3.858	0.010	3.100	20.980	4,588.000
ROA	0.026	0.063	-0.259	0.029	0.183	4,588.000
Growth	0.074	0.150	-0.294	0.060	0.662	4,588.000
InValue	23.377	1.234	21.139	23.240	26.964	4,588.000
CR10	36.413	15.138	10.390	33.997	74.890	4,588.000
OR	22.380	1.593	18.988	22.254	26.595	4,588.000
OC	22.070	1.681	18.426	21.959	26.425	4,588.000
TOP	36.175	15.147	10.320	33.430	74.890	4,588.000
CashFlow	0.112	0.164	-0.415	0.091	0.702	4,588.000
Excesslev	0.004	0.156	-0.350	0.003	0.412	4,588.000
EPS	0.441	0.858	-1.860	0.287	4.335	4,588.000
BVPS	6.029	4.552	0.485	4.835	27.783	4,588.000
NCFPS	0.166	0.829	-2.244	0.058	3.706	4,588.000
OCFPS	0.745	1.196	-1.741	0.449	6.719	4,588.000
ICFPS	-0.538	0.922	-4.743	-0.274	1.240	4,588.000
FCFPS	-0.034	1.068	-3.723	-0.100	4.111	4,588.000
CSPS	1.999	1.856	0.018	1.533	10.674	4,588.000
SRPS	0.317	0.298	0.015	0.228	1.844	4,588.000
TLPS	7.648	9.146	0.257	4.426	54.041	4,588.000
REPS	1.952	2.756	-3.349	1.393	13.890	4,588.000

In Table 2-4, it shows the descriptive statistics on the independent variable DT and the change in the dependent variable of the measure for the stability test DOS, the dependent variable and the control variables, with FC mean of 0.042 and variance of 0.398. A series of control variables are added to eliminate the errors caused by unobservant outliers. Among them, ROE and ROA are used to reflect the profitability of enterprises, and SOE represents different property rights, in which “0” represents non-nationalized enterprises without nationalization mark and “1” represents nationalized enterprises with nationalization mark. terms of the size of company, the research results show that under the condition of fixed individuals and time, the digital transformation of SMEs can significantly reduce their debt financing costs and pass the robustness test [15]. Therefore, firm size is also an important control variable in the research process. The proportion of shares held by the first largest shareholder (TOP), the equity concentration indicator (CR10) and whether there are two positions (dual) respond to the corporate governance structure, which also affects the cost of debt financing. Earnings per share among the per-share indicators is one of the most important information that listed companies must disclose, and it is an important basis for investors to evaluate the company's operating performance and management effectiveness, and to judge the company's dividend policy and future earnings potential [16].

3.3. Analysis of main regression results

Table 5: 2019-2022 DT and FC main regression results (independent variable)

implicit variable independent variable control variable	FC
DT	-0.017*** (-4.94)

Table 6: 2019-2022 DT and FC main regression results (control variable)

implicit variable independent variable control variable	FC
size	0.166* (1.75)
lev	9.029*** (13.68)
dual	0.100 (1.50)
SOE	-0.411*** (-5.08)
ROE	0.276 (0.98)
IN	-0.012 (-1.05)
ROA	-3.856*** (-3.31)
Growth	-1.147*** (-4.86)
InValue	-0.326*** (-4.37)
CR10	0.004 (0.55)
OR	-0.039 (-0.23)
OC	0.137 (0.96)
TOP	-0.020** (-2.41)
CashFlow	0.573* (1.86)
Excesslev	-2.216*** (-3.56)
EPS	0.249*** (3.17)
BVPS	0.102*** (4.41)
NCFPS	-0.034 (-0.42)
OCFPS	-0.044 (-0.55)
ICFPS	-0.052 (-0.62)
FCFPS	-0.010 (-0.13)
CSPS	-0.045** (-2.01)
SRPS	-0.821*** (-6.75)
TLPS	-0.068*** (-10.26)
Constant	0.849 (1.03)
Observations	4,588
Adjusted R-squared	0.422
INDUSTRY	YES
YEAR	YES

Note: Robustness standard deviation values in parentheses, *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively.

The main regression results in Table 5-6 show that the correlation coefficient between the digital transformation index DT and the cost of debt financing FC is -0.017*** and is significant at the 1% level, which indicates that DT and FC are negatively correlated, and the basic regression results are

ideal. The higher the degree of digital transformation of the enterprise, the more the cost of corporate financing can be reduced.

3.4. Robustness test

Robustness testing is widely used in empirical research in economics as an important method to improve the credibility of inferences [17]. Although the main regression based on the above digital transformation index and the cost of debt financing concludes that they are negatively correlated, in order to avoid the result error caused by a single independent variable as well as the fluctuation of part of the data, this paper adopts the following two ways to carry out the robustness test.

3.4.1. Delete some samples

In order to improve the accuracy and stability of the data, based on the sample of all A-share listed Chinese enterprises in 2019-2022 (excluding ST and financial industries), the data of 2019 and 2022 are deleted, and the main regression is re-conducted with the data of 2020 and 2021 to obtain the results as shown in Table 7.

Table 7: 2020-2021 DT and FC main regression results

	(1)	(2)
	FC	FC
DT	-0.0183*** (-3.561)	-0.0144*** (-2.642)
size	0.1397 (0.946)	0.0992 (0.687)
lev	9.1867*** (10.159)	9.8963*** (11.461)
dual	0.0815 (0.871)	0.1275 (1.328)
SOE	-0.3987*** (-3.247)	-0.4207*** (-3.324)
ROE	-0.0755 (-0.185)	0.2599 (0.688)
IN	0.0050 (0.301)	-0.0218 (-1.252)
ROA	-2.5819 (-1.633)	-3.6439** (-2.376)
Growth	-1.1428*** (-4.049)	-0.9902*** (-3.627)
InValue	-0.4213*** (-3.863)	-0.3255*** (-2.933)
CR10	0.0039 (0.433)	0.0089 (0.968)
OR	-0.1047 (-0.388)	0.1207 (0.452)
OC	0.2484 (1.095)	-0.0007 (-0.003)
TOP	-0.0199** (-2.212)	-0.0225** (-2.325)
CashFlow	0.7975* (1.866)	0.5442 (1.378)
Excesslev	-2.6480*** (-3.287)	-3.0238*** (-4.117)
EPS	0.2524** (2.242)	0.2908*** (2.739)
BVPS	0.1206*** (3.240)	0.0844** (2.257)
NCFPS	0.0751 (0.722)	-0.0078 (-0.078)
OCFPS	-0.1538 (-1.539)	-0.0468 (-0.448)
ICFPS	-0.1409 (-1.278)	-0.0281 (-0.264)
FCFPS	-0.1155 (-1.117)	0.0153 (0.149)
CSPS	-0.0485 (-1.363)	-0.0393 (-1.153)
SRPS	-0.8165*** (-3.976)	-0.8343*** (-3.988)
TLPS	-0.0704*** (-6.963)	-0.0644*** (-6.189)
REPS	-0.0940** (-2.243)	-0.0653 (-1.561)

Table 7: (continued).

Year	Yes	Yes
Ind	Yes	Yes
<i>N</i>	3331	3507
adj. R^2	0.400	0.418

Note: Standard deviations for robustness are in parentheses; *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

From the data in this table, it can be concluded that the digital transformation index and the cost of debt financing are negatively correlated and significant at the 1% level, which is consistent with the findings of the main regression in Table 5-6 and proves the robustness of the relationship.

3.4.2. Changing the measurement of the independent variables

As one of the important indicators to measure the results of enterprise digital transformation, the digital achievement score mainly includes digital innovation standards, digital innovation papers, digital innovation qualifications and digital national awards and other sub-indicators. By using the digital outcome score to measure the degree of enterprise digital transformation again, the broad concept of the independent variable digital transformation index is more detailed and specific to the outcome effect, and then conduct robustness tests. An in-depth analysis was conducted by main regressions (Table 8-9) on the results of the digitization scores.

Table 8: 2019-2022 DOS and FC main regression results (independent variable)

implicit variable independent variable control variable	FC
DOS	-0.013** (-2.35)

Table 9: 2019-2022 DOS and FC main regression results (control variable)

implicit variable independent variable control variable	FC
size	0.190** (2.00)
lev	8.878*** (13.39)
dual	0.102 (1.53)
SOE	-0.403*** (-4.97)
ROE	0.229 (0.82)
IN	-0.018* (-1.68)
ROA	-3.753*** (-3.22)
Growth	-1.155*** (-4.89)
InValue	-0.344*** (-4.61)
CR10	0.004 (0.51)
OR	-0.080 (-0.47)
OC	0.158 (1.11)
TOP	-0.018** (-2.28)
CashFlow	0.583* (1.90)
Excesslev	-2.148*** (-3.43)

Table 9: (continued).

EPS	0.263*** (3.36)
BVPS	0.101*** (4.36)
NCFPS	-0.028 (-0.34)
OCFPS	-0.050 (-0.62)
ICFPS	-0.067 (-0.80)
FCFPS	-0.020 (-0.26)
CSPS	-0.044* (-1.94)
SRPS	-0.806*** (-6.60)
TLPS	-0.067*** (-10.12)
REPS	-0.085*** (-3.26)
Constant	1.085 (1.32)
Observations	4,588
Adjusted R-squared	0.419
INDUSTRY	YES
YEAR	YES

Note: Robustness standard deviation values in parentheses, *, ** and *** indicate significant at the 10%, 5% and 1% levels, respectively.

While keeping other control variables unchanged, the digitalize achievement score of the changed independent variable is regressed with the financing cost again. The correlation coefficient between DOS and FC is -0.013**, indicating that the digitalis achievement score is negatively correlated with the financing cost and is significant at the 5% level. This once again proves that the higher the degree of an enterprise's digital transformation, the more it can reduce the enterprise's financing cost. When there are different control variables, the correlation of the control variables is consistent with those in Table 5-6, verifying that the higher the degree of an enterprise's digital transformation, the more it can reduce the financing cost.

3.5. Heterogeneity analysis

A causal relationship may not be the same for all individuals and all points in time, so it is necessary to examine how the strength of the causal relationship varies with the characteristics of the target and the reality of the situation, therefore, it is necessary to examine how the strength of a causal relationship varies depending on the characteristics of the subject and the reality of the situation[18].

Table 10: Heterogeneity analysis of property rights

	(1)	(2)
	SOE	NO-SOE
DT	-0.0162*** (-3.049)	-0.0212* (-1.777)
CVs、Year、Ind	Yes	Yes
<i>N</i>	3827	761
adj. <i>R</i> ²	0.426	0.412

Note: Standard deviations for robustness are in parentheses; *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

According to the nature of property rights, the sample enterprises are divided into state-owned enterprises and non-state-owned enterprises, and after passing the heterogeneity test it is concluded

from Table 10 that the digital transformation index is negatively correlated with the cost of debt financing for both state-owned enterprises and non-state-owned enterprises, which indicates that the digital transformation of enterprises can reduce the cost of debt financing for both types of enterprises. However, the DT -SOE correlation coefficient is -0.0162***, which is significant at the 5% level, while DT-NO-SOE correlation coefficient is -0.0212* at 10% significant level, there is a significant difference in significance. Increasing the digital transformation index of state-owned enterprises to reduce the cost of debt financing is more powerful when other control variables remain unchanged.

Table 11: Heterogeneity analysis of corporate governance structure

	(1)	(2)
	dual	NO-dual
DT	-0.0223** (-2.306)	-0.0144*** (-2.704)
CVs	Yes	Yes
Year	Yes	Yes
CVs , Year, Ind	Yes	Yes
N	964	3624
adj. R ²	0.419	0.428

Note: Standard deviations for robustness are in parentheses; *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

From the perspective of corporate governance structure, the heterogeneity test is categorized by whether the chairman and general manager have two positions. The negative correlation coefficients of DT with dual and NO-dual in Table 11 indicate that the higher the degree of digital transformation of the firm, the more the cost of debt financing is reduced, regardless of whether the two positions are combined or not. In the same way as the heterogeneity test for the nature of property rights, the significance level of DT with dual is at 5%, and with NO-dual at 10%, keeping the other control variables unchanged, increasing the digital transformation index reduces the cost of financing more for firms that are not dual-employed.

4. Conclusion

By analyzing the above variables of all Chinese A-share listed enterprises excluding ST and financial industries in 2019-2021, hypothesizing based on the conclusions of existing references and investigating with a double fixed effect model, the following important conclusions are drawn. First, an increase in the degree of corporate digital transformation can significantly reduce the cost of debt financing and confirms that the hypothesis is valid. Second, the robustness of firms' digital transformation in reducing the cost of debt financing is reaffirmed by deleting part of the sample and changing the measurement of the dependent variable. Finally, nationalizing the enterprise and abandoning the dual-employment approach can significantly contribute to the effect of enterprise digital transformation on reducing the cost of corporate debt financing.

References

- [1] Liu, Y., Cao, G.G. Research on total factor productivity improvement driven by enterprise digital transformation[J]. *Research Management*, 2025(1).
- [2] Derkinderen, F. G. J., Crum, R. L. Risk, Capital Costs, and Project Financing Decisions[J]. *Nijenrode Studies in Business*, 1981, 6.DOI:10.1007/978-94-009-8129-4.
- [3] Zheng M. Study on Financing Preferences of Chinese Listed Companies [D]. East China Normal University [2025-02-21].DOI:10.7666/d.y895729.

- [4] Tian, J. W. Investigation on the Financing Cost of Enterprises [J]. *Gansu Agriculture*, 2005(11):1.DOI:10.3969/j.issn.1673-9019.2005.11.13
- [5] Liao L., Zhu Z.Q. An Empirical Study on the Cost of Equity and Debt Financing of Chinese Listed Companies [J]. *China Industrial Economics*, 2003(6):7.DOI:10.3969/j.issn.1006-480X.2003.06.009.
- [6] Song W. Determination of the Degree of Equity Financing and Debt Financing[J]. *Heilongjiang Foreign Trade and Economic Cooperation*, 2003(9):2. DOI:CNKI:SUN:HLJW.0.2003-09-005.
- [7] Liu H. Influencing factors of corporate debt financing cost[J]. *Science and Technology Economic Market*, 2020(4): 2. DOI:CNKI:SUN:KJJC.0.2020-04-023.
- [8] Tan, J., Chan, K. C., Chen, Y. The impact of air pollution on the cost of debt financing: Evidence from the bond market[J]. *Business Strategy and the Environment*, 2022, 31(1): 464-482.DOI:10.1002/bse.2904
- [9] Gupta, S., Modgil, S., Bhushan, B., Kamble, S., & Mishra, J. Digital innovation and transformation capabilities in a large company. *Expert Systems*, 41(7). <https://doi.org/10.1111/exsy.13452>
- [10] Baiyere A, Salmela H, Nieminen H, Kankainen T. Assessing digital capabilities for digital transformation - The MIND framework[J]. *International Journal of Information Systems and Project Management*, 2024.
- [11] Liu, M. S., Shao, Q, Ruan Q.S. Research on the Impact of Digital Transformation on Corporate Debt Financing Cost[J]. *Research on Financial Issues*, 2023(1):10. DOI:10.19654/j.cnki.cjwtyj.2023.01.006.
- [12] Xu, Y.X., Ke, J.Q., Liu, J.N., et al. Research on the impact of enterprise digital transformation on the cost of debt financing[J]. *Macroeconomic research*, 2023(4):14-26.
- [13] Du, S.Z., Ma, L.F. How the Speed of Digital Transformation Affects Corporate Debt Financing [J]. *Auditing and Economic Research*, 2024, 39(2):52-62. DOI:10.3969/j.issn.1004-4833.2024.02.006.
- [14] Guan, Y.M., Xiao, X. Disclosure of environmental information on the impact of debt financing costs and corporate credit scale — An empirical study based on listed companies in heavily polluted industries in Shanghai [J]. *International Business Accounting*, 2018(5):8.DOI:CNKI:SUN:CWJC.0.2018-05-005.
- [15] Zhang H., The Impact of Digital Transformation on the Debt Financing Costs of Small and Medium-Sized Enterprises[J].*iBusiness*, 2024, 16(4):21.DOI:10.4236/ib.2024.164014.
- [16] Zhang X. Z. On the Calculation of Earnings Per Share Indicator[J]. *Business Finance and Accounting*, 2003.DOI: CNKI:SUN:SYCH.0.2003-05-017.
- [17] Liu, M., Song Y. L. Robustness testing methods in empirical research in economics--an interpretation based on the perspective of test logic[J]. *Statistics and Decision Making*, 2023, 39(12):45-50. DOI:10.13546/j.cnki.tjyjc.2023.12.008.
- [18] Jiang, T. Mediating and moderating effects in empirical studies of causal inference[J]. *China Industrial Economy*, 2022, (05): 100-120. DOI:10.19581/j.cnki.ciejournal.2022.05.005.